# Appendix 2-1: Water Management Plan (AGS)

Knight Piésold CONSULTING

Management System Certified By: bsi ISO 9001 Quality Management Systems CERTIFIED FS 64925 | ISO 14001 Environmental Management CERTIFIED EMS 550121 | ISO 45001 Occupational Health and Safety Management CERTIFIED OHS 550122

**December 2, 2025**

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Isaac Sam
Mine Manager
Canada Fluorspar (NL) Inc.
1 Clarke's Pond Road
St. Lawrence, Newfoundland and Labrador A0E 2V0
Canada

Dear Isaac,

## RE: 2025 Site Water Management Plan

## 1.0 INTRODUCTION

Canada Fluorspar (NL) Inc. is currently re-commissioning the St. Lawrence Fluorspar Project (the Project) into an operating mine site. The Project will include updates to the following infrastructure (Figure 1):

- Open Pits
- North Waste Rock Facility
- South Waste Rock Facility
- Overburden Stockpile
- Mine Haul Roads
- AGS Mill Site
- Tailings Management Facility

Knight Piésold (KP) previously prepared the site wide water management plan and water balance update for the Project in February 2017 (KP, 2017) based on the site infrastructure at that time. Given the new infrastructure and modified existing infrastructure in the upcoming mine development plan, KP was requested to update the site wide management plan to include for the components listed above. The proposed site wide water management strategy for the Project is focused on achieving the following:

- Ensure all discharge from the project complies with the site water quality objectives (Schedule A and the Certificate of Approval; C of A) (Government of Newfoundland and Labrador; 2003, and 2016)
- Provide sufficient water to support milling operations
- Minimize impacts on the surrounding watersheds
- Provide flexibility and allow for future adaptation to actual conditions

This letter summarizes the proposed water management plan update for the site. The plan includes a description of the impacted watersheds, a summary of water sources and the site wide water balance, and the preliminary design details of the proposed stormwater management measures.

## 2.0 EXISTING WATERSHEDS

The following watersheds will be directly impacted by the proposed updates to the St. Lawrence Fluorspar Project development:

- **Salt Cove Watershed:** This approximately 2,465 ha watershed contains both Hay Pook Pond and Long Pond, and drains towards the south, outleting along the south shore of the peninsula. The previously mined Tarefare and Director Veins are located within the Salt Cove Watershed. Project components within the Salt Cove Watershed include the Tailings Impoundment, Polishing Pond, and the majority of the AGS Mill Site infrastructure. It is estimated that the project development will impact approximately 43.6 ha of the Salt Cove Watershed.
- **Upper Island Pond Watershed:** This approximately 230 ha watershed contains Upper Island Pond and drains towards the south, outleting along the south shore of the peninsula. Project components within the watershed include small portions of the AGS Mill Site, Maintenance shop, South Waste Rock Facility and the combined AGS Pit. It is estimated that the project development will impact approximately 14.9 ha of the Upper Island Pond Watershed.
- **Northwestern Pond Watershed:** This approximately 38 ha watershed drains towards the west, outleting at a small cove south of Mine Cove. Project components within the watershed include portions of the combined AGS Pit and the South Waste Rock Facility. It is estimated that the project development will impact approximately 13.8 ha of the Northwestern Pond Watershed.
- **Mine Cove Watershed:** This approximately 163 ha watershed contains several small creeks that drain towards the west into Little Lawn Harbour. The creeks range in length from 0.06 km to 1.3 km and are considered to be intermittent or seasonal streams (i.e. flowing only part of the year or immediately after precipitation events). Project components within the watershed will include portions of the combined AGS Pit, North Waste Rock Facility and the Overburden Stockpile. It is estimated that the project development will impact approximately 14.2 ha of the Mine Cove Watershed.
- **Grebes Nest Watershed:** This approximately 507 ha watershed contains Grebes Nest Pond and John Fitzpatrick Pond. Grebes Nest Pond will be dewatered and removed as part of the project development. Project components within the watershed will include portions of the combined AGS Pit, Overburden Stockpile, North Waste Rock Facility and the South Waste Rock Facility. This watershed drains towards the northwest towards Little Lawn Harbour. It is estimated that the project will impact approximately 58.4 ha of the Grebes Nest Watershed.

The layout and extent of the watersheds relative to the proposed project are illustrated on Figure 2.

## 3.0 WATER SOURCES

The following water will be managed as part of the site wide water management strategy:

- **Precipitation and Runoff:** Majority of the water that will require management at the Project will be generated by direct precipitation on ponds and runoff from other infrastructure within the various catchment areas. The project footprint has been divided into several sub-catchment areas to estimate the volumes of runoff originating from each part of the site footprint (Figure 3). The average precipitation for the St. Lawrence Fluorspar Project has been estimated by KP based on regional data and the results are summarized in Table 1.

**Table 1 Average Precipitation**

| Location | Desc. | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annu. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| St. Lawrence Climate Station (48.5 masl) | Mean | 128 | 120 | 119 | 112 | 115 | 119 | 106 | 118 | 132 | 142 | 149 | 139 | 1499 |
| Project Site Estimate | Mean | 154 | 143 | 137 | 134 | 132 | 137 | 126 | 138 | 164 | 179 | 173 | 164 | 1785 |
| | % Monthly Precip. | 9% | 8% | 8% | 7% | 7% | 8% | 7% | 8% | 9% | 10% | 10% | 9% | 100% |

**Note(s):**

1. Data used for the analysis are from Environment Canada "National Climate Data and Information Archive" (www.climate.weatheroffice.gc.ca); daily data from the St. Lawrence climate station (ID: 8403619) from 1967 to 2024.
2. Average annual precipitation is estimated based on the sum of the average monthly precipitation.
3. The project site values are based on a 20% uplift of the St. Lawrence values. This uplift accounts for gauge undercatch and is consistent with the procedure outlined by Mekis and Vincent (2011).

A review of the updated climate data available to 2024 indicates that the expected Extreme rainfall events are 2% to 11% lower than the values derived in 2016. With consideration that climate change can impact the extreme event values by 2 to 15% depending on the model adopted it is recommended that the previous 2016 design values be maintained. Extreme 24-hour precipitations are estimated in the site hydrometeorology report (KP, 2016a) and summarized below in Table 2.

**Table 2 Extreme Rainfall Events Summary**

| Return Period (years) | Rainfall (mm) |
|---|---|
| 2 | 71 |
| 5 | 90 |
| 10 | 103 |
| 15 | 110 |
| 20 | 115 |
| 25 | 119 |
| 50 | 130 |
| 100 | 142 |
| 200 | 154 |
| 500 | 169 |
| 1,000 | 180 |
| PMP | 419 |

- **Groundwater Inflow:** The rate of groundwater inflow into the Open Pits is estimated as 4,000 $m^3$/day (167 $m^3$/hr) based on work completed by Golder Associates (Golder, 2016). The groundwater will be collected by sump in the base of the open pit (sub-catchments 101) and pumped to Sediment Basin 1 (SB-01). Groundwater inflow will generally be discharged to John Fitzpatrick Pond via SB-01.

- **Mill Process Water:** The Mill will reclaim 74 $m^3$/hr of water for use in the process (CFI, 2024). During normal operations, this water will be taken from the future water treatment plant, which feeds from the Polishing Pond. The Mill will output an average of 145 $m^3$/hr of supernatant water with the tailings to the Tailings Impoundment (CFI, 2024).
- **John Fitzpatrick Pond Intake:** Potable water will continue to be required for use in the Mill dry and other facilities. A freshwater intake is established at the south shore of John Fitzpatrick Pond to provide approximately 3 $m^3$/hr of water. The water will be filtered and treated within the Mill as required to produce acceptable potable water and to meet all applicable health and safety regulations.
- **Tarefare:** A well has been established within a historic mining shaft located approximately 1.5 km southeast of the Mill site. This well will be used to provide clean water as required for process at an average rate of 69 $m^3$/hr.

# 4.0 SITE WIDE WATER BALANCE

## 4.1 GENERAL

In general, all non-contact water (runoff from clean overburden, undisturbed areas, revegetated areas) will be diverted away from the project work areas to the maximum practical extent. All potentially impacted waters (excess from the tailings and process, open pit workings, waste rock dumps, Mill Site, and ore stockpiles) will be collected, temporarily stored, monitored, and then released to the environment once it can be demonstrated the water meets the water quality objectives (Schedule A and the C of A). In order to estimate the volumes of water that will be managed, a series of water balances have been completed. The details of the water balances are described in the following sections.

## 4.2 WATER BALANCE MODELS

The water balances were completed as three separate models:

- **Mill Water Balance:** This model was prepared by CFI (2024) to estimate the water requirements and discharges of the Mill. The model was carried out as a static water balance with the current best estimate of the water requirements for each component of the Mill.
- **AGS East Tailings Management Facility (TMF) Water Balance:** This water/solids balance model was previously prepared by KP to estimate the monthly water surplus and/or deficit in the proposed TMF (includes the Tailings Impoundment and Polishing Pond) and in the Mill Site Event Pond. The details of this water balance are provided in KP (2016b). The water balance flowsheets were revised to include the new overall mine footprint differences however, the flow paths have not changed since the last issued flowsheets in 2019 (KP, 2019). The results of the revised TMF water balance are presented in schematic form in the attached flowsheet (Figure 4).
- **Mine Site Water Balance:** This water balance model was prepared by KP to estimate the monthly water volumes reporting to the Sediment Basins, which will be available for use as process water and the volumes of water that will be released to the environment once the majority of sediment is settled out. The need for make-up water to be obtained from an outside source was also considered as part of this water balance. The results of the revised Mine site water balance are presented in schematic form in the attached flowsheet (Figure 5). Details regarding this Mine Site Water Balance model are provided below.

### 4.3 MINE SITE WATER BALANCE INPUTS AND METHODOLOGY

The objectives of the Mine Site Water Balance are to:

- Estimate available contact water to be collected and available for commissioning and initial operations of the Mill
- Estimate the volumes of water reporting to each of the main facilities and the discharge volume to the environment

The main facilities included in the Mine Site Water Balance are listed as follows:

- Sediment Basins 1 to 6 (SB-01 to SB-06)
- John Fitzpatrick Pond Discharge
- Combined AGS Pit
- Overburden Stockpile
- South Waste Rock Facility
- North Waste Rock Facility

In addition to the facilities listed above, there are several undisturbed sub-catchment areas, adjacent to the facilities that also contribute runoff and are included in the water balance. The sub-catchment boundaries and relevant infrastructure is shown on Figure 3.

The water balance was developed for average precipitation conditions, using monthly time steps. The water balance was completed for the 25 year mine life (2025 to 2050).

The following design criteria used in the water balance model are based on the site characterization work previously completed by KP and information provided by others.

- The mean annual precipitation for the site is estimated to be 1,785 mm (KP, 2016a).
- Potential evapotranspiration is estimated to be 522 mm annually based on the Thornthwaite and Hargreaves equations (KP, 2016a).
- Sublimation is estimated to be 53 mm annually (KP, 2016a).
- Catchment areas associated with the project site are approximate and were delineated using available topographic survey information and the proposed project site layout. Primary catchment area boundaries delineated for this water balance are shown on Figure 2. The sub-catchment area boundaries within the direct footprints of the various infrastructure are shown on Figure 3. The catchment area land covers are comprised of a combination of undisturbed areas, pond areas, open pits, and stockpiles.
- The runoff coefficients have been assigned based on the sub-catchment area land covers and flow records (KP, 2016a). The utilized runoff coefficients are as follows:
    - Ponds: 1.0.
    - Upstream Catchments (including Overburden Stockpile, North Waste Rock Facility and South Waste Rock Facility): 0.41 to 1.33 (above 1.0 during spring freshet to account for snowpack melting).
    - Evaporation volumes were assumed to be negligible as there will normally be little to no water in the Sediment Basins at any given time.

Volumes of runoff were estimated based on the sub-catchment areas as shown on Figure 3, the monthly precipitation, and the design criteria listed above.

### 4.4 RESULTS

An estimated average hourly, monthly, and annual flow sheet summarizing the Mine Site Water Balance for a typical operating year (2029) is shown on Figure 5.

Based on the water management strategy for the project and the results of the water balance models, it is estimated that sufficient water will be available from the AGS TMF to support milling operations during the life of the project. The strategy is sufficient to support the initial years of operations up to the development of the underground mine. If required under extreme dry periods, make-up water can be sourced from the Open Pits, Sediment Basins, or potentially from John Fitzpatrick Pond.

## 5.0 WATER MANAGEMENT MEASURES

### 5.1 GENERAL

A series of water management measures will be required to manage the various water sources at site (e.g. runoff from the Open Pits, North and South Waste Rock Stockpiles, groundwater inflow to the Open Pits). The proposed water management measures at the St. Lawrence Fluorspar Project site include Collection Ditches, Diversion Ditches, low height berms, pumps and pipelines, and Sediment Basins. If required, disturbed areas on site will be regraded to promote drainage and to direct runoff to the runoff management measures. The design criteria and details for each of the measures are summarized in the sections below. Details regarding water management measures for the TMF and Mill Site were previously provided under separate cover (KP, 2016b and c).

### 5.2 DIVERSION AND COLLECTION SYSTEMS

#### 5.2.1 DIVERSION/COLLECTION DITCHES

Ditches will be established around the Open Pits, North and South Waste Rock Stockpiles, and Overburden Stockpile. The ditches have been divided into two groups: Collection Ditches and Diversion Ditches. Collection Ditches will collect and convey runoff (contact water) towards a water management basin or sump. Diversion Ditches will direct runoff (non-contact water) from undisturbed areas away from the water management area, directly to the environment. In general, the design criteria for both of the collection and diversion ditches are the same. Key design criteria for the ditches are as follows:

- Sufficient capacity will be provided to convey the peak inflow resulting from the 1 in 100 year, 24-hour rainfall event.
- Ditches will generally be trapezoidal channels either excavated into the existing overburden or shallow blasts into the near surface bedrock.
- Jute mesh and/or riprap will be installed within the ditches as required to provide erosion protection
- Sediment traps in the form of straw bales, silt fencing and/or clean, coarse rock berms will be established along the ditches as required to minimize sediment transportation.

Typical details for the ditches are included on Figure 6. Final sizing and erosion protection requirements will be confirmed for each ditch prior to construction.

#### 5.2.2 LOW HEIGHT BERMS

Low height berms will be constructed between the Collection Ditches and Diversion Ditches located to the south of the South Waste Rock Stockpile as required in order to help separate contact from non-contact

runoff water. Low height berms will also be constructed, as required, around the Open Pits to help divert runoff away from the pits.

A typical section for the low height berms is included on Figure 6. The berms will be constructed of nominally compacted random fill placed directly on the surface of existing overburden, shallow blasted channels or site grading material. The low height berms will be approximately 0.6 m high, and their locations will depend on the topography of the area. Depending on the anticipated flows reporting to each berm, the low height berms will either be covered with a thin layer of organics (0.15 m typically) and reseeded or covered with riprap.

## 5.3 TEMPORARY STORAGE SYSTEMS

### 5.3.1 GENERAL

The primary concern related to the mine site water management at this project will be sediment loading. Schedule A requires that discharge be limited to 30 mg/L TSS. As a result, water management will include a number of sediment basins designed to reduce the suspended solids in the collected water. All contact runoff from disturbed project areas will be routed to a basin for clarification prior to discharge to the environment.

The basins include the existing Tailings Impoundment, Polishing Pond, and Mill Site Events Pond, as well as newly proposed Sediment Basins SB-01 through SB-06. The Tailings Impoundment and the Polishing Pond are described in detail in KP (2016b), while the Mill Site Event Pond is described in detail in KP (2016c). Sediment Basins SB-01 through SB-06 are described below.

### 5.3.2 RUNOFF VOLUMES AND PEAK RUNOFF FLOWS

The design storm events for the Sediment Basins were selected as the 1 in 10 year, 24-hour rainfall event (103 mm; KP, 2016a). This is the design storm event for temporary storage of collected runoff in each of the basins.

The total storm volumes (1 in 10 year, 24-hour storm event) was then used to estimate the storage capacity required for each basin. Table 3 provides a summary of the estimated runoff volumes (1 in 10 year, 24-hour storm event) reporting by gravity to each of the Sediment Basins. Flows reporting by pumping have been excluded as it is expected pumped flows can be managed in the days following and extreme rainfall.

**Table 3 Sediment Basins - Summary of Runoff Volumes**

| Sediment Basin | Runoff Volume (1 in 10 year, 24-hour storm event) ($m^3$) |
|---|---|
| SB-01 | 21,000 |
| SB-02 | 10,000 |
| SB-03 | 37,000 |
| SB-04 [2] | 29,000 |
| SB-05 | 6,000 |
| SB-06 | 11,000 |

**Note(s):**

1. Flows include direct runoff only, pumping from basin to basin would be halted following extreme rainfall events in order to manage containment.
2. In an extreme rainfall SB-04 would overflow into the pit and as such the size of SB-04 maybe reduced based on the space available.

### 5.3.3 SEDIMENT BASIN DETAILS

In general, with the exception of SB-04 all basins will be sized to temporarily contain the design runoff volume reporting by gravity to each basin. The runoff volumes have been estimated for the 1 in 10 year, 24-hour event (rain only). Temporarily storing this runoff will allow the majority of the suspended solids to settle out prior to the runoff discharging to the environment. The preliminary basin sizes have been based on the following criteria:

- Minimum Operating Pond Level (Min OPL): 1 m dead storage for sediment accumulation and permanent water cover
- Maximum Operating Pond Level (Max OPL): 3 m above the Min OPL
- The difference between the Max OPL and Min OPL is the operating pond volume which is approximately equal to the volume of runoff estimated to report to the basin as a result of the 1 in 10 year, 24-hour design event
- Maximum Flood Water Level (Wet Freeboard): 0.5 m above the Max OPL
- Dry Freeboard: 0.5 m above the Max OPL
- Maximum Basin Depth: 45 m (basins will be constructed with a combination of cut and fill berms)
- Maximum Berm Side Slopes: 2H:1V (excavation and fill slopes)
- A summary of the preliminary basin dimensions is provided in Table 4

**Table 4 Preliminary Basin Dimensions**

| Sediment Basin | Design Volume [1] ($m^3$) | Storage Depth (m) [2] | Total Depth [3] (m) | Top Width [4] (m) | Top Length [4] (m) |
|---|---|---|---|---|---|
| SB-01 | 21,000 | 3 | 5 | 50 | 200 |
| SB-02 | 10,000 | 3 | 5 | 40 | 140 |
| SB-03 | 37,000 | 3 | 5 | 100 | 170 |
| SB-04 [5] | 29,000 | 3 | 5 | 60 | 230 |
| SB-05 | 6,000 | 3 | 5 | 30 | 110 |
| SB-06 | 11,000 | 3 | 5 | 40 | 150 |

**Note(s):**

1. Design storage capacity excludes freeboard and dead storage. The capacity has been selected based on a 1 in 10 year 24 hr rainfall event.
2. Storage Depth excludes freeboard and dead storage.
3. Depth includes freeboard, dead storage, and operating capacity.
4. Dimensions are provided to the inside crest of the berm; Actual design capacities are to be verified based on site topography.
5. Dimensions of SB-04 may be reduced as required to account for space available.

Most basins will be unlined but will either be covered with a layer of organics and jute mesh or the upstream face of the perimeter berms will be covered in rockfill for erosion protection. SB-04 adjacent to the pit will be lined if required to minimize seepage into the pit. Details of the lining will be confirmed following field adjustment of the location.

All basins will be equipped with overflow spillways to convey flows greater than the 1 in 10 year, 24 hour event to the downstream environment in a controlled manner. The spillways will be sized with sufficient capacity to pass the flows resulting from a 1 in 100 storm event. Each spillway will consist of a trapezoidal channel constructed over the crest of the basin berm and down the outer slope of the berm. Each spillway channel will be lined with riprap underlain by non-woven geotextile. A riprap apron will be constructed as required at the base of the spillway channel outlet to dissipate energy and to minimize erosion. Typical sections and details for the basins and spillways are shown on Figure 6.

All basins have been sized to temporarily contain the runoff from the 1 in 10 year, 24-hour rainfall. The capacity of SB-04 may be reduced to suit the space available on site as any resulting outflows would be contained by the open pits. This time period should allow for the settlement of the majority of suspended solids. If required, settling aids can be used to assist with the settling of particles.

## 6.0 SUMMARY AND RECOMMENDATIONS

It has been estimated that sufficient water will be available from the AGS TMF to support milling operations during the life of the project. This conclusion is based on the water management strategy presented above and the results of the site wide water balance models. Make-up water will generally be sourced from the former Tarefare mine as required to provide fresh water to the process.

Excess water will generally be discharged to the environment throughout each year provided that the water quality is adequate for release.

The following recommendations are provided to aid in implementation of an effective water management plan.

- Environmental monitoring should be carried out as outlined within the Environmental Effects Monitoring Plan (CFI, 2016a).
- The Project's Environmental Protection Plan (CFI, 2016b) must also be adhered to (in addition to the measures outlined in this memo).
- Additional supplies such as pumps, hoses, filter bags, silt fencing, and straw bales should be made available on site during construction to allow for rapid implementation of remedial measures in the event that the target discharge water quality objectives are not met. Settling aids such as flocculant may also be considered. The selection and use of appropriate flocculant will be carried out in consultation with the appropriate government regulators.
- Construction of the major sediment and erosion control measures (ditches and sediment basins) should be overseen by a qualified person. The installation of these measures should be documented in an as-built summary letter and/or report.
- The sites OMS manual should be updated to include the proposed stormwater management measures. All stormwater management measures should be inspected on a regular basis. Additional inspections will be required following large storm events and after freshet. Inspections will focus on recognizing any accumulation of sediment or debris that will reduce flow capacity and prevent runoff from flowing freely through the structures. If significant amounts of sediment or debris are present, it should be removed as soon as practically possible. Any removed material should be placed in a designated area and in such a way to prevent it from impacting any of the stormwater management structures.
- The water balances should be updated annually as new data becomes available (i.e. process flows, rainfall records, flow measurements, water levels, etc.).

## 7.0 REFERENCES


Canadian Fluorspar Inc. (CFI), 2024. *Mine Development Plan.* June. Rev 1.

Golder Associates (Golder), 2016. *Fluorspar Mine Site - Numerical Groundwater Flow Modelling of Groundwater Inflow and Drawdown*. January 29. Report Number: 0066-1407707 RA, Rev A.

Knight Piésold Ltd. (KP), 2016a. *Preliminary Hydrometeorology Report*. January 27. Vancouver, British Columbia. Ref. VA101-642/2-1, Rev 0.

Knight Piésold Ltd. (KP), 2016b. *AGS East Tailings Management Facility Design Summary.* May 9. North Bay Ontario. Ref. No. NB101-642/1-1, Rev 0.

Knight Piésold Ltd. (KP), 2016c. Memorandum to: Mr. Stefan Gueorguiev. Re: *Mill Site Event Pond Design Summary.* April 25. North Bay, Ontario. Ref. No. NB16-00185 (NB101-642/21).

Knight Piésold Ltd. (KP), 2017. Memorandum to: Mr. Frank Pitman. Re: *St. Lawrence Fluorspar Project - Site Wide Water Management Plan (Updated)*. February 1. North Bay, Ontario. Ref. NB17-00065 (NB101-642/15).

Knight Piésold Ltd. (KP), 2019. Transmittal to: Shelly Adams, CFI. Re: *Draft Water Balance Figures CFI, 643/23.* June 4. North Bay, Ontario. Ref. No. NB19-00450 (NB101-642/23).

Mekis, É and L.A. Vincent, 2011. *An overview of the second generation adjusted daily precipitation dataset for trend analysis in Canada*. Atmosphere-Ocean, 49 (2), 163-177.

Yours truly,
**Knight Piésold Ltd.**

REGISTERED PROFESSIONAL ENGINEER
PEGNL
JOHN ALEX MCINTYRE
SIGNATURE
DATE
NEWFOUNDLAND & LABRADOR

Prepared: Maxine Piché, P.Eng.
Project Engineer

Reviewed: Alex McIntyre, P.Eng.
Senior Engineer

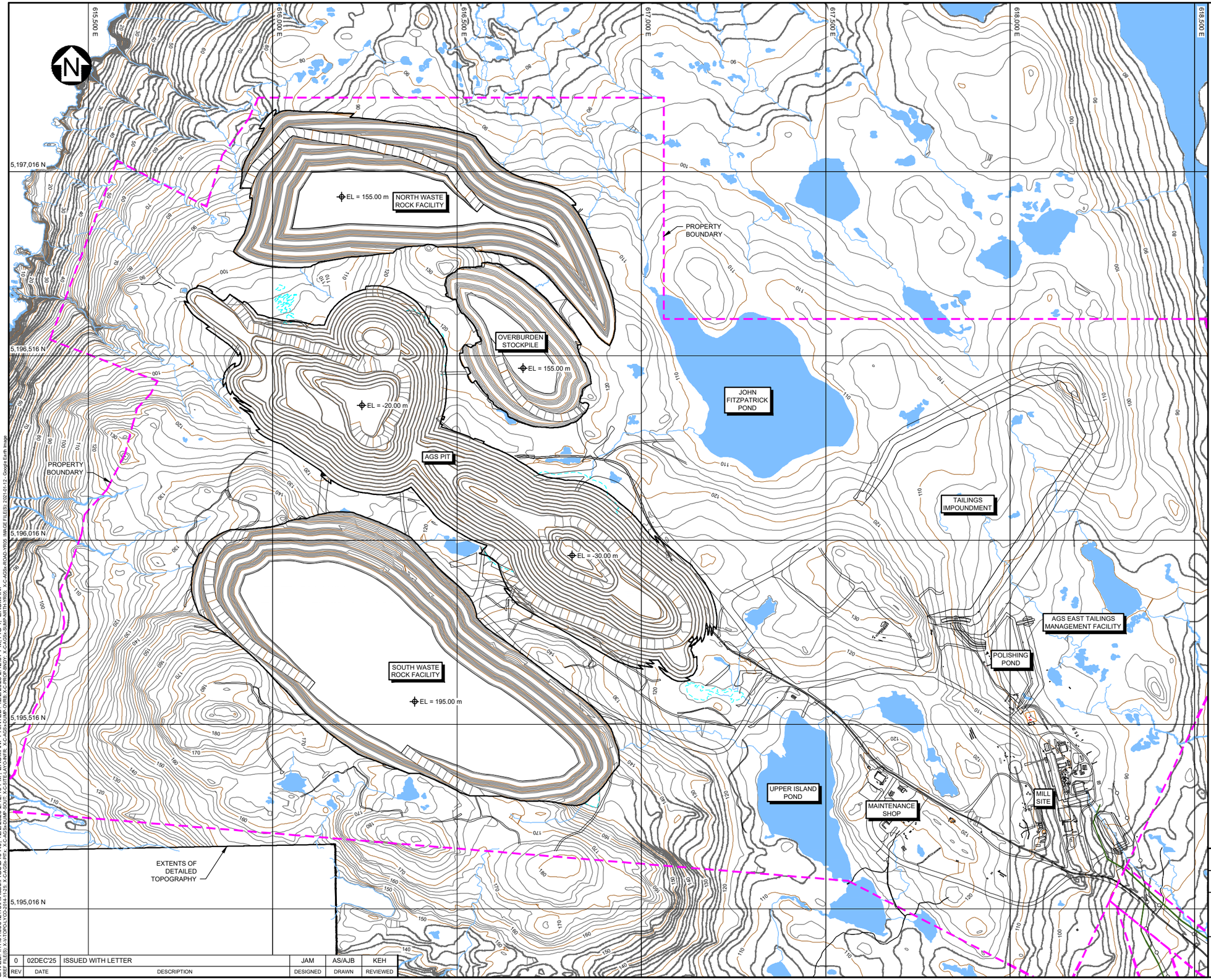
Approval that this document adheres to the Knight Piésold Quality System:

PROVINCE OF NEWFOUNDLAND AND LABRADOR
PEGNL
PERMIT HOLDER
This Permit Allows
KNIGHT PIESOLD LTD.
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEGNL 0738
which is valid for the year 2025

**Attachments:**

| | |
|---|---|
| Figure 1 Rev 0 | General Arrangement |
| Figure 2 Rev 0 | Watershed Boundaries |
| Figure 3 Rev 0 | Operational Water Management Plan |
| Figure 4 Rev 0 | AGS East Tailings Management Facility - Water Balance Flowsheet - Average Conditions |
| Figure 5 Rev 0 | Mine Site - Water Balance Flowsheet - Average Conditions |
| Figure 6 Rev 0 | Ditches, Berms and Sediment Basins - Typical Sections and Details |

/jam




**LEGEND:**

- WATER
- RIVER/STREAM/DRAINAGE

**NOTES:**

1. COORDINATE GRID IS UTM NAD83 ZONE 21.
2. TOPOGRAPHY BASED ON INFORMATION PROVIDED BY LYCOPODIUM, NOVEMBER 4, 2015. PIT AND DUMPS WERE PROVIDED BY PIRAN MINING LTD. JUNE 24, 2024.
3. CONTOUR INTERVAL IS 2 METRES.
4. ELEVATIONS ARE IN METRES.

SCALE A: 100 50 0 100 200 300 400 500 m

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
| 0 | 02DEC'25 | ISSUED WITH LETTER | JAM | AS/AJB | KEH |

CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**GENERAL ARRANGEMENT**

Knight Piésold CONSULTING

P/A NO. NB101-642/43

REF NO. NB25-01357

**FIGURE 1**

REV 0

SAVED: I:\1101\006\243\AA\acad\FIGS\B16 R0, 12/2/2025 2:12:10 PM, EROMANI PRINTED: 12/2/2025 2:12:37 PM, FIG 1, EROMANI
XREF FILE(S): X-V-TOPO-LY-CO-2014-11-25, XC-AGSs-mm, XC-AGSs-DUMP-SOUT, XC-SITE-LAYO-NFR, XC-AGS-s-DUMP-OVRB, XC-PROP-BNDY, XC-AGSs-DUMP-NRTH-YR05, XC-AGSs-ROAD-YR05 IMAGE FILE(S): 2021-01-12 - Google Earth Image

615,000
616,000
618,000
619,500
621,000
622,500
624,000
625,500
5,197,500
5,196,000
5,194,500
5,193,000
N
WINTER POND
GREBES NEST WATERSHED
220 HIGHWAY
ST. LAWRENCE
MEMORIAL DRIVE
PARK
RVIEW AVENUE
MARION DRIVE
WATER STREET EST
LAURENTIAN AVENUE
DOCTORS POND
JONES POND
MINE COVE
BLACK DUCK POND
LONG POND
HAY POOK POND
MINE COVE WATERSHED
NORTH WASTE ROCK FACILITY
NORTHWESTERN WATERSHED
JOHN FITZPATRICK POND
AGS TAILINGS STORAGE FACILITY
OPEN PITS
SALT COVE WATERSHED
DIRECTOR DRIVE
BLAKES POND
CLARKES POND
POLLUX CRESCENT
TOPSOIL STOCKPILES
SOUTH WASTE ROCK FACILITY
CRUSHED ORE STOCKPILE
MAINT. SHOP
MILL SITE
UPPER ISLAND POND
IRON SPRING ROAD
MINWORTH TAILINGS DAM
UPPER ISLAND POND WATERSHED
HARES EARS POND
ISLAND POND
SALT COVE
250 125 0 250 500 750 1,000 1,250 1,500 m
SCALE

**LEGEND:**

- BUILDINGS
- EXISTING ROAD
- PROPOSED POWERLINE
- PRE-DEVELOPMENT WATERSHED BOUNDARIES
- EXISTING MINWORTH TAILINGS
- WATER

**NOTES:**

1. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: NAD 1983 UTM ZONE 21N.
2. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009). ALL RIGHTS RESERVED.
3. CONTOUR INTERVAL IS 50 METRES.
4. PLAN BASED ON INFORMATION PROVIDED BY CFI, DECEMBER 2, 2015. PLANT SITE, PORT LOCATIONS, PROPOSED ROADS BASED ON INFORMATION PROVIDED BY GEOMATICS, NOVEMBER 23, 2015. DUMPS AND PITS BASED ON INFORMATION PROVIDED BY AGP JANUARY 15, 2016.

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CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

# WATERSHED BOUNDARIES

Knight Piésold CONSULTING

P/A NO. NB101-642/43

REF NO. NB25-01357

FIGURE 2

REV 0

615,500 E
616,000 E
616,500 E
617,000 E
617,500 E
618,000 E
618,500 E
5,197,016 N
5,196,516 N
5,196,016 N
5,195,516 N
5,195,016 N

MINE COVE WATERSHED
NORTHWESTERN POND WATERSHED
GREBES NEST WATERSHED
UPPER ISLAND POND WATERSHED
SALT COVE WATERSHED

SUMP
SUMP
SUMP
PROPERTY BOUNDARY
PROPERTY BOUNDARY

303
NORTH WASTE ROCK FACILITY
201
102
OVERBURDEN STOCKPILE
103
101
301
302
401
SOUTH WASTE ROCK FACILITY
402
501
601

SB-01
SB-02
SB-03
SB-04
SB-05
SB-06

AGS PIT
NEW WELL LOCATION

JOHN FITZPATRICK POND
TAILINGS IMPOUNDMENT
AGS EAST TAILINGS MANAGEMENT FACILITY
POLISHING POND
UPPER ISLAND POND
MAINTENANCE SHOP
MILL SITE

EXTENTS OF DETAILED TOPOGRAPHY

**LEGEND:**

- WATER
- FORMER POND EXTENT
- RIVER/STREAM/DRAINAGE
- DIVERSION PATHWAY/DIVERSION DITCH
- COLLECTION DITCH
- PROPERTY BOUNDARY
- WATER MANAGEMENT PUMP AND PIPELINE
- DIVERSION BERM
- CULVERT
- SB-01 SEDIMENT BASIN
- 101 CATCHMENT NUMBER
- GENERAL DIRECTION OF FLOW
- DISCHARGE LOCATION

**NOTES:**

1. COORDINATE GRID IS UTM NAD83 ZONE 21.
2. TOPOGRAPHY BASED ON INFORMATION PROVIDED BY LYCOPODIUM, NOVEMBER 4, 2015. PIT AND DUMPS WERE PROVIDED BY PIRAN MINING LTD. JUNE 24, 2024.
3. CONTOUR INTERVAL IS 2 METRES.
4. ELEVATIONS ARE IN METRES.
5. CULVERTS TO BE REMOVED AT CLOSURE.

SCALE A: 100 50 0 100 200 300 400 500 m

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CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

# OPERATIONAL WATER MANAGEMENT PLAN

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**FIGURE 3** | REV 0

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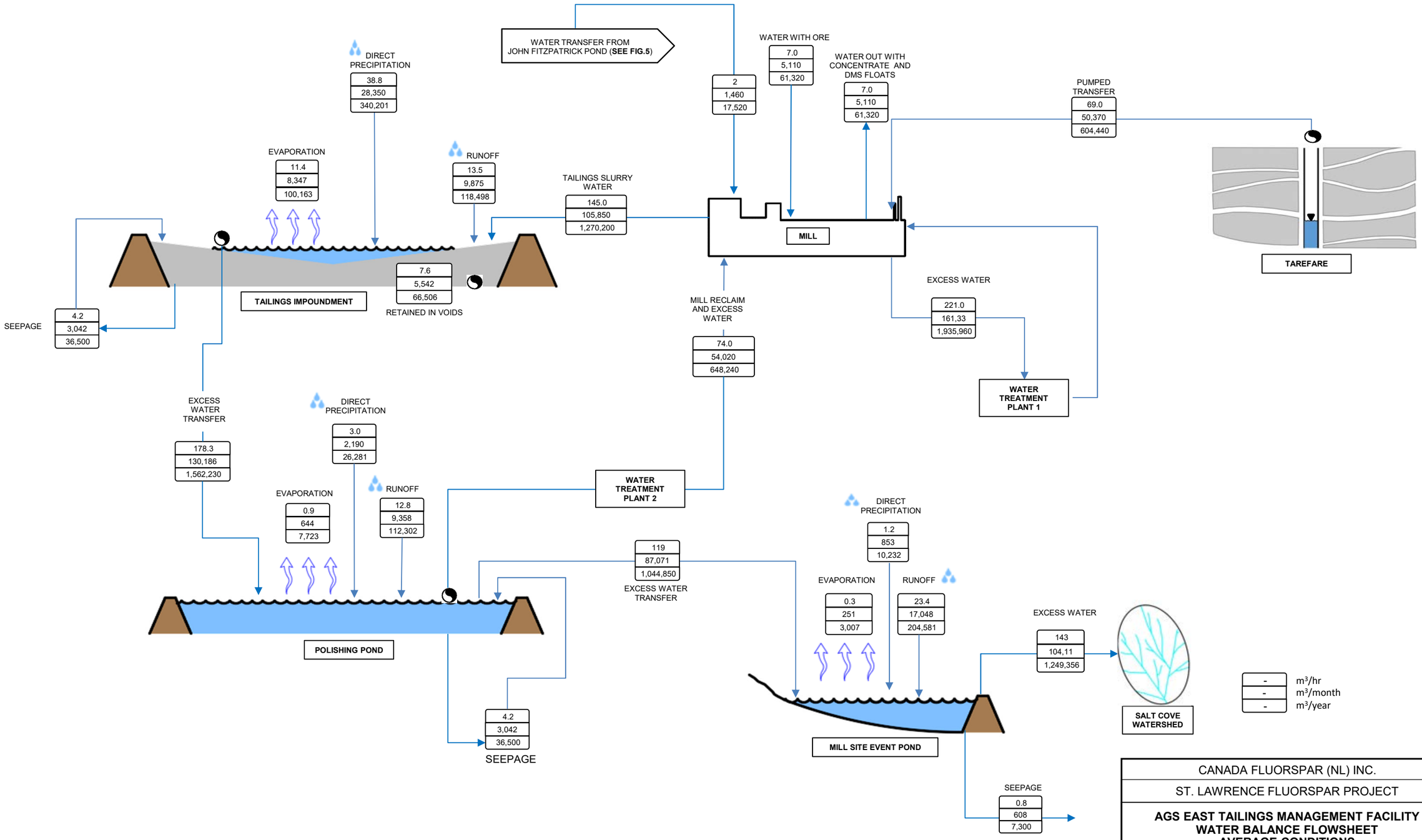
XREF FILE(S): X-V-TOPO-LY-CO-2014-11-25, X-C-AGSs-mm, X-C-AG-Ss-DUMP-SOUT, X-C-SITE-LAYO-INFR, X-C-AGS-s-DUMP-OVRB, X-V-WATERSHED-BOUNDARIES, X-C-PROP-BNDY, X-C-AGS-s-SUMP-NRTH-VR05, X-C-AGSs-ROAD-YR05, IMAGE FILE(S): 2021-01-12 - Google Earth Image




**NOTES:**

1. VALUES BASED ON AVERAGE WATER BALANCE RESULTS.

   YEAR: 2029 IS SHOWN

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CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**AGS EAST TAILINGS MANAGEMENT FACILITY**
**WATER BALANCE FLOWSHEET**
**AVERAGE CONDITIONS**

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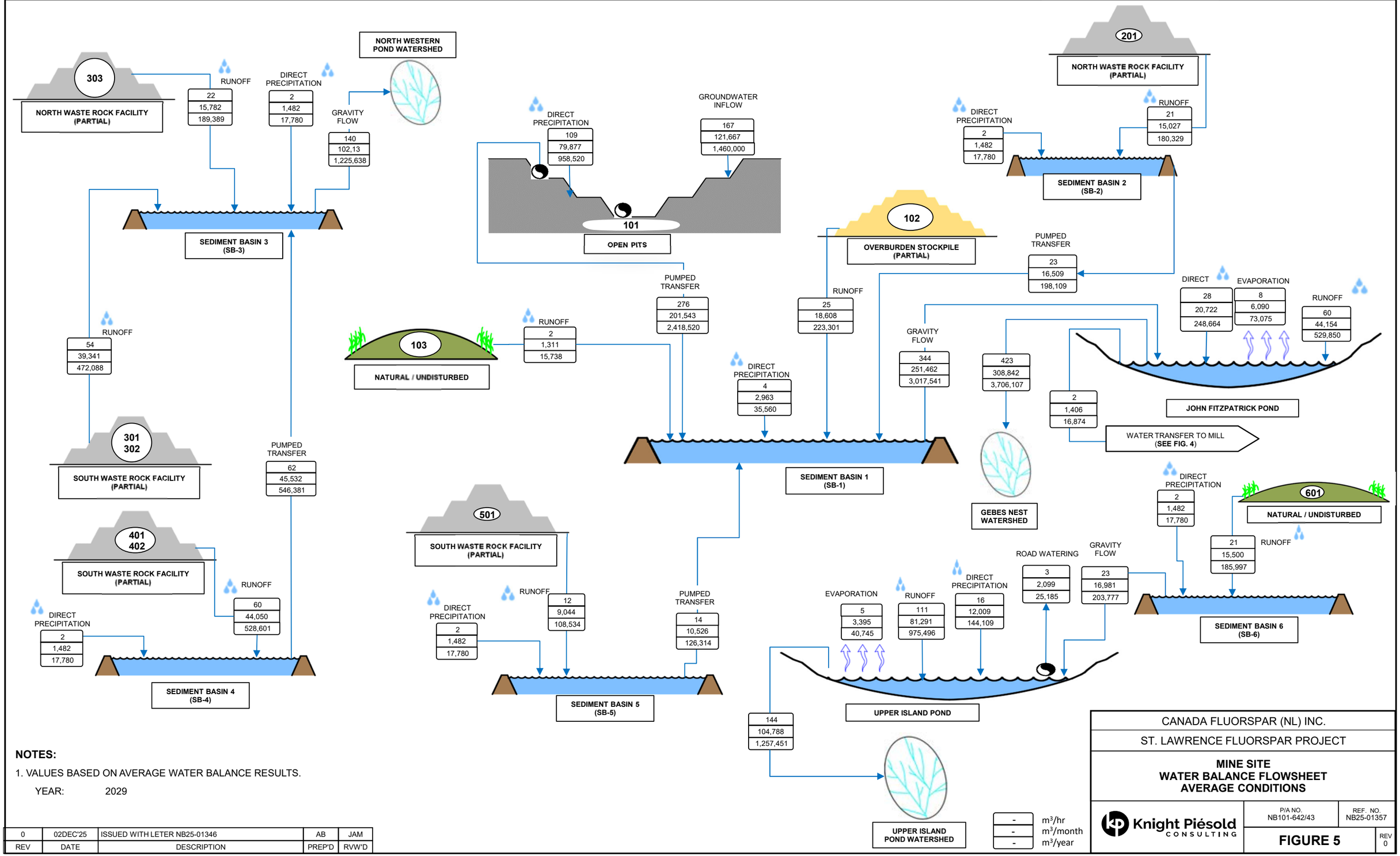
P/A NO. NB101-642/43

REF. NO. NB25-01357

**FIGURE 4**

REV 0




**NOTES:**

1. VALUES BASED ON AVERAGE WATER BALANCE RESULTS.

   YEAR: 2029

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CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**MINE SITE**
**WATER BALANCE FLOWSHEET**
**AVERAGE CONDITIONS**

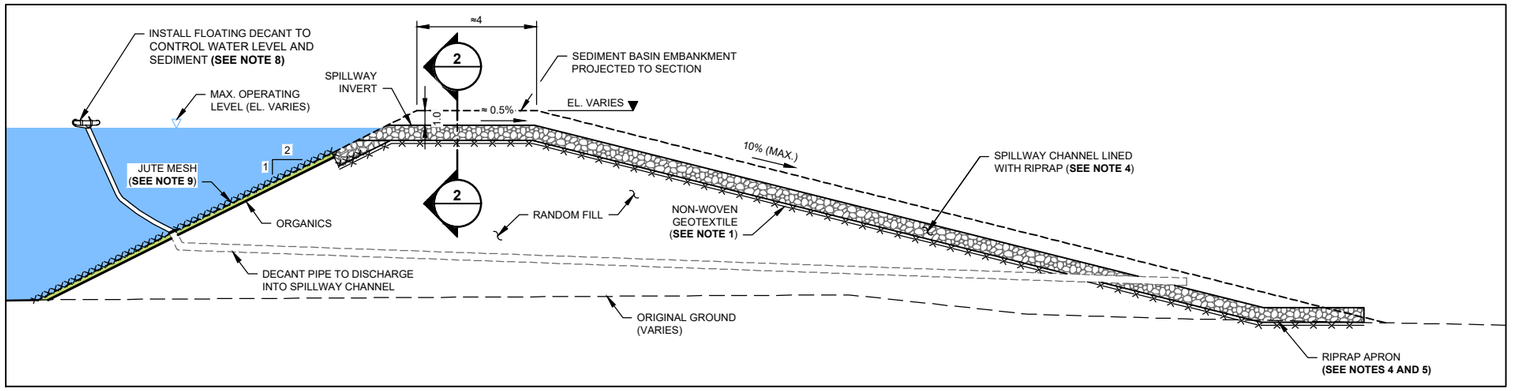
Knight Piésold CONSULTING

P/A NO. NB101-642/43

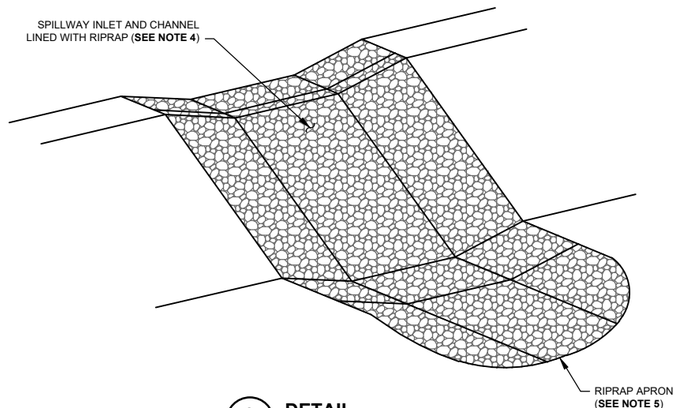
REF. NO. NB25-01357

**FIGURE 5**

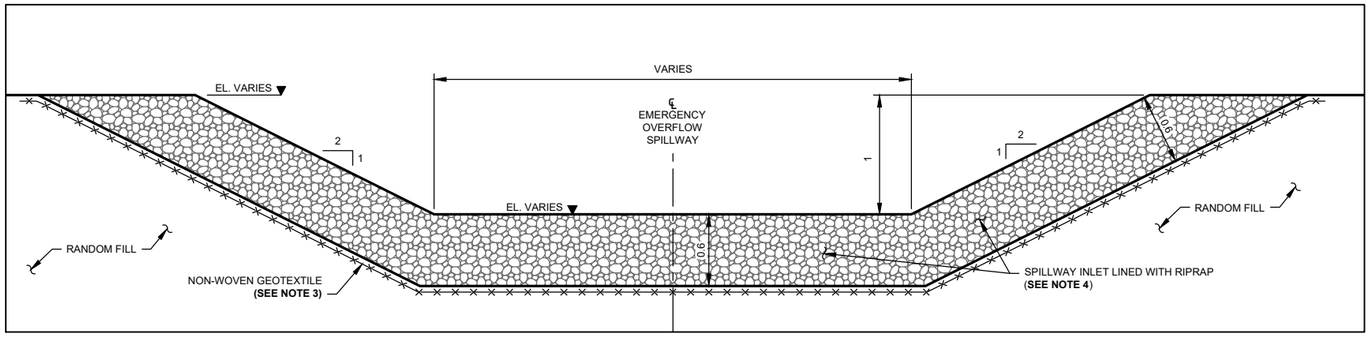
REV 0



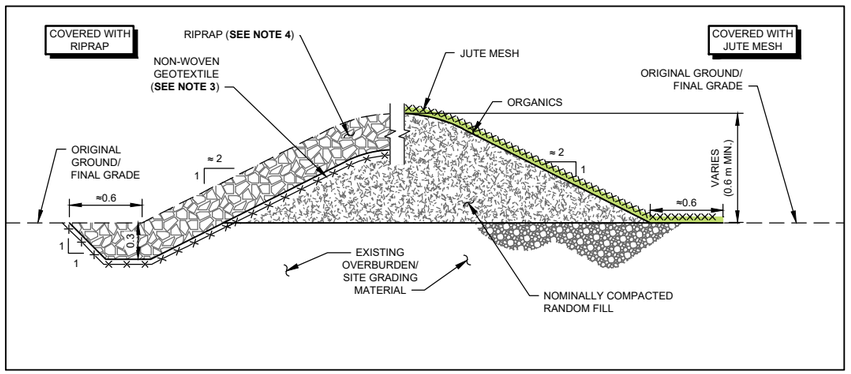

1 - **SECTION**
**TYPICAL SECTION ALONG SPILLWAY CHANNEL**
SCALE A



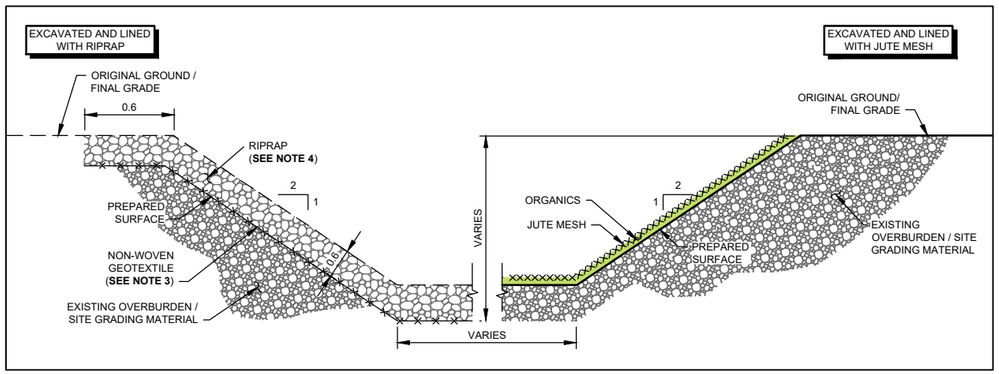

A - **DETAIL**
**TYPICAL SPILLWAY PERSPECTIVE**
NTS




2 - **SECTION**
**TYPICAL SECTION THROUGH SPILLWAY INLET**
SCALE B




3 - **SECTION**
**TYPICAL LOW HEIGHT BERM (COVERED WITH RIPRAP OR JUTE MESH)**
SCALE B




4 - **SECTION**
**TYPICAL TRAPEZOIDAL CHANNEL (RIPRAP OR JUTE MESH LINED)**
SCALE C

**LEGEND:**

- RIPRAP
- COMPACTED FILL
- EXISTING OVERBURDEN/SITE GRADING MATERIAL
- ORGANICS
- NON-WOVEN GEOTEXTILE
- ORIGINAL GROUND
- JUTE MESH

**NOTES:**

1. DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. DETAILS AND FINAL LOCATIONS OF STORMWATER MANAGEMENT MEASURES TO BE DETERMINED DURING DETAILED DESIGN AND BASED ON ACTUAL SITE CONDITIONS.
3. NON-WOVEN GEOTEXTILE TO BE TERRAFIX 360R, LAYFIELD LP6 OR APPROVED EQUIVALENT. NON-WOVEN GEOTEXTILE TO BE INSTALLED AS PER MANUFACTUER'S RECOMMENDATIONS OR AS PER OWNER'S REPRESENTATIVE.
4. RIPRAP TO BE CLEAN AND DURABLE, AND ANGULAR. RIPRAP TO BE TIGHTLY PLACED AND SPREAD IN MAX. 300 mm LAYERS.
5. LIMITS OF RIPRAP APRON TO DEPEND ON ACTUAL SITE CONDITIONS.
6. SPILLWAY SLOPES TO BE CONFIRMED DURING DETAILED DESIGN.
7. FOR MATERIAL SPECIFICATIONS, SEE DRAWING 520.
8. FLOATING DECANT TO BE 8" FAIRCLOTH SKIMMERS®, EACH WITH A 6" HEAD OR APPROVED EQUIVALENT, SKIMMERS TO BE INSTALLED AS PER THE MANUFACTURER'S SPECIFICATIONS.
9. EROSION PROTECTION ON SEDIMENT BASIN BERMS WILL CONSIST OF JUTE MESH OVERLYING ORGANICS OR RIPRAP OVERLYING NON-WOVEN GEOTEXTILE.

SCALE A: 2 1 0 2 4 6 8 10 m
SCALE B: 0.5 0.25 0 0.5 1.0 1.5 2.0 2.5 m
SCALE C: 0.4 0.2 0 0.4 0.8 1.2 1.6 2.0 m

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CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**DITCHES, BERMS AND SEDIMENT BASINS TYPICAL SECTIONS AND DETAILS**

Knight Piésold CONSULTING

P/A NO. NB101-642/43 | REF NO. NB25-01357

**FIGURE 6** | REV 0

SAVED: I:\1\01\00642\43\AA\acad\FIGS\B15 R0, 12/2/2025 2:08:20 PM, EROMANI PRINTED: 12/2/2025 2:11:41 PM, FIG 6, EROMANI
XREF FILE(S): IMAGE FILE(S):

# Appendix 2-3: Mine Development Plan AGS

# St. Lawrence Fluorspar Project

# Mine Development Plan

## Canada Fluorspar (NL) Inc.

Canada Fluorspar (NL) Inc.
1 Clarke's Pond Road
St. Lawrence, NL A0E 2V0

**April 2025**

# DOCUMENT REVISION INDEX

INSTRUCTION TO PRINT CONTROL (Indicate X where applicable)

[x] Reissue all pages.

[ ] Reissue revised pages only.

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[ ] Issued for review and comments

[ ] Issued for approval

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| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 2025/04/14 | All Pages | Update to received comments | CFI | EV | EV |
| 4 | 2024/12/02 | All Pages | Update to received comments | CFI | EV | EV |
| 3 | 2024/06/27 | All Pages | Update to new guidelines and project updates | CFI | EV | EV |
| 2 | 2021/08/26 | All Pages | Project changes | AMB | JAM | SRA |
| 1 | 2016/10/12 | All Pages | Full Resubmittal Original | JAM | SRA | SRA |
| Rev. | Date yyyy/mm/dd | Page No. | Description | Prepared By | Reviewed By | Approved By |

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## List of Abbreviations

Units of measurement used in this report conform to the SI (metric) system unless otherwise indicated. All currency in this report is Canadian dollars (C$) unless otherwise noted.

| | |
|---|---|
| St. Lawrence Fluorspar Project | the Project |
| ABA | acid base accounting |
| AGS | Arthur Gordon Stollery |
| AGSE | AGS East |
| ALCAN | Aluminum Company of Canada |
| AMED | African Minerals Exploration and Development Funds |
| ARD | acid rock drainage |
| BBMT | Blue Beach Marine Terminal |
| BBN | Blue Beach North |
| BFS | bankable feasibility study |
| BML | Burin Minerals Limited |
| CCME | Canadian Council of Ministers of the Environment |
| CDA | Canadian Dam Association |
| CP | Center Pit |
| CEQG | Canadian Environmental Quality Guidelines |
| CFI | Canada Fluorspar (NL) Inc. |
| CoA | Certificate of Approval |
| COG | cut-off grade |
| CM | circulating medium |
| CRM | Certified Reference Materials |
| Davy | Davy International Canada Ltd. |
| DFO | Department of Fisheries and Oceans Canada |
| DFS | definitive feasibility study |
| DNR (Now IET) | Department of Natural Resources |
| DM | dilute medium |
| DMS | dense media separation |
| DOEC (Now ECC) | Department of Environment and Conservation |
| DTH | down the hole hammer |
| EA | environmental assessment |
| EBITA | earnings before interest, taxes, and amortization |
| ECC (Formerly DOEC) | Department of Environment and Climate Change |
| EDGM | Earthquake Design Ground Motion |
| EDS | Environmental Design Storm |
| EEMP | Environmental Effects Monitoring Plan |
| ELC | Ecological Land Classification |
| EPP | Environmental Protect Plan |
| EPR | Environmental Preview Report |
| EPCM | engineering, procurement and construction management |
| EPRP | Emergency Preparedness and Response Plan |

ERR ..... Environmental Registration Report
F ..... Fluorite Veins
FeSi ..... ferrosilicon
FoS ..... Factor of Safety
FW ..... Footwall
G&A ..... general and administrative
GC ..... grade control
GNP ..... Grebes Nest Pit
Golder ..... Golder Associates Ltd.
GP2 ..... Grebes Nest Vein
GSW ..... Gland Seal Water
HCT ..... humidity cell test
HLEM ..... horizontal loop electromagnetic
HMS ..... heavy media separation
HW ..... Hanging Wall
HWSA ..... Hazardous Waste Storage Area
IDF ..... Inflow Design Flood
IDW2 ..... Inverse Distance Weighting
IET (Formerly DNR) ..... Department of Industry, Energy and Technology
KP ..... Knight Piésold Ltd.
LC ..... low carbonate
LHD ..... Load, Haul, Dump machine
LOM ..... Life of Mine
LV ..... low voltage
masl ..... meters above sea level
MCC ..... motor control center
MDP ..... Mine Development Plan
ML ..... metal leaching
MRCP ..... Mine Rehabilitation and Closure Plan
MRE ..... Mineral Resource Estimate
MS ..... Undivided metasedimentary rocks
MSEP ..... Mill Site Event Pond
Mtpa ..... million tonnes per annum
NAG ..... Net acid generation
NL ..... Newfoundland and Labrador
NN ..... Nearest Neighbour Estimation
NOC ..... National Occupational Classification
NPA ..... Newfoundland Power Authority
NPR ..... neutralization potential ratio
NS ..... North/South Ridge
NV ..... North Vein
OCP ..... Open Cut Pit
OK ..... Ordinary Kriging
OMS ..... Operations, Maintenance and Surveillance Manual

ONAN ..... oil natural air natural
OP ..... Open Pit
PAG ..... potentially acid generating
PFS ..... prefeasibility study
PP ..... Pond Pit
QFP ..... Quartz-feldspar porphyritic
QP ..... qualified person
RHY ..... Rhyolite; Quartz-Feldspar porphyritic sills/dykes
RL ..... reduced level
ROM ..... Run of Mine
RPA ..... Roscoe Postle Associates Inc.
SCR ..... solid core recovery
SFE ..... shake flask extraction
SG ..... specific gravity
SGS ..... SGS Canada Inc.
SLG ..... St. Lawrence Granite
SLR ..... SLR Consulting (Canada) Ltd.
SMU ..... smallest mining unit
SRP ..... Spill Response Plan
SV ..... South Vein
TCR ..... total core recovery
TD ..... Total Depth
TF ..... Tarefare
TMF ..... Tailings Management Facility
TSS ..... Total Suspended Solids
tpd ..... tonnes per day
UAV ..... Unmanned Aerial Vehicle
UG ..... Underground
UPS ..... uninterrupted power supply
VTEM ..... versatile time domain electromagnetic
VGF ..... vibrating grizzly feeder
WorleyParsons ..... Worley Parsons Canada Services Limited
WMP ..... Water Management Plan
WRF ..... Waste Rock Facility
WRMD ..... Department of ECC - Water Resources Management Division

**Terminology**

Fluorite is the mineral mined and milled in order to produce the product, fluorspar. Both of these have the formula $CaF_2$.

Calcium carbonate has the formula $CaCO_3$.

# 1 Introduction

## 1.1 Company Information and Contact Information

Canada Fluorspar (NL) Inc. (CFI) is the proponent of the St. Lawrence Fluorspar Project. CFI's corporate office is based in St. Lawrence, NL, and the company is wholly owned by Renova Capital. CFI is a registered corporation in NL.

**Proponent Name and Address:**

Canada Fluorspar (NL) Inc.

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1 Clarke's Pond Road
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Eben Visser, CEO
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St. Lawrence, NL, Canada
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The authorized contact for the Project is:

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## 1.2 Contributing Authors

The Mine Development Plan (MDP) has been based on contributions made by CFI and various consultants outlined in Table 1.1.

**Table 1-1: Contributing Authors**

| Name | Contact | Company | Title | Responsibilities |
|---|---|---|---|---|
| Melissa Lambert (P.Geo) | mlambert@canadafluorspar.com | CFI | Senior Geologist | Section 1, 2, 3, 5 Report compilation and submission |
| Gillian Kearney | gkearney@canadafluorspar.com | CFI | Environmental Manager | Section 1, 2, 4, 8 - 11 Report compilation |
| Eben Visser | evisser@canadafluorspar.com | CFI | Chief Executive Officer | Section 1, 2, 6, 10,12, 13 Report compilation and review |
| Isaac Sam (P.Eng) | isam@canadafluorspar.com | CFI | Mine Manager | Section 2,5,6,11,12 Report compilation and review |
| Tim Peters | tim.peters@piranmining.com | Piran Mining UK Ltd. | Consulting VP Technical Services; Qualified Person for the Reserves | Section 2, 5, 6<br><br>Mineral Reserves Statement |
| Ian Holl | ian.holl@primero.ca | Primero | Mill Manager | Section 7 |
| Lina Du | lina.du@primero.ca | Primero | Mill Superintendent | Section 7 |
| Nelis Leonard | nleonard@canadafluorspar.com | CFI | Chief Financial Officer | Section 12 |
| Kevin Fearn | kfearn@canadafluorspar.com | CFI | Human Resources Manager | Section 12 |
| Adam Wheeler | adamwheeler@btinternet.com | Adam Wheeler Mining Consultant Ltd. | Qualified Person; Consultant for the MRE | Mineral Resource Estimate/Statement |

| | | | | |
|---|---|---|---|---|
| Gary Dempers | gdempers@dempersseymour.com.au | Dempers & Seymour PTY LTD | Principal Geotechnical Engineer; Consultant for AGS and South Ridge Pit Design | Geotechnical Review and FS Pit Slope Designs for AGS and South Ridge Pits |

## 1.3 Internal Document Approval

The MDP has been reviewed and approved by the Authorizing Officer, Eben Visser, CEO.

## 1.4 Project Overview

Canada Fluorspar (NL) Inc. (CFI) is actively operating the St. Lawrence Fluorspar Project (the Project) on the Burin Peninsula, in the province of Newfoundland and Labrador (NL) (Figure 1.1).

This Mine Development Plan (MDP) has been revised from the 2016 and 2021 submission to reflect completed construction, current operations, and notable changes to the overall plan. Although this MDP is aimed at restarting the Arthur Gordon Stollery (AGS) mine and mill site, it includes references to proposed projects outside the scope of the current MDP. Once these projects have been registered and released from the environmental assessment process, they will be included in an amendment to the development plan and rehabilitation and closure plan.

CFI understands that before any major changes or deviations from the approved fluorspar mining operations in St. Lawrence, a Development Plan and a Rehabilitation and Closure Plan will be filed, and financial assurance provided to the satisfaction of the Department of Industry, Energy and Technology (IET). CFI also understands that it must continue to submit an Operational Plan before, and an Annual Report after, each year of production.

The Project includes the construction, operation, and planned rehabilitation and closure of an open pit fluorspar mine, mill, tailings storage facility, ancillary infrastructure, and marine export facility.

After its closure in February 2022, African Minerals Exploration and Development Funds (AMED Funds), through a newly created subsidiary called Fluorspar Holdings, purchased CFI, the former operator of the St Lawrence mine in June 2023, following a 15-month insolvency process.

Since the sale, various projects have been completed including the construction of a new retaining wall at the Run of Mine (ROM) Tip, and refurbishment of the process plant and infrastructure is ongoing. CFI also completed additional geotechnical drilling and engineering to produce an updated Mineral Resource Estimate (MRE) and mine designs for the Arthur Gordon Stollery (AGS) and South Ridge open pits. In addition to work already completed, CFI has embarked on engineering studies related to the retreatment of tailings, expansion/upgrading of the Blue Beach Marine Terminal (BBMT), a 2.6mtpa aggregate plant, a water treatment plant, as well as the potential development of the South Ridge open pit, North Ridge (formerly Director) and Tarefare underground mines.

Procurement of the mining contractor was completed in May 2024, and mobilization of mining equipment and refurbishment of existing infrastructure (mine dry, mobile maintenance workshop and ancillary infrastructure) has been completed. Rehabilitation of the existing access and haul roads are ongoing as detailed in the preproduction and commissioning plan presented to IET and approved by the honorable Minister Parson on 28 August 2024. It is expected that this work will be completed in January 2025 and that pioneering activities including the first blast and stripping of waste rock from the AGS pit is intended to start in 2025, subject to approval of the MDP and RCP.

Preproduction and commissioning of the mill (concentrator) commenced in September 2024 and includes the reprocessing of 150,000 tonnes of existing mine tailings from the Tailings Management Facility (TMF). Commissioning will be completed in Q1 2025 and will be followed by the introduction of fresh ore from existing ore stockpiles as well as the AGS pit once back in production in 2025. Ramp up of the mill is expected to take 13 months from the introduction of fresh ore in 2025. Commissioning of the crushing circuit also commenced in September 2024 with the processing of 590,000 tonnes to be completed by February 2025.

The AGS open pit mine has an overall planned life of ten (13) years, with 9 years remaining, based on the current Mineral Reserve and mill throughput rate. The mill is designed to feed a maximum of 1,100,000 tonnes per year to the Dense Media Separation (DMS) circuit. The capacity of the process plant will be optimized to efficiently perform at an 79.9% recovery of fluorspar concentrate in order to produce a maximum of 200,000 dry tonnes of acid-grade $CaF_2$ concentrate and 200,000 dry tonnes of DMS Rejects/Float to be used as construction aggregate annually.

Progressive rehabilitation has been and will continue to be carried out throughout for the life of the Project. Following completion of mining, the Mine Rehabilitation and Closure Plan will be executed. This includes the rehabilitation of the AGS open pit, South and North Waste Facilities, AGS East TMF, the Blue Beach Marine Terminal, and the decommissioning and dismantling of buildings and infrastructure where required.

The Arthur Gordon Stollery (AGS) mine and mill site is comprised of the following major components (Figure 1.2):

- The AGS Open Pit consisting of four phased open pits which eventually connect to form a single open pit, previously referred to as Grebes Nest Pit (GNP), Centre Pit (CP), Open Cut Pit (OCP) and Pond Pit (PP). Note that Grebes Nest Pit and Centre Pit will connect via Pond Pit. Open Cut Pit is the western extension of the AGS Pit.
- AGS Mill - For processing the fluorspar ore into an acid-grade fluorspar concentrate as well as DMS Rejects/Floats used in the production of construction aggregate.
- South and North Waste Rock Facilities (WRF) - Excess waste rock produced during open pit mining will initially be placed within the South WRF followed by the North WRF in year 3 (2026). Some of the waste rock produced during mining will be used in the construction of haul roads, berms, ramps and other infrastructure.
- AGS East Tailings Management Facility (TMF) – Flotation Tailings are generated as a result of the process and are pumped to the AGS East TMF. The facility has been constructed in two phases that will provide for tailings storage to 2029 based on current filling projections. The Tailings Impoundment has been constructed to the Stage 2 lift. The filling

projections are currently under review to develop an updated filling schedule to align with the Life of Mine (LOM) plan.

- Water Management Infrastructure - This includes the Event Pond at the AGS Mill Site, sediment basins, in-pit sumps and associated dewatering equipment, collection and diversion ditches, effluent discharge pipelines and outfalls, and freshwater intake structures and associated pipelines.
- Overburden and topsoil stockpiles.
- Storage and maintenance buildings.
- Fuel storage facility.
- Explosives storage.
- Haul roads for mining equipment transporting ore, waste rock, aggregate material, and overburden materials.
- Site access roads for non-mining mobile equipment.
- Clarke's Pond geology and exploration office.
- Minworth Mill Site.
- South and North Ridge exploration sites.
- AGS North exploration site.
- Tarefare exploration site.
- Real-Time Air Quality Monitoring Station.
- Warehouse and storage yard.

The Blue Beach Marine Terminal consists of the following components:

- Site buildings - including security building, office/breakroom, control room, washroom facility.
- Concentrate and product stockpiles.
- Power supply and distribution system.
- Water supply (potable).
- Marine infrastructure including a barge, mooring buoys, and fenders.
- Ship loading equipment, including a conveyor system.

- Runoff water management components including diversion ditches.
- Haul road (Port Access Road).

A detailed description of the St. Lawrence Fluorspar Project is provided in Section 2.

**Figure 1-1: Project Location**

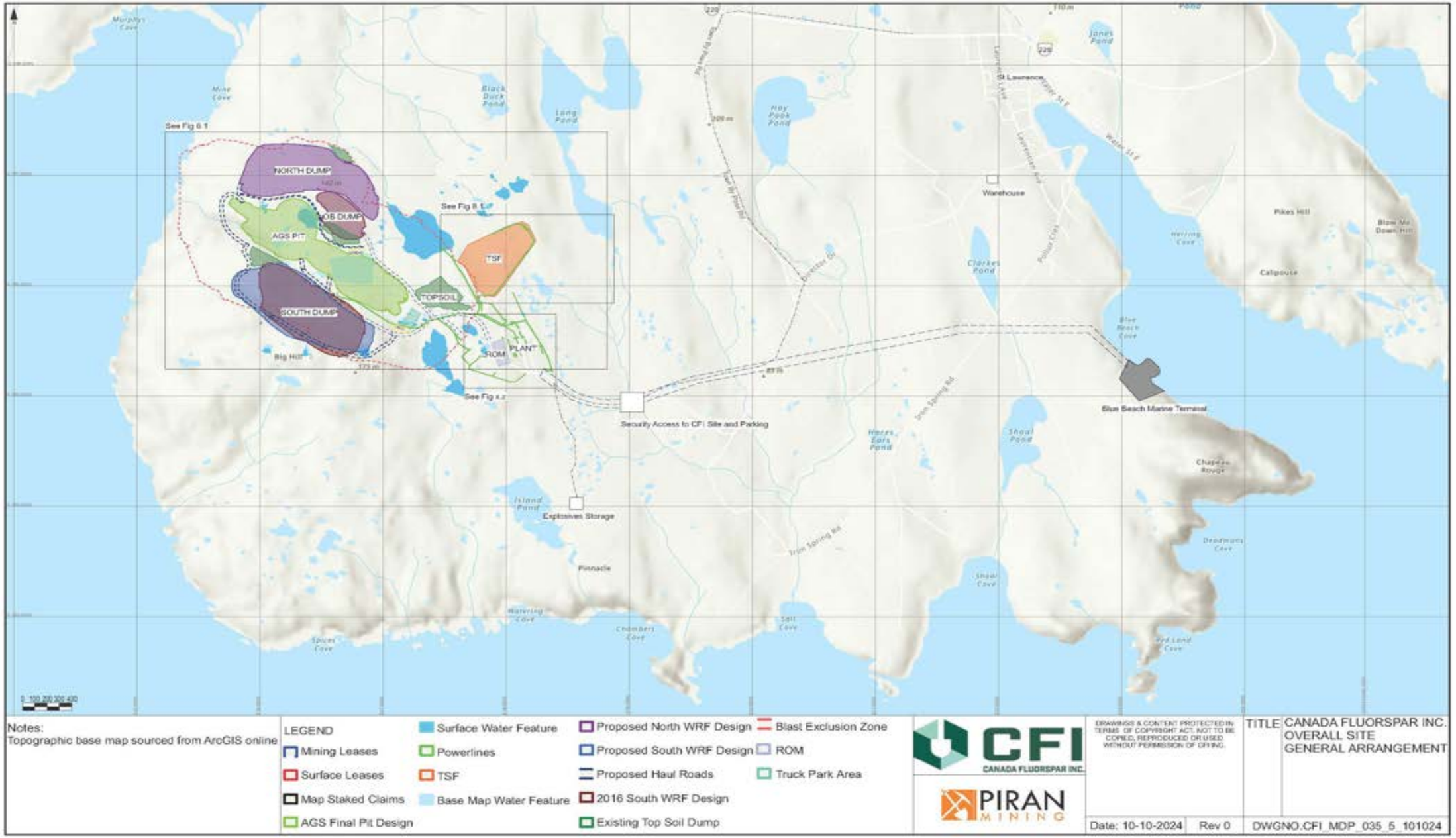



**Figure 1-2: Overall Site General Arrangement**

## 1.5 Project History

### 1.5.1 Historical and Current Land Use

The Project is located partly on a brownfield site used historically for mining and milling activities processing fluorspar for several decades beginning in the early 1930s (EPR; CFI, 2015b). There is limited forest cover, and the area mainly consists of bog, marsh, heathland with numerous shallow ponds. The Project area is occupied by CFI infrastructure. There are no permanent dwellings located in the Project area, however, there are some homes (permanent residential dwellings) located on privately owned properties located close to the Project area. As well, there are some registered cabins located near the Project area. These cabins are accessed by way of the existing gravel access roads within the Project area and ATV trails. In addition, areas near the Project area such as access roads and bog/marsh land are occasionally used for recreational purposes by local residents for walking, ATV use, hunting, and berry picking.

There are no National Parks or National Historic Sites located near the Project area. There are also no designated Aboriginal lands near the Project. There is one registered archaeological site at Blue Beach. The site was registered by the Provincial Archaeology Office in 2007 following the discovery of a shipwreck that occurred in 1946. However, based on the results of the historic resource assessment conducted for the Project, no other historic resources were identified in the Project area. The wreck sites of the USS Truxtun and USS Pollux (located in Chambers Cove and off Lawn Head, respectively) have been designated as municipal historic sites by the Heritage Foundation of Newfoundland (a non-profit organization). The Iron Springs Mine site is also classified as a municipal heritage site.

#### *1.5.1.1 Existing Conditions*

The following sections provide a summary of the existing aquatic and terrestrial environments at the mine site. Additional details are provided in environmental registration and preview reports (CFI 2015a and CFI, 2015b, respectively).

#### *1.5.1.2 Terrestrial Environment*

The AGS Mine, Mill, Blue Beach Marine Terminal, and Ancillary Infrastructure are located within the Eastern Hyper-Oceanic Barren Ecoregion. This ecoregion is dominated by blanket bogs, stunted balsam fir, and coastal barrens. The topography in the area is flat to rolling with subtle changes in relief. Elevations range from 0 m to approximately 200 m above sea level (CFI, 2015a).

The vegetation communities and habitat types located within the Project area were characterized using Ecological Land Classification (ELC). The ELC was completed by Golder to support the EA Registration in 2015 (CFI, 2015a). The results of the ELC are presented on Figure 1.3.

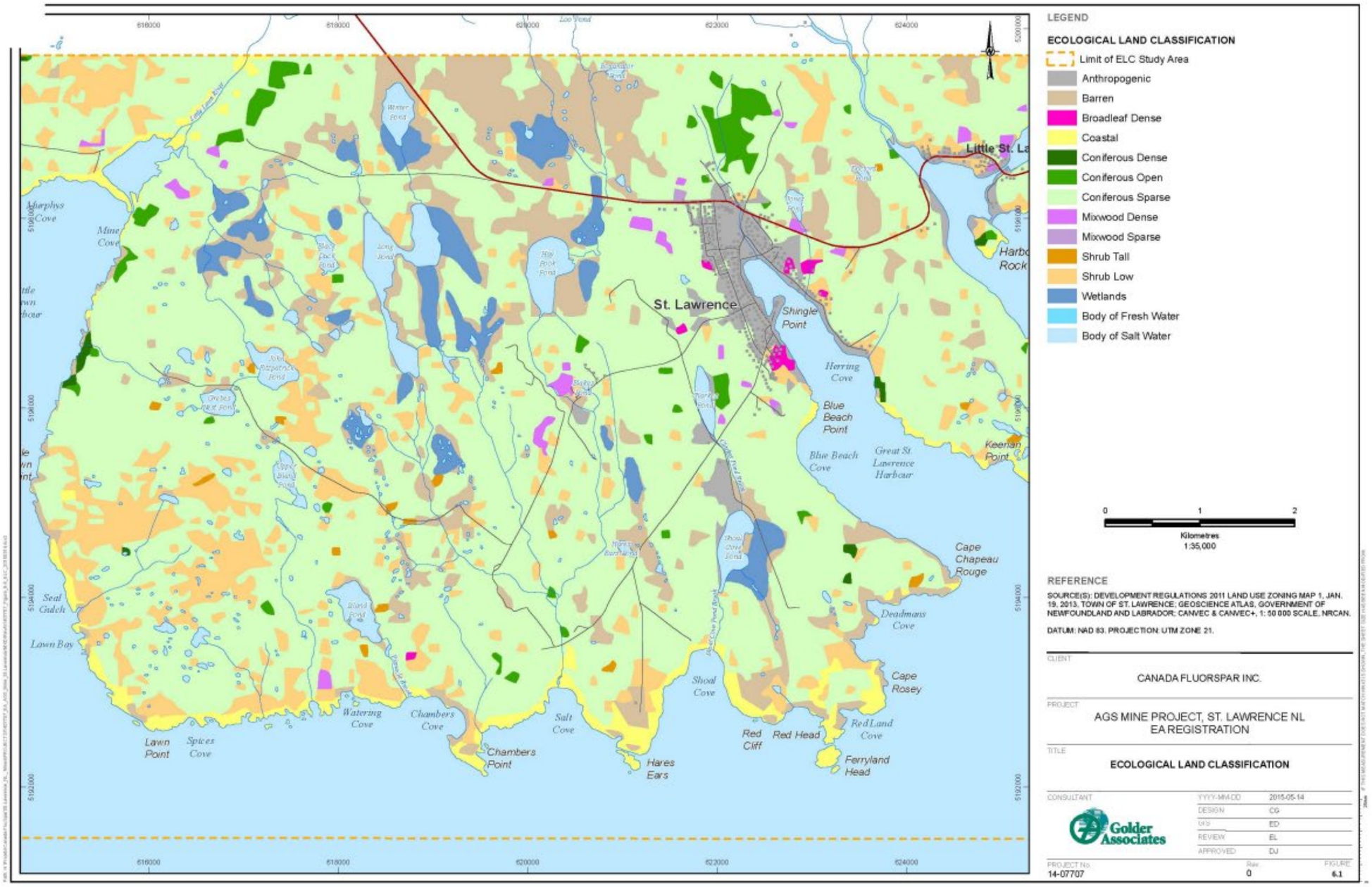



**Figure 1-3: Ecological Land Classification**

#### *1.5.1.3 Aquatic Environment*

As illustrated on Figure 1.4, the Project spans six watersheds, including:

- Salt Cove Watershed
- Upper Island Pond Watershed
- Grebes Nest Pond Watershed
- Mine Cove Watershed
- Northwestern Pond Watershed
- Blue Beach Terminal Watershed

The local streams and ponds support fish communities comprised of one or more of the following species: Atlantic salmon, Brook trout, and American eel (CFI, 2015a and 2015b; AMEC, 2015).

Long-term historical flow records for streams in the project area are not available. As such, a hydrometeorological program was initiated in 2015 to support the current Project. Four (4) hydrology stations were established in the AGS vein watersheds (i.e., Grebes Nest Pond, Upper Island Pond, Northwest Pond, and Salt Cove Watersheds) to determine baseline conditions prior to Operations commencing. These stations are currently inactive. A precipitation gauge was also established at the mine site in 2016. Since 2016, the station has been updated to include windspeed and direction, temperature, and barometric pressure.

Baseline surface water quality data were collected to support the environmental assessment (CFI, 2015a). As presented in CFI (2015a), the water quality within the AGS watersheds is characterized as having acidic pH (5.0 – 6.2) and elevated concentrations (compared to CCME (2015) Canadian Water Quality Guidelines (CEQGs)) of fluoride, total phosphorus, aluminum, iron, and lead. CFI's surface water quality monitoring locations, as outlined in their CoA, are shown on Figure 1.4. There are two real-time water monitoring stations located on site to allow for continued monitoring of surface water quality and hydrometric information. The installed locations shown in Figure 1.4 are downstream of the Mine Site at the Grebes Nest Pond outlet (UTM Zone 21T 617071m E 5196306 m N), and downstream of the TMF at the AGS east outlet (UTM 21T 618525

m E 5195662 m N). The surface water monitoring program is described in detail within the EEMP (Appendix B) and continues to be actively followed.

#### *1.5.1.4 Hydrogeology*

A hydrogeological study was completed by Golder to support the environmental assessment on behalf of CFI. As outlined in CFI (2015a and 2015b), there are two aquifer zones at the mine site; a shallow aquifer located within the glacial till, and a deep aquifer located within the granite (bedrock). Flow through the deep aquifer is controlled by fracture zones as the granite has very little to no permeability. The lateral extent of the shallow aquifer is limited to the size of the watershed. Groundwater flows are largely controlled by topography and tend to mimic surface water flow directions.

Based on the data presented in CFI (2015a), groundwater quality in the deep aquifer showed elevated concentrations of colour, aluminium, iron, and total manganese.

A groundwater monitoring network was established prior to construction and was expanded in 2016. The locations of the groundwater monitoring wells are illustrated on Figure 1.4.

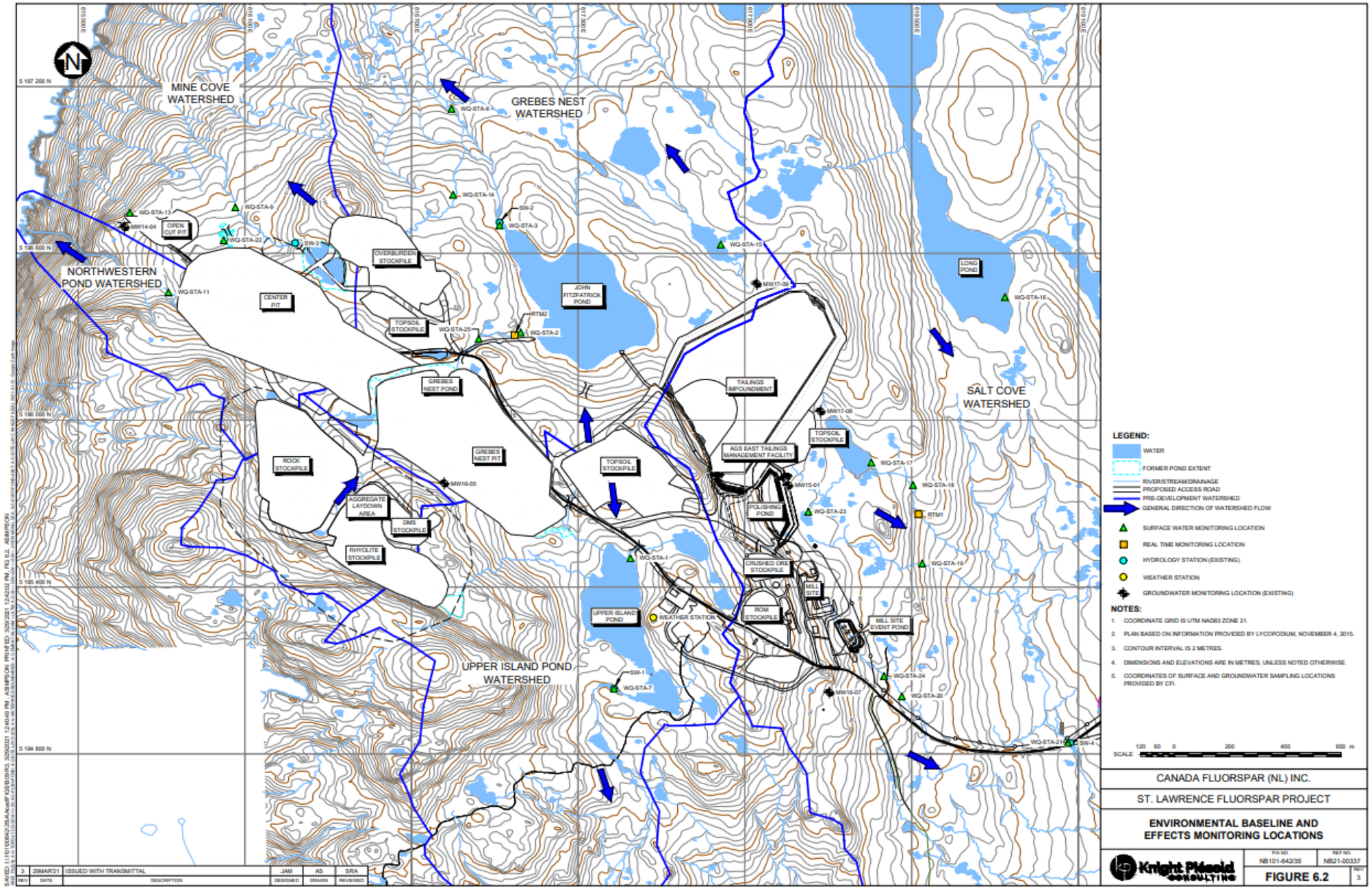



**Figure 1-4: Environmental Baseline and Effects Monitoring Location**

### 1.5.2 Historical Mining Activities

As described in the 2022 Technical Report by SLR, the following discussion on the history of ownership, mining and exploration has been taken from Lycopodium (2016), which summarizes material from Agnerian 2008, 2009, Agnerian et al, 2011, Lecuyer et al., 2013, Agnerian and Waldegger, 2013, and Agnerian, 2015.

#### *1.5.2.1 Early Mining and Exploration (1910 to 1991)*

Exploration (mainly prospecting) for fluorite deposits in the St. Lawrence and neighbouring areas on the Burin Peninsula of Newfoundland started in the early 1910s and resulted in the discovery of fluorite on an outcrop by a local resident near the present Blue Beach North No. 2 Shaft. Some records indicate, however, that mining of fluorite may have taken place on the Mine Cove Vein prior to 1870, probably by the early French settlers (Wiseman and Cameron, 1968 and Edwards, 1991).

In their account of the historic mining in the St. Lawrence area, Wiseman, and Cameron (1968) describe a tunnel having been driven at the Mine Cove Vein prior to 1870. This six-inch-wide vein is also reported to have contained silver. Early underground work is also reported on a low-grade fluorspar vein at Chambers Cove and at Little Lawn Point area and tunneling on the east side of St. Lawrence harbour in 1910 by Bethlehem Steel Company (Wiseman and Cameron, 1968).

The earliest continuous mining activity was by St. Lawrence Corporation of Newfoundland, which worked the Black Duck Vein from 1933 to 1941. During this period two of the main fluorspar veins on the Property were identified by prospecting, such as the Director Vein and Tarefare Vein in 1937, and the smaller Hookey Vein in 1936 (Wiseman and Cameron, 1968). From 1937 to 1942, American Newfoundland Fluorspar Limited (Newfluor) worked the Director Vein and upper parts of the Tarefare Vein. Mine infrastructure at the Director Mine included a permanent headframe at No. 2 Shaft, crushing plant, hoist house, powerhouse, and service shops. Mining operations provided the fluorspar for the manufacture of aluminum until the end of World War II (Wiseman and Cameron, 1968).

In 1940, Aluminum Company of Canada (renamed Alcan Incorporated (Alcan) in 2001) purchased the holdings of American Nfld. Fluorspar Co. and operated the mines until 1978. At the end of 1945, Alcan allowed the Director Mine to flood, a state in which it remained until the end of 1947. In early 1948, the Director Mine was dewatered, and mining operations were resumed. In 1951, Alcan installed a heavy media separation (HMS) plant and began producing metallurgical grade concentrate (HMS sink fraction). Pre-screened fines were shipped to Arvida, Québec, for further processing to acid-grade fluorspar (Alcan, 1978). In 1965, Newfluor purchased 100% of the properties of St. Lawrence Corporation of Newfoundland (Alcan), but there are no records of additional mining done at the Black Duck Vein or other veins in the Project area.

From the mid-1960s to the mid-1980s, a number of geological, metallurgical, and engineering studies were carried out by various organizations (Parsons, 1965, Zawadski, 1966, Cochrane, 1967, Farrell, 1967, Howse, 1983 and Collins, 1985).

Alcan ceased operations in 1978 mainly due to a series of strikes and cheaper fluorspar from Mexico. Extraction from previous mining operations totals approximately 4.6 million tonnes (Mt) of fluorspar ore, predominately from the Director Vein, with average grades ranging from 40% $CaF_2$ to 58% $CaF_2$.

Following closure, the Property remained dormant for a period of eight years from 1978 to 1986. Production of fluorspar resumed on the Property in 1987and continued until 1991. In 1987, Minworth- UK reopened the nearby Blue Beach North Mine and processed 440,000 t of fluorspar ore from small open pits, one of which was located in a surface pillar at the Director Mine near the main shaft. The block of ore in the pillar was reported to be very high grade and measuring approximately 20 m wide.

In 1990, Mr. Stan Bharti, Mining Consultant, carried out an assessment of rock mechanics on the Property and concluded that “the ore at St. Lawrence [the Property] is relatively weak and is often associated with prominent geological structures, vuggy ground, and shear/fault zones. In addition, the presence of water build up can lead to further ground deterioration”. Mr. Bharti recommended that mining be carried out using wire mesh in all future mine development in the

mineralized vein, together with two-metre-long mechanical rock bolts 1.6 cm in diameter on a 1.2 m by 1.2 m pattern (Bharti, 1990). From 1991 to 1995 the Property was once again inactive.

#### *1.5.2.2 Exploration and Other Activities (1991 to 2000)*

No new mining activities have taken place on the Property since 1990 when it was returned to the Government of Newfoundland and Labrador.

On May 18, 1995, Burin Minerals Limited (BML) acquired the Property and commenced exploration, including limited diamond drilling on the Blue Beach North and Tarefare veins. The Property was again inactive for almost a decade, when BML was re-organized and to become CFI in 2008, and systematic exploration commenced the current operator, CFI.

In 1995, Davy International Canada Ltd. (Davy) carried out a prefeasibility study (the 1995 PFS) on the Tarefare No. 2 Vein and Blue Beach North deposit for BML. Based on the 1995 PFS, Davy concluded that both deposits could be mined by underground mining methods and that the approximate mine life would be approximately 6.1 years for the Tarefare Mine and 4.8 years for the Blue Beach North Mine, respectively. Davy further concluded that the Mineable Reserves of the Tarefare deposit comprised approximately 2.1 Mt at an average grade of 54.9% $CaF_2$ and the Mineable Reserves of the Blue Beach North deposit comprised approximately 1.67 Mt at an average grade of 49% $CaF_2$ (Davy, 1995).

In early 1996, BML applied for approval for a new tailings facility at Shoal Cove Pond, near St. Lawrence that included a no-net-loss compensation agreement with the right to use Shoal Cove Pond as a tailings facility. Although the agreement is still recognized, the right to use Shoal Cove Pond has been re- registered with the Newfoundland and Labrador Department of Environment. CFI, through Newspar, had planned to re-start underground mining operations by developing the lower levels of the Blue Beach North, Tarefare, and Blowout veins.

In 1996, Roscoe Postle Associates Inc. (RPA), now part of SLR, carried out a review of previous resource estimates of the Blue Beach North and Tarefare veins, and the results of work completed on the Property by BML as well as other operators from 1984 to 1996. RPA also carried

out a preliminary resource estimate of the Blue Beach North and Tarefare veins based on available data at that time (BML, 1996).

During 1997 and 1998, BML was involved in negotiations with the Government of Newfoundland and Labrador to build a new wharf at St. Lawrence. This was considered essential for the planned production at the new mine. In 2000, BML signed an agreement with the provincial government whereby the latter agreed to provide $10 million (interest free loan) towards the construction of a new deep-water port.

In July 1998, BLM Bharti Engineering (BLM Bharti) of Toronto (currently non-existent), carried out a PFS based on the January 1998 proposal by the BML management. The BLM Bharti PFS also confirmed an earlier assessment that a deep-water port was necessary for the Project.

From May to December 1999, BML carried out diamond drilling on the Property by further testing portions of the Blue Beach North and Tarefare veins which were not tested by earlier campaigns. BML completed 8,322 m of drilling (27 holes) on the Blue Beach North Vein and 5,768 m (16 holes) on the Tarefare Vein.

In December 1999, Ross Glanville and Associates (Glanville) carried out a study on the economics and marketing of fluorspar products from the Project. Glanville concluded that the value of the Project ranged from $10 million to $20 million (BML, 2009a and 2009b, Price, 2000).

In April 2000, RPA carried out a further review of the Project and an update of the Blue Beach North Vein Mineral Resources at two different cut-off grades, for Blue Desert Mining, Inc. (Blue Desert), which was considering acquiring the Project via a reverse takeover of BML.

In June 2000, BML estimated mineral resources for the Blue Beach North and Tarefare Veins and completed a study on the economic potential of the Blue Beach North, Tarefare, and Director Veins (BML, 2000). The QP of the 2022 SLR Technical Report notes BML's 2000 mineral resources are not NI 43-101 compliant.

In June 2000, B.J. Price Geological Consultants Inc. (Price) carried out a review of the Project and prepared an update report, including Mineral Resources, for the then proposed company CFI, which was to be formed at the time by the reverse takeover of Blue Desert Mining Inc. by BML. Price concluded that approximately $3.0 million had been spent on exploration, mostly on diamond drilling by BML, up to that date (Price, 2000). The Property subsequently remained dormant from 2000 to 2008.

#### *1.5.2.3 Recent Exploration (2008 to 2015)*

Recent exploration in the Project area commenced in 2008, with a drilling program by BML. On April 16, 2009, BML was amalgamated into Canada Fluorspar (NL) Inc., and CFI commenced a program of in-fill drilling on the Tarefare and Blue Beach North veins (BML, 2008 and Wilson, 2009). More recently, CFI has carried out a program of testing the northern and southern extensions of the Director Vein and western and central parts of the AGS Vein structure.

In 2012, CFI undertook a resource evaluation program which included trenching along the southern projected strike of the Director Deposit. Grids were established over three selected areas within the Project area. Horizontal loop electromagnetic (HLEM) and magnetometer surveys were conducted over the grid areas and a subsequent diamond-drill program was planned to test the geophysical anomalies. Drilling was initiated in January of 2013 on the Director Deposit and continued to test the Hares Ears Vein structure and Grebes Nest area. Drilling in the Grebes Nest area identified a new mineralized structure, known as the AGS Deposit. In November of 2013, a NI 43-101 Technical Report was prepared by Agnerian Consulting Ltd. (Agnerian) and provided a revised resource calculation for the Director Deposit and a new resource estimate for the AGS Deposit. Additional grid construction and geophysical surveys were completed in two extensions on the AGS grid and a new grid at Clam Pond during the winter 2013 to 2014. Inclement weather encountered during the winter required a part of the planned work to be completed in the summer of 2014.

In 2014, CFI completed a major in-fill, delineation, and exploration drilling program over the AGS Deposit. Other exploration activity in 2014 consisted of grid extension and ground HLEM and magnetometer surveys at Director North Extension. A revised NI 43-101 Technical Report was

completed by Agnerian in March 2015. The drill program initiated in 2014 continued during 2015 and formed the foundation for a PFS and bankable feasibility study (BFS) on the AGS Deposit. An updated NI 43-101 Technical Report was completed in October 2015 and included the results obtained from the 2015 drill program.

The drill program initiated in 2014 continued during 2015 with an additional 84 holes for 22,265 m and formed the foundation for a revised mineral resource estimate and BFS on the AGS Deposit. Additional drilling included geotechnical and condemnation drilling. An updated NI 43-101 Technical Report was completed by Agnerian in October 2015 and included the results obtained from the 2015 drill program. Lycopodium Minerals Canada (Lycopodium) initiated the BFS in late 2015 and completed the study in 2016.

Also in 2015, CFI contracted Geotech Ltd. to complete an airborne geophysical survey of its land holdings. The helicopter borne survey used the versatile time domain electromagnetic (VTEM) plus system for locating conductive anomalies and was fitted with a cesium gradiometer for mapping geological structure and lithology. Geotech Ltd. conducted the survey between May 22 and June 7, 2015, and covered 867.20 line-km of surveying over all the CFI mineral licenses. Geotech Ltd. outlined several priority targets for follow up testing. Significant grid cutting extensions completed in late 2015 include the Mine Cove, AGS South, and Iron Springs grids. The Mine Cove and AGS South grids were extended from the main AGS Grid while the Iron Springs Grid was tied into the Director Grid originally cut in 2012.

During the 2013, 2014, and 2015 exploration programs, CFI completed 61,149 m of drilling in 287 diamond drill holes, as follows:

- 2013: 15,165 m of drilling in 80 diamond drill holes.
- 2014: 23,400 m of drilling in 112 diamond drill holes.
- 2015: 22,580 m of drilling in 89 diamond drill holes, including 57 exploration holes (18,678 m), nine geomechanical holes (total: 1,278 m), and fourteen condemnation holes (2,335 m). Fifty- eight of the exploration holes (16,457 m) were completed on the AGS grid, and nine holes (2,036 m) were completed on the Director North grid.

In total, 426 historic and recent diamond drill holes have been completed in the Project area, as follows:

- Approximately 58,747 m of drilling completed in 218 holes on the AGS Vein structure.
- More than 32,500 m on the Blue Beach North and Tarefare Veins.
- Approximately 7,065 m on the northern and southern extensions of the Director Vein.

The evolution of the Project as well as statistics of mining and exploration work is summarized in Table 1.2.

**Table 1-2: History of Exploration and Mining**

| Year | Company | Drilling (m) | No. of Holes | Comments |
|---|---|---|---|---|
| 1933 - 1941 | St. Lawrence Corp. of Nfld. | - | - | Mining Black Duck Vein |
| 1936 - 1942 | Newfluor | - | - | Mining parts of the Director and TF veins |
| 1942 - 1978 | Alcan | 11,192 | 42 | Mining upper part of Director Vein |
| 1986 - 1991 | Minworth-UK | 866 | 15 | Mining upper part of Director Vein |
| 1995 | Davy | - | - | PFS on the TF No. 2 Vein. |
| 1996 | BML | - | - | Application to use Shoal Cove Pond as a tailings facility |
| 1996 | RPA | - | - | Review of data and preliminary resource estimate of BBN and TF veins |
| 1997 - 1998 | BML | - | - | Negotiations with the provincial government regarding a new wharf at St. Lawrence. |
| 1998 | BLM Bharti | - | - | PFS on the BBN and TF veins |
| 1999 | BML | 14,090 | 43 | In-fill drilling on the BBN and TF veins |
| 1999 | Glanville | - | - | Market study on the Project |
| 2000 | RPA | - | - | Update of Mineral Resources of BBN and TF veins |
| 2000 | BML | - | - | Update of Mineral Resources of BBN, TF, and Director veins |
| 2000 | B.J. Price | - | - | Review of the Project |
| 2008 | CFI | 18,368 | 60 | In-fill drilling on the BBN and TF veins |
| 2011 | RPA | - | - | NI 43-101 Technical Report and PFS on Project |
| 2013 | RPA | - | - | NI 43-101 Technical Report and updated PFS on the Project |
| 2013 | CFI | 1,005 | 7 | Exploration drilling Hares Ears |
| 2013 | CFI | 15,165 | 80 | Director Vein extensions and western part of AGS grid and seven holes at Hares Ears |
| 2014 | CFI | 23,404 | 112 | In-fill drilling and eastern part of the AGS Vein structure |
| 2015 | CFI | 22,265 | 84 | In-fill drilling and testing eastern part of the AGS Vein structure, testing the northern extension of the Director Vein, and geomechanical and condemnation holes. |
| **Total** | | **106,355** | **443** | |

Sources: CFI-NL 2013, and Agnerian 2008, 2009, Agnerian et al., 2011, Lecuyer et al., 2013, Agnerian and Waldegger, 2013, Agnerian 2015, and CFI-NL, 2015a.

Notes:

1. BBN: Blue Beach North, TF: Tarefare.

## 1.6 Project Statements

The Project was subject to environmental assessment review under the Newfoundland and Labrador Environmental Protection Act, SNL 2002 cE-14.2. As such, CFI was required to submit an Environmental Registration Report (ERR; CFI, 2015a) and Environmental Preview Report (EPR; CFI, 2015b). Based on a review of the latter report, the Project was released from further environmental assessment (under the NL Environmental Protection Act) in November 2015 providing that several conditions were met prior to the project construction (DOEC, 2015).

In addition to the original MDP and this update, CFI has submitted the following plans to the Minister for approval (Table 1.3).

**Table 1-3: Submitted Plans**

| Title | Abbreviation | Reference | Department Submission |
|---|---|---|---|
| Mine Rehabilitation and Closure Plan | MRCP | KP, 2016a<br>KP, 2021 | IET |
| Environmental Effects Monitoring Plan | EEMP | CFI, 2017; Appendix B | ECC |
| Environmental Protection Plan | EPP | CFI, 2016b | ECC |
| Waste Management Plan | - | CFI, 2018 | ECC |
| Avifauna Management Plan | - | AMEC, 2016b | ECC |
| Contingency/Spill Response Plan | SRP | CFI, 2019 | ECC |
| Environmental Effects Monitoring Plan Addendum for the Blue Beach Marine Terminal Construction Project | - | CFI, 2020c; Appendix B | ECC |

A Construction Phase and Operations Phase Certificate of Approval has been issued to CFI under the Environmental Protection Act, SNL 2002 c E 14.2 Section 83 (Approval No. AA16-045637; DOEC, 2016). CFI has also received Development Approvals from the Town of St. Lawrence. (Town of St. Lawrence, 2015 & 2018).

CFI is committed to constructing, operating, and closing the Project in compliance with all applicable legislation. CFI will continue to obtain the necessary permits, authorizations, and approvals prior to initiating applicable works.

Any and all conditions, provisions or statements contained in this plan shall strictly be followed along with those detailed in terms, conditions, provisions or reservations of any and all permits, approvals, licences, authorizations or other instruments issued under NL provincial or federal legislation, policies and guidelines. Where a condition, provision, statement or correspondence contained in or made under this plan is inconsistent or conflicts with a term, condition, provision or reservation of NL provincial or federal legislation, policies and guidelines or a permit, approval, licence, authorization or other instrument issued under them, NL provincial or federal legislation, policies and guidelines along with terms, conditions, provisions or reservations of any and all permits and approvals, licences, authorizations or other instruments issued under NL provincial or federal legislation, policies and guidelines shall prevail to the extent of the inconsistency or conflict.

There are no designated Aboriginal lands in the St. Lawrence region and Project activities are not likely to affect Aboriginal or First Nations groups within the province.

This MDP is being submitted to fulfill requirements of sections 4(b)(i) and 6(1) of the Mining Act (Government of Newfoundland and Labrador, 1999; Chapter M-15.1).

Furthermore, the Mine Development Plan has been specifically designed to fulfill the requirements of the Government of Newfoundland and Labrador's Development Plan Guidelines (IET, September 2020).

# 2 Project Description

The Project is located primarily within the municipal boundaries of the Town of St. Lawrence on the southern tip of the Burin Peninsula, in the Province of Newfoundland and Labrador (Figure 1.1). The Project area is accessible by existing mining roads stemming from the Town of St Lawrence, which is situated along Provincial Highway 220.

In 2017, CFI started construction of an open pit fluorspar mine operation, milling facility and tailings management facility. Initial pre-production followed by full-scale production mining and mill commissioning occurred from 2018 to 2020 with commercial production levels achieved in Q2 2020. Between 2018 and summer 2021 acid-grade fluorspar concentrate was transported to a third-party export facility and marine infrastructure at Cow Head in Mortier Bay for shipping to international markets. CFI completed significant construction at the Blue Beach Marine Terminal (BBMT) located in St. Lawrence and shipped the first load of fluorspar concentrate during the summer of 2021. CFI was in the process of evaluating additional construction options to increase availability of the facility during broader weather conditions prior to receivership in February 2022.

CFI was in a state of cold idle up to June of 2023 and therefore no mine or mill operations activity occurred during that period. Activities on site were limited to security inspections, any maintenance required to upkeep infrastructure, and safety/environmental activities to remain in compliance with regulations, such as required reporting and water sampling. Upon finalization of the sale in June 2023, the new ownership team began detailed planning and scheduling to restart operations at CFI.

Since the transaction in June 2023 various projects have been completed including the construction of a new retaining wall at the Run of Mine (ROM) Tip, and refurbishment of the process plant and concentrate storage building, and infrastructure is ongoing. CFI also completed additional geotechnical drilling and engineering to produce an updated Mineral Resource Estimate (MRE) and mine designs for the Arthur Gordon Stollery (AGS) and potential South Ridge open pits.

Preproduction is expected to begin in Q3-2024 with the commencement of pioneering mining in the GNP and retreatment of 150,000 tonnes of tailings from the Tailings Management Facility (TMF), as well as the crushing and screening of DMS Rejects/Floats stockpiles, as part of the hot commissioning and restart plan. Processing of fresh ore from the GNP Pit will commence once the AGS Pit has been re-established and commissioning has been completed.

In addition to work already completed CFI has embarked on engineering studies related to the expansion/upgrading of the Blue Beach Marine Terminal (BBMT), a 2.6mtpa aggregate plant, a water treatment plant as well as the potential development of the South Ridge open pit, North Ridge (formerly Director) and Tarefare underground mines.

The planned aggregate plant will consist of a crushing and screening plant and associated infrastructure and will produce course and fine construction aggregates from waste rock mined from the AGS pit (GNP, CP, PP) as well as DMS reject streams.

The future expansion/upgrading of the BBMT will allow the export of both 200,000 dry tonnes of acid-grade $CaF_2$ concentrate and 2,600,000 dry tonnes of aggregates annually. Concentrate shipments will range between 10,000 and 15,000 tonnes while the maximum aggregate shipment BBMT will accommodate is expected to be up to 60,000 tonnes via Panamax class vessel. Engineering studies and designs to support a BBMT expansion are under review prior to advancing to a final design stage. Once confirmed, expansion details will be included in a revision to the MDP.

Mine development of the potential South Ridge open pit is expected to commence in Q4-2026. The potential North Ridge (formerly Director) and Tarefare underground mine development is expected to start in 2029 and 20232 respectively. Preliminary designs for the potential South Ridge open pit as well as the potential North Ridge and Tarefare underground mines have been completed, and detail engineering, environmental assessments and regulatory approvals will be completed ahead of planned development. Once these projects have been registered and released from the environmental assessment process, they will be included in an amendment to the development plan and rehabilitation and closure plan.

Once engineering and feasibility studies for these projects have been completed CFI will submit revised Mine Development Plans and Rehabilitation and Closure Plans.

## 2.1 Geographical Location

The St. Lawrence property is located near the southern tip of the Burin Peninsula, adjacent to the Town of St. Lawrence. The Town is located 210 kilometres southwest of St. John's, Newfoundland, Canada (Figure 1.1). Access to the area is via an all-weather-paved road 350 kilometres distance (via the Trans Canada Highway and Routes 210/220) from St. John's to the Town of St. Lawrence, Newfoundland. No commercial air transportation or rail service is available to the area. The property held by Canada Fluorspar (NL) Inc. is described in Section 2.6.

The Mine and AGS Mill sites are located entirely within the municipal boundaries of the Town of St. Lawrence. The Blue Beach Marine Terminal is located in Blue Beach Cove, east of the Mine site.

The Project is located within the Eastern Hyper-Oceanic Barren Ecoregion. This ecoregion is dominated by blanket bogs, stunted balsam fir, and coastal barrens. The topography in the area ecoregion is flat to rolling with subtle changes in relief. Elevations range from 0 m to approximately 200 m above sea level (CFI, 2015a; Figure 2.1).

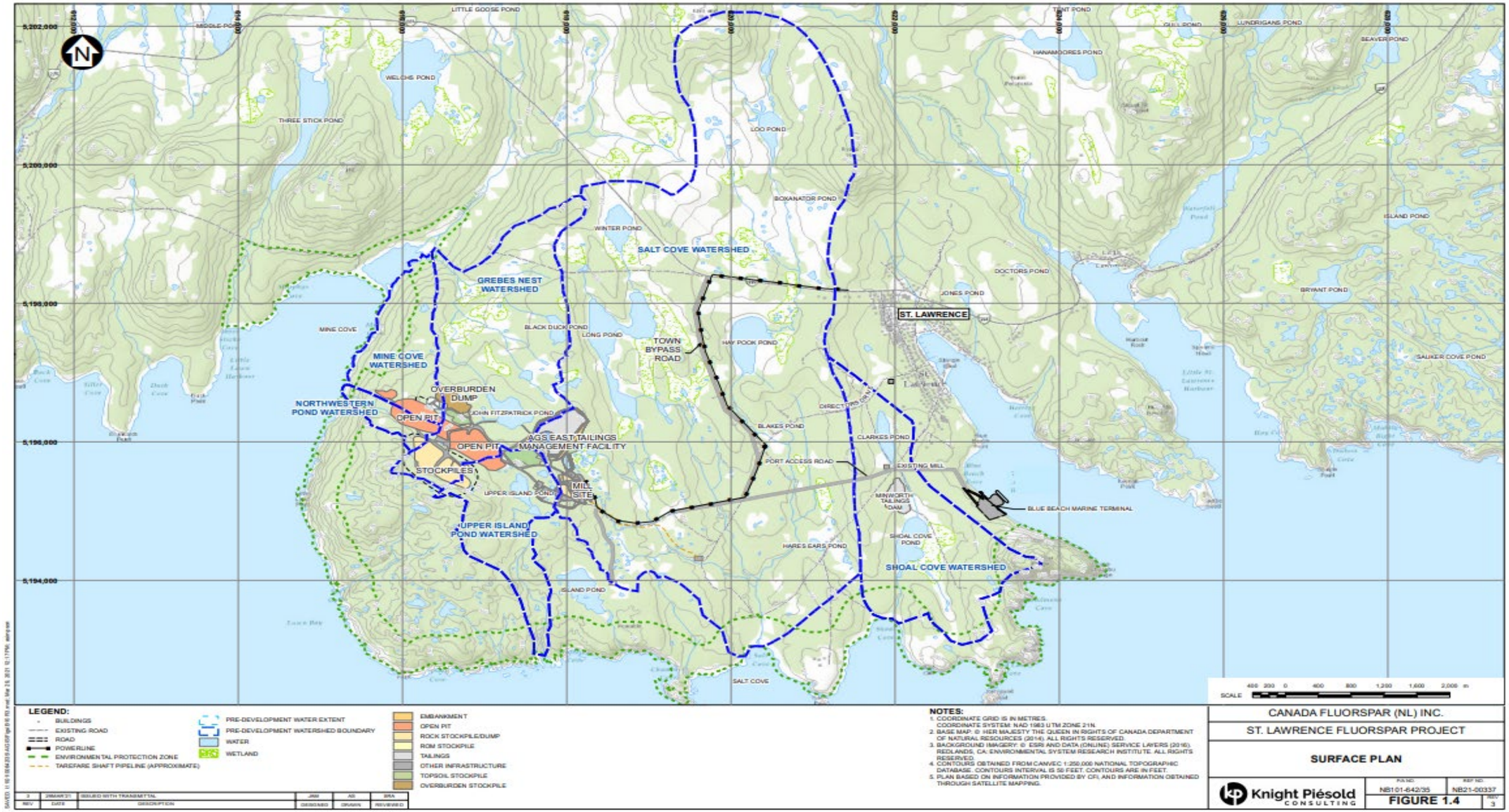



**Figure 2-1: Surface Plan**

## 2.2 Detailed Project Description

The Project includes five main components, as follows:

- AGS Open Pit consisting of two phased pits (GNP and CP) that include four previous pits (GNP, CP, OCP, PP)
- A process plant to produce acid-grade fluorspar concentrate
- A Tailings Management Facility (TMF)
- A Marine Export Facility (Blue Beach Marine Terminal)
- Various infrastructure to support the mining, milling, and transportation of fluorspar concentrate and aggregate products

CFI is continuing to develop the St. Lawrence Fluorspar Project, which includes the construction, operation, rehabilitation, and closure of a surface fluorspar Mine, a Mill, a Tailings Management Facility (TMF), marine export facility, and ancillary infrastructure.

The scope of this MDP, as described herein, includes continued operation of existing project components as well as recent and near future development of the following project components (expected within the next 5 years):

- Mine Site Components:
    - AGS Open pit in the 2016 MDP AGS consisted of four separate open pits, Grebes Nest Pit Center Pit, Open Cut Pit and, Pond Pit
    - South Waste Rock Facility
    - North Waste Rock Facility
    - Overburden and Topsoil (organics) Stockpiles
    - AGS East Tailings Management Facility
    - Mobile equipment workshops, mine dry and offices
- Mill Site Components:
    - Mill/Concentrator Building
    - Storage Buildings and Maintenance facilities
    - Administration building, Mill office and dry

  - Warehouse
- Blue Beach Marine Terminal (BBMT)
  - Site buildings - including security building, office/breakroom, control room, washroom facility.
  - Fluorspar concentrate storage area
  - Access roads and discharge/unloading area
  - Power supply and distribution system
  - Water supply (potable)
  - Marine infrastructure including temporary mooring buoys and fenders
  - Ship loading equipment, including a conveyor system
  - Runoff water management components including a sediment basin and diversion ditches.

CFI will continue to use the BBMT once in production and during the expansion/upgrading of the Blue Beach facility to ship Fluorspar concentrate and DMS rejects as aggregate. In instances where either construction activities or adverse weather conditions prevent the use of the BBMT, CFI will make use of third-party export facilities, although this is planned to be minimal and limited to the first year of production. The main concentrate haul route is illustrated on Figure 1.2 and contains 5.5 km of roadway access from the Mill and along site roads which all fall under existing CFI surface leases.

In addition to the primary project components listed above, CFI has completed partial rehabilitation of Shoal Cove Pond adjacent to the former Minworth Tailings Dam (as discussed in Amec Foster Wheeler (AMEC, 2016b; Appendix A). Shoal Cove Pond contains historic tailings which were produced by previous mining operations (i.e. not CFI); however, they were not remediated prior to 2016 to the extent that potential environmental effects would be completely mitigated. As such, CFI has carried out some remediation to alleviate concerns for the environment (with the exception of a breakwater). It should be noted that responsibility and/or liability for the former tailings is not being assumed or considered.

The project has an expected Life of Mine (LOM) of 8 years excluding active and passive closure and will produce 1.4 million tonnes of acid-grade fluorspar concentrate in addition to concentrate previously produced between 2018 and 2022. This concentrate will continue to be shipped to international markets via the BBMT as well as third-party export facilities, although this is expected to be minimal and limited to Fluorspar concentrate. The BBMT will also be used to export 200,000T DMS rejects annually in aggregate products to local and international markets.

CFI will systematically continue infill drilling within the AGS pit and potential exploration activities on its other mineral licences and mining leases for the purposes of deposit definition, resource expansion, and eventual advancements to prefeasibility level mine design. The Project has a planned life, post receivership, of approximately 8 years as illustrated in the Project schedule (Figure 2.2) and outlined below.

1. **AGS Engineering and Refurbishment Phase (Q2-2023 – Q3-2024):** Various projects have been completed including the construction of a new retaining wall at the Run of Mine (ROM) Tip, and refurbishment of the process plant and infrastructure is ongoing. CFI also completed additional geotechnical drilling and engineering to produce an updated Mineral Resource Estimate (MRE) and mine designs for the Arthur Gordon Stollery (AGS) and potential South Ridge open pits. In addition to work already completed CFI has embarked on engineering studies related to the retreatment of tailings, expansion/upgrading of the Blue Beach Marine Terminal (BBMT), a 2.6mtpa aggregate plant, a water treatment plant as well as the potential development of the South Ridge open pit, North Ridge (formerly Director) and Tarefare underground mines. Cold commissioning of the process plant will also be completed during this phase in preparation for the start of production.

2. **Pre-Production and Commissioning Phase (Q3-2024 to Q4-2025):** The start of production phase 1 will commence with hot commissioning of the mill in Q3-2024 with the reprocessing of 150,000 tonnes of tailings. At the same time, the existing crushing and screening circuit will be recommissioned and will be used to produce approximately 200,000 tonnes of DMS reject aggregate for sale to local and export markets. Procurement of the mining contractor was completed in May 2024, and it is expected that stripping of the AGS open pit will

commence in July with cleaning and rehabilitation of the pit ramp, haul roads, and berms as well as the existing mining infrastructure. The start of production phase 2 will see the introduction of fresh ore from the AGS Open Pit produced from the GNP in the first 6 months of mining. Ramp up of the mill is expected to take 13 months from the introduction of fresh ore.

3. **Operations Phase (2026 to 2032):** Following ramp-up of the AGS process plant, nameplate production is expected in Q1 2026 and is planned to continue for the Life of Mine. Technical studies as well as environmental assessments will be completed to support future Development Plans and updated RCP.

4. **Decommissioning and Closure Phase (post-2031):** Progressive rehabilitation has been and will continue to be carried out throughout for the life of the Project. Following completion of mining, the Mine Rehabilitation and Closure Plan will be executed. This includes the rehabilitation of the open pits, Waste Rock Facilities (WRFs), and AGS East TMF.

## 2.3 Summary of Pre-Feasibility / Feasibility Study

### 2.3.1 Pre-Feasibility Summary

WorleyParsons was retained by Canada Fluorspar (NL) Inc. (CFI) to prepare a pre-feasibility Study (PFS) based on the discovered AGS deposit at its project site located in St. Lawrence, Newfoundland and Labrador. In March 2015, Agnerian Consulting Ltd. (Agnerian) prepared a Technical Report on the AGS project including an update of the Mineral Resources of the AGS deposit. The purpose of the Technical Report was to present the PFS results based on the discovery of the AGS Vein. The report included the results of exploration activities, capital and operating costs, and the cash flow model based on the AGS Vein deposit. WorleyParsons prepared this PFS report with a level of accuracy of +/-30%.

At the time of the pre-feasibility study, CFI's assets included:

- Underground mines with past production from three mineralized structures. From 1933 to 1990, previous operators, including Aluminum Company of Canada (Alcan), extracted approximately 4.6 million tonnes of fluorspar ore with average grades ranging from 40% $CaF_2$ to 58% $CaF_2$. Currently, the mines are closed.
- A conventional flotation mill, with a capacity of 80,000 tonnes per year (the Minworth Mill).
- Mine and mill infrastructure including office buildings, shops, and equipment.
- Permission received in 2010 to use Shoal Cove Pond for tailings impoundment.
- Permission for construction of a marine terminal received in November 2012 from Transport Canada, pursuant to the Navigable Waters Protection Act.
- The PFS contemplates an approximate 10-year mine life, 9 years which includes 1.7 million tonnes of $CaF_2$ concentrate produced from the class 1 and 2 resources and another 1 year or longer from the class 3 resource or other discoveries from the on-going drilling activities. Only the class 1 and class 2 resources have been included in the economic analysis.

A comprehensive breakdown of conclusions and recommendations are detailed in the 2015 Technical Report and has been attached as Appendix C.

### 2.3.2 Feasibility Summary

Lycopodium Minerals Canada Ltd (Lycopodium) was commissioned by CFI in September 2015 to provide Engineering and Procurement services and prepare the NI 43-101 compliant technical report on the Project. The purpose of this Technical Report was to provide CFI with sufficient information to determine the economic feasibility of developing the Project. The Technical Report presents the results of the Definitive Feasibility Study (DFS) for the St Lawrence Fluorspar Project, located in St Lawrence, Newfoundland, Canada. The Technical Report was prepared at the request of Canada Fluorspar Inc. (CFI).

A comprehensive breakdown of conclusions and recommendations for AGS Open Pit and Underground are detailed in the 2015 Technical Report by Lycopodium and has been attached as Appendix C.

## 2.4 Schedule

The Project has a planned life of approximately 8 years as illustrated in the Project schedule (Figure 2.2) and outlined below as well as in Appendix P.

| PROJECT COMPONENT AND ACTIVITY | Receivership | | | Restart | | | Preprod & Ramp-Up | | Operating Phase | | | | | | | Active Closure | | | Post-Closure | | | | | | | | | | Post-Flooding | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operating Year | -3 | -2 | | -1 | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | AC-1 | AC-2 | AC-3 | PC-1 | PC-2 | PC-3 | PC-4 | PC-5 | PC-6 | PC-7 | PC-8 | PC-9 | PC-10 | PC-11 | PC-12 | PC-13 | PC-14 |
| Calendar Year | 2022 | | | 2023 | | | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 |
| Calendar Quarter | Q1 Q2 Q3 Q4 | | | Q1 Q2 Q3 Q4 | | | Q1 Q2 | Q3 Q4 Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 | Q3 Q4 Q1 Q2 Q3 Q4 | | | Q1 Q2 Q3 Q4 | | | | | | | | | | | | | | | |
| **AGS SITE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Receivership** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operations Ceased | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Warm Idle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cold Idle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Conclusion of sale & transfer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **AGS Engineering and Refurbishment Phase** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Geology and Mining Technical Studies including Open Pit designs and prelim UG design | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS (GNP & CP) Dewatering | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tender and adjudication of Mining Contractor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mining Contractor Mobilization | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Process Plant Refurbishment including Retaining Wall and Crushed Ore Dome | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cold Commissioning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Preproduction & Commissioning Phase** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mining Preproduction (Infrastructure, ramps & haul roads) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Start of Producttion 1 - Tailings Retreatment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Start of Producttion 1 - Interim DMS Aggregate Production | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Start of Producttion 2 - Fresh Ore and Ramp Up to Nameplate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Operations Phase** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **AGS Open Pit** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS Phase 1 - GNP Mining | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS Phase 1 - PP Mining | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS Phase 2 - CP Mining | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS Phase 2 - OCP Mining | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **AGS Plant Production Phase** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS Plant Nameplate Production | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS Ramp Down Prodution | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DMS Aggregate Production | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Tailings Management Facility** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS East TMF Stage 2 Filling | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Progressive Rehabilitation Activities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rehabilitation of AGS Open Pit (Boulder Fencing, Signage) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rehabilitation of AGS South WRF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rehabilitation of AGS North WRF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rehabilitation of AGS Topsoil and Organics Stockpiles | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rehabilitation of AGS Construction Disturbances (Infrastructure, Laydowns, Access Roads) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Active Closure Phase Activities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Process Plant Site** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Decommission, Demolish and Remove Debris and Infrastructure from Site | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rehabilitate Disturbed Areas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Removal of Mill Site Event Pond | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Tailings Management Facility** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capping and Revegetation of AGS East TMF Tailings Surface | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Removal of Polishing Pond | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Open Pits** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flooding of AGS Pit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rehabilitation of Remaining Disturbed Areas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reconfigure Water Management Infrastructure for Closure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Post Closure Monitoring and Maintenance** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Mill Site** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chemical, Physical, and Biological Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Tailings Management Facilities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chemical, Physical, and Biological Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **AGS Open Pit** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chemical, Physical, and Biological Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **BLUE BEACH FLUORSPAR EXPORT FACILITY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Active Closure** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Removal of Equipment and Buildings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capping and Revegetation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Environmental Site Assessment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Post Closure Monitoring and Maintenance** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chemical, Physical, and Biological Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Figure 2-2: Simplified Life of Mine Schedule**

## 2.5 Site Plan

The current site plan is illustrated on Figure 2.3 which contains a site wide overview of the project. Insets for separate project areas are included as additional Figures 2.4 to 2.6 and includes overviews of the AGS mine area, the Mill, and the TMF.

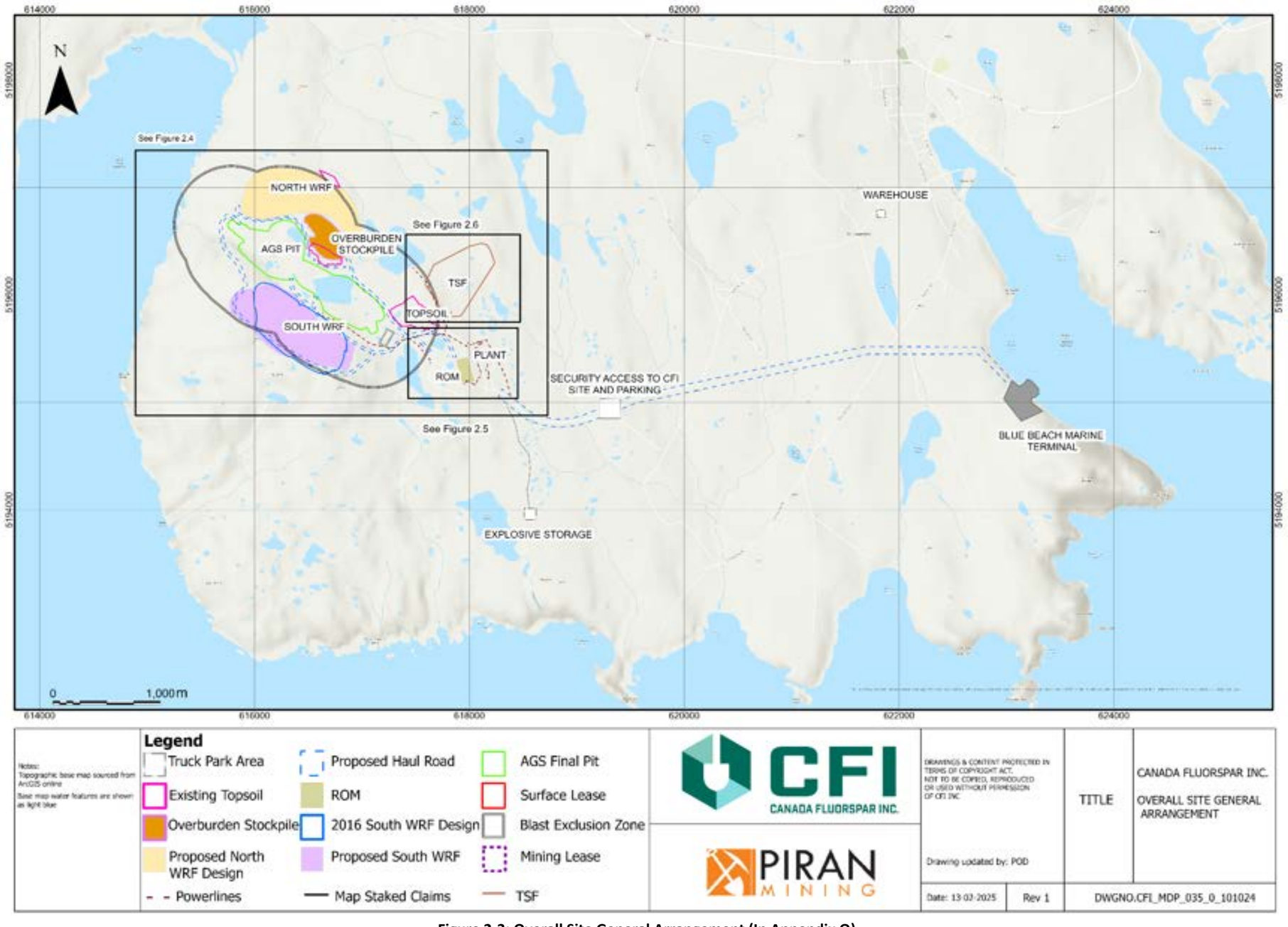



**Figure 2-3: Overall Site General Arrangement (In Appendix Q)**

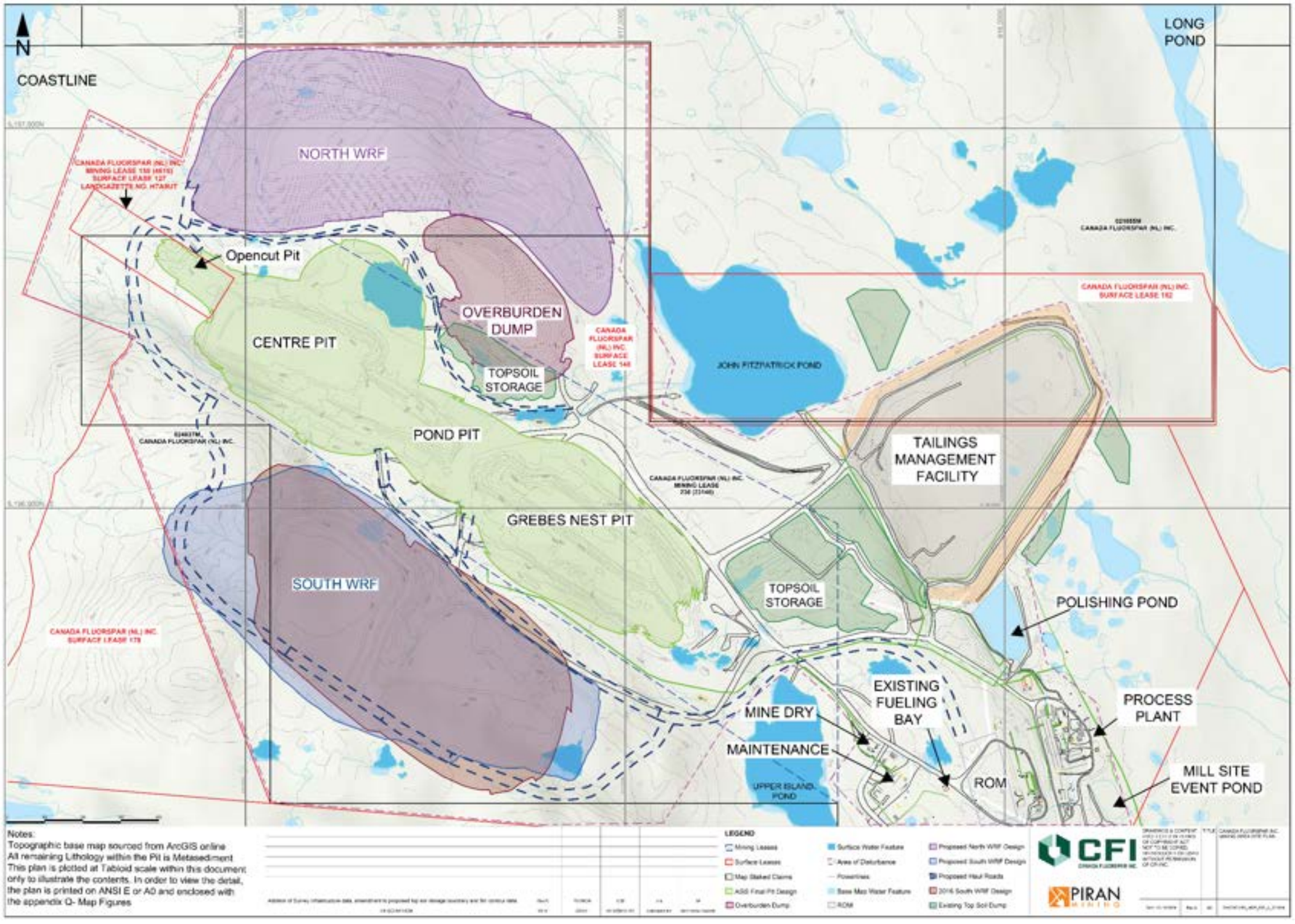



**Figure 2-4: AGS Mining Area Site Plan (In Appendix Q)**

**Figure 2-5: Mill Site Plan (In Appendix Q)**

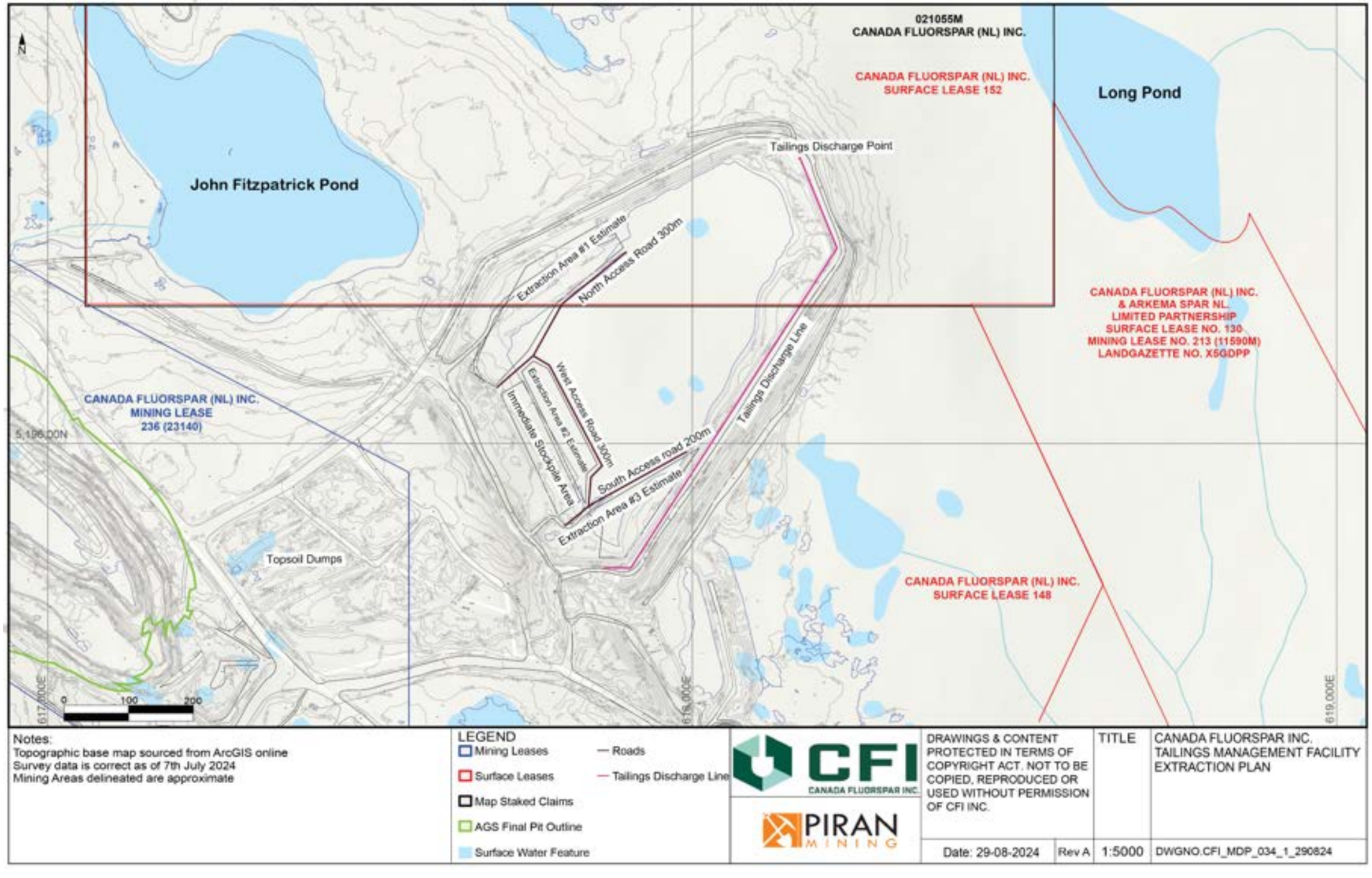



**Figure 2-6: TMF Site Plan (in Appendix Q)**

## 2.6 Leases

The St. Lawrence Fluorspar Mine Property (the Property) is comprised of five (5) mining leases and twenty (20) surface leases as described in Table 2.1 and illustrated on Figure 2.7.

**Table 2-1: Mining and Surface Leases held by Canada Fluorspar (NL) Inc.**

| Deposit | ID | Ownership | Area (ha) | Due Date | Validity Period | Expiry Date |
|---|---|---|---|---|---|---|
| **Surface Leases** | | | | | | |
| Tarefare | 130 | CFI | 153.2161 | 27-Mar-12 | 25 | 27-Mar-37 |
| Blue Beach | 131 | CFI | 95.9658 | 27-Mar-12 | 25 | 27-Mar-37 |
| Mill Site | E-11024 Parcel B | CFI | 20.0074 | 13-Aug-97 | 50 | 13-Aug-47 |
| TMF (SCP) | 133 | CFI | 97.0978 | 05-Mar-12 | 25 | 05-Mar-37 |
| Grebes Nest | 176 | CFI | 5.4875 | 01-Apr-24 | 3.42 | 01-Sep-27 |
| Director | 126 | CFI | 167.8562 | 05-Mar-12 | 25 | 05-Mar-37 |
| BB Wharf WL 1 | 128 | CFI | 16.2400 | 05-Mar-12 | 25 | 05-Mar-37 |
| BB Wharf OS 1 | 129 | CFI | 18.2800 | 05-Mar-12 | 25 | 05-Mar-37 |
| AGS | 148 | CFI | 433.1408 | 01-Apr-16 | 10 | 01-Apr-26 |
| John Fitzpatrick Pond | 152 | CFI | 59.8491 | 01-Apr-16 | 10 | 01-Apr-26 |
| Haul Road 1 | 149 | CFI | 8.7218 | 01-Apr-16 | 10 | 01-Apr-26 |
| Haul Road 2 | 150 | CFI | 10.8579 | 01-Apr-16 | 10 | 01-Apr-26 |
| Haul Road 3 | 151 | CFI | 6.6705 | 01-Apr-16 | 10 | 01-Apr-26 |
| By-Pass Road 1 | 153 | CFI | 15.6186 | 01-Apr-16 | 10 | 01-Apr-26 |
| By-Pass Road 2 | 154 | CFI | 4.5647 | 01-Apr-16 | 10 | 01-Apr-26 |
| By-Pass Road 3 | 155 | CFI | 7.2391 | 01-Apr-16 | 10 | 01-Apr-26 |
| Blue Beach OS 2 | 158 | CFI | 50.4357 | 01-Apr-19 | 7 | 01-Apr-26 |
| Blue Beach Water Lot 2 | 159 | CFI | 24.7639 | 01-Apr-19 | 7 | 01-Apr-26 |
| AGS Explosive Magazine | 161 | CFI | 13.0917 | 01-Apr-19 | 7 | 01-Apr-26 |
| AGS South WRF | 178 | CFI | 44.1537 | 01-Jun-2024 | 2.83 | 01-Apr-27 |
| **Mining Leases** | | | | | | |
| Tarefare | 213 | CFI | 185.5081 | 27-May-12 | 25 | 27-May-37 |
| Blue Beach | 214 | CFI | 106.2397 | 27-May-12 | 25 | 27-May-37 |
| Director | 212 | CFI | 177.9326 | 05-May-12 | 25 | 05-May-37 |
| Grebes Nest | 150 | CFI | 5.4866 | 01-Aug-22 | 5 | 01-Aug-27 |
| AGS | 236 | CFI | 107.9555 | 01-Apr-16 | 10 | 01-Apr-26 |

### 2.6.1 Blue Beach Marine Terminal

The Blue Beach Marine Terminal is located within the boundaries of Surface Lease (158 & 129) & Water Lot (128 & 159) along the southwestern shore of Great St. Lawrence Harbour near Blue Beach.

The access road to the BBMT was constructed in 2020. As of July 29, 2021, CFI had substantially completed earthworks and shoreline improvements at the BBMT. On this same date, the BBMT received its first bulk carrier at the facility and completed ship loading of fluorspar concentrate with the assistance of a barge moored between the shoreline and the ship

As of June 2023, the BBMT included the following major components:

- Port Access Road
- Marine infrastructure, including a barge, mooring buoys, and fenders
- Ship loading equipment, including a conveyor system
- Security building (sea container)
- Office-breakroom and control room sea containers (temporarily relocated)
- Power and water supply and distribution systems
- DMS Reject / Aggregate discharge and stockpile areas (75,000 t capacity)
- Water management components for surface water run-off

### 2.6.2 AGS Mine and Mill Site

CFI's land tenure is summarized in Tables 2.1 and 2.2 and illustrated on Figure 2.7. CFI presently holds 8 mineral licences, which includes three (3) licences (No. 021055M, 021479M, and 022121M) that have been optioned and transferred to CFI from Newfoundland Fluorspar Exploration Ltd. These licences account for a total of 257 claims covering 6,425 ha. The footprint of the Project falls within four (4) license boundaries (021055M, 024837M, 023140M, and 023139M). CFI plans to continue exploration of the remaining licenses and will update the project description and development plan as further resources are identified.

Project surface infrastructure is located within Surface Leases 176 (formerly 127), 130, and 148, through 155 held by CFI. The Shoal Cove Pond remediation measures are located within Surface Lease 133. The remaining surface leases cover areas current expansion (such as the Blue Beach port facility) as well as areas associated with previous mining activities (such as the existing mill).

A recent application was submitted and approved for Surface Lease 178 which would cover an expansion area for the existing South Waste Rock Facility. At the time of this report, the legal survey and application documentation has been submitted and is currently under review with the Mineral Lands branch of IET.

Open pit mining previously occurred and is planned for areas within the held mining leases 150 and 236 as shown on Figure 2.7. Additional potential resources are being evaluated within leases 212, 213, 214, and 236 and CFI mineral licence holdings.

### 2.6.3 Town Bypass Road

The Town Bypass Road is located within the boundaries of CFI's Mineral Licenses (023140M and 023139M) and surface leases (149, 130, 150, 154, 126, 153). The Town Bypass Road is shown on Figure 2.3.

### 2.6.4 Port Access Road (Blue Beach Marine Terminal)

The Port Access Road is located within the boundaries of CFI's Mineral Licenses (023140M and 023139M) and surface leases (126, 133, 150, and 151).

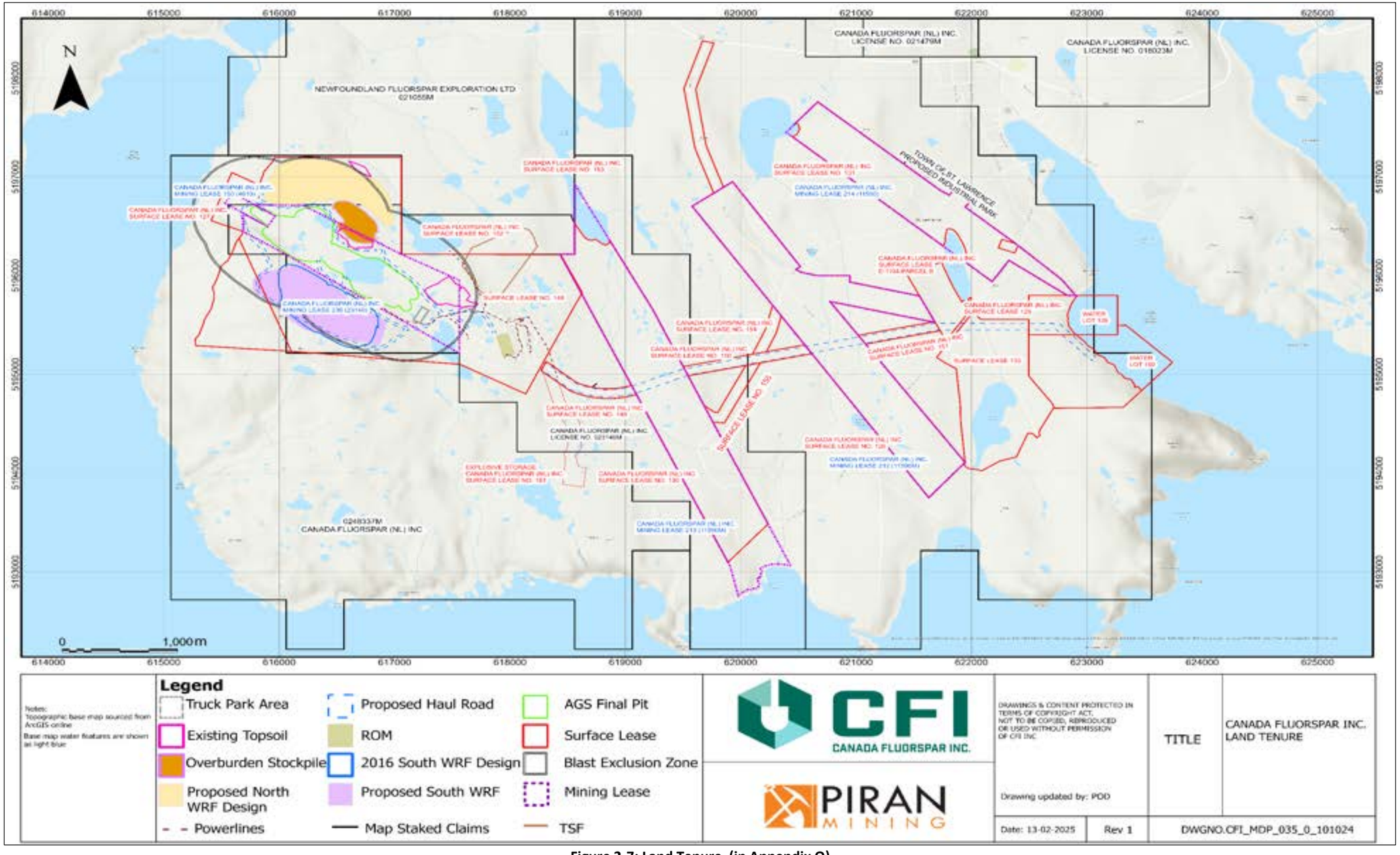



**Figure 2-7: Land Tenure (in Appendix Q)**

## 2.7 Claims

CFI presently holds 8 mineral licences, which includes three (3) licences (No. 021055M, 021479M, and 022121M) that have been optioned and transferred to CFI from Newfoundland Fluorspar Exploration Ltd. These licences account for a total of 257 claims covering 6,425 ha. The footprint of the Project falls within four (4) license boundaries (021055M, 024837M, 023140M, and 023139M). CFI plans to continue exploration of the remaining licenses and will update the project description and development plan as further resources are identified.

**Table 2-2: Mineral Licences held by Canada Fluorspar (NL) Inc.**

| License No. | No. Claims | No. Hectares | NTS Map Sheet | Issuance Date | License Renewal |
|---|---|---|---|---|---|
| 018023M | 8 | 200 | 01L/14 | 21-Oct-10 | 21-Oct-25 |
| 021055M | 27 | 675 | 01L/14 | 19-Feb-07 | 19-Feb-27 |
| 021479M | 19 | 475 | 01L/14 | 11-Jan-10 | 11-Jan-30 |
| 022121M | 11 | 275 | 01L/14 | 22-Feb-07 | 22-Feb-27 |
| 022721M | 27 | 675 | 01L/14 | 19-Feb-07 | 19-Feb-27 |
| 023139M | 81 | 2025 | 01L/14 | 18-May-95 | 19-May-25 |
| 023140M | 37 | 925 | 01L/14 | 18-May-95 | 19-May-25 |
| 024837M | 47 | 1175 | 01L/14 | 09-Dec-10 | 09-Dec-25 |

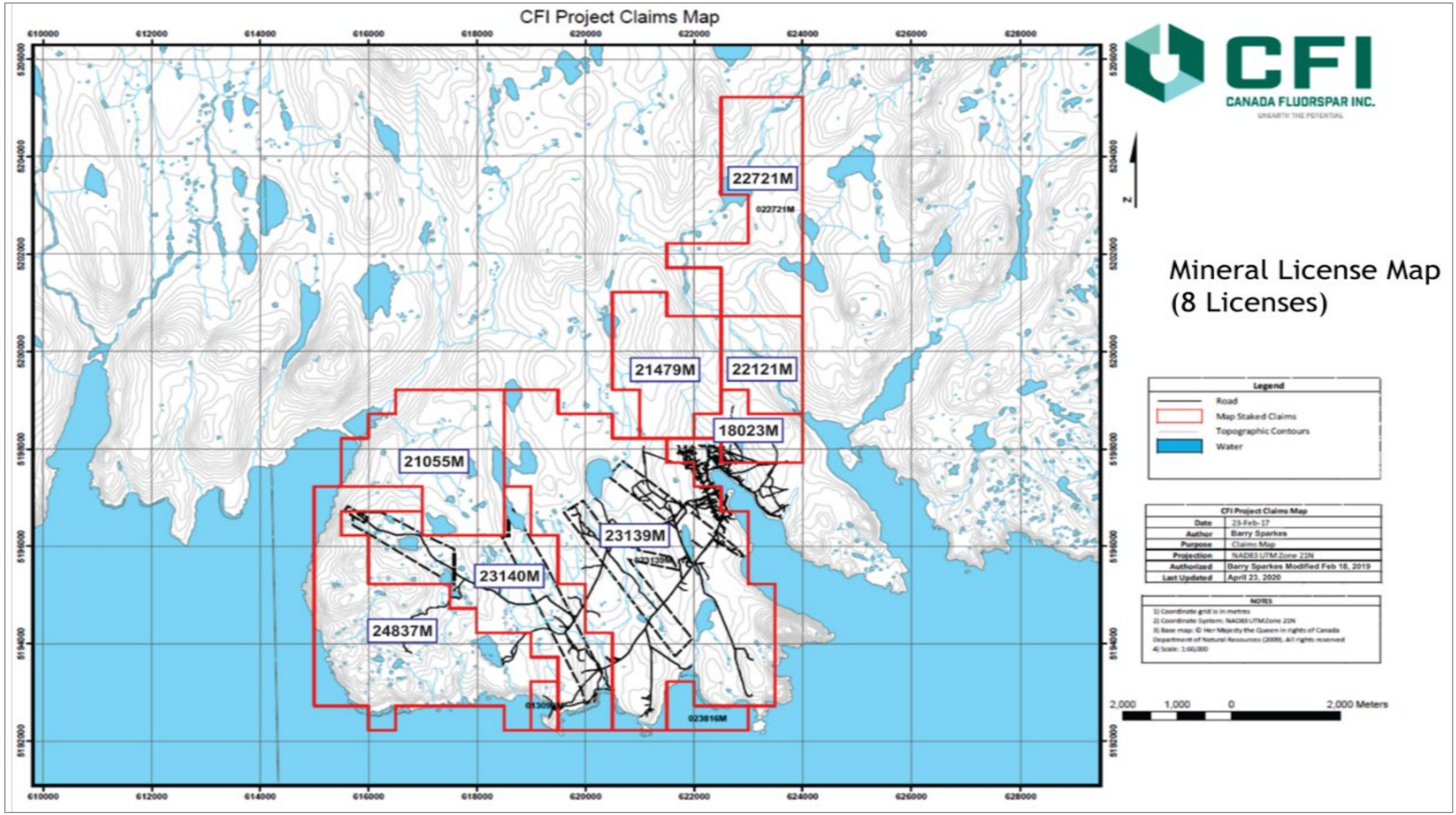



**Figure 2-8: Mineral Licence and Mine Lease Map**

## 2.8 Joint Ventures and Partner Agreements

CFI is wholly owned by Renova Capital and does not have any Joint Venture or Partnership agreements in place.

# 3 Geology and Exploration

The following discussion on the St Lawrence Fluorspar Project geology is taken from various publications including the Mineral Resource Estimate technical report (Wheeler, 2023) and the Technical Report on the St. Lawrence Fluorspar Project (SLR, 2022) with reference and support from historical and previous technical reports from the Project. Previous publications include the AGS Deposit Preliminary Feasibility Study (WorleyParsons et al., 2015), AGS Project Feasibility Study (Lycopodium, 2016), Magyarosi et, al., (2019), Deposit Resource Updates by AGP Mining (AGS Deposit Resource Update, 2022) and various internal CFI documents.

The CFI deposits are hosted by the St. Lawrence Granite (SLG), rhyolite or meta-sedimentary units. The SLG was formed within the Avalonian belt of the Appalachian Mountain system in eastern Newfoundland. The AGS Deposit was discovered in 2013. The AGS Deposit consists of over 60 individually interpreted veins over a strike length of 1,200 m. Diamond drilling encountered various absent intervals (recorded as 'void'), which with subsequent mining were shown to be parts where fault gouge had been washed out. This clay material led to problems with mining and processing.

The AGS North Deposit, previously known as Mine Cove, is located about 1 km north of the AGS deposit. It was discovered relatively recently in 2019. It is also hosted in meta-sediments and rhyolite. It is dominated by two veins which are approximately 900 m long.

## 3.1 Regional Geological Setting

The St. Lawrence Granite is formed within the Avalonian belt of the Appalachian Mountain system in eastern Newfoundland. The Avalonian belt covers an area of over 200 km in width on land and extends for more 400 km offshore. This sequence is characterized by sections of thick, dominantly sub aerial, volcanic rocks and marine to terrestrial clastic sedimentary rocks of late Precambrian age. Shallow marine sedimentary and minor volcanic rocks of Cambrian age overlie

these older lithologies. An angular unconformity lies between the Cambrian rocks and the younger Devonian and Carboniferous sedimentary and volcanic rocks.

Several late Precambrian and late Devonian to Carboniferous aged granites intruded the Avalonian belt rocks. These magmas were generated and emplaced in a variety of arc and back arc or analogous continental arc settings along the length of the Avalonian belt between 635 Ma and 550 Ma. The calc-alkaline rocks erupted as subaerial caldera pyroclastic rocks, flows and domes. The felsic-to intermediate magmas were the most probable source of the heat and fluids for the large, spatially associated, hydrothermal systems. Folding and thrust faulting of the Cambrian and older sequences preceded the intrusion of the Late Devonian age St. Lawrence granite (SLG).

The St. Lawrence Granite intrudes the shales and limestones of the Brigus Formation and the Late Proterozoic volcanics of the Burin Series. Van Alstine (1948) described the granite as an alaskite type, derived from a highly differentiated magma that was intruded with very little assimilation of the surrounding country rock. The granite has a typical porphyritic texture with three well-developed joint sets. One set parallels the north-south elongate trend of the granite, a second set is normal to the north-south trend and a third set is horizontal. Quartz porphyry dykes and sills have been observed in the area and appear to have a similar chemical composition as the granite. These dykes and sills are considered to have come from the same source as the granite.

Teng (1974) suggests that the granite was emplaced in four separate stages. The first phase introduced the rhyolite sills and dykes to the area. The remaining phases introduced larger volumes of magma with associated volatiles carrying the mineralization and causing the associated alteration. Recent field work has identified an apparent later phase of rhyolite dykes that have been observed to cut the granite in the St. Lawrence area.

The SLG pluton has been radiometrically age dated as 315+/- 10 Ma. This age places the granite in the Lower Pennsylvanian age (Bell and Bleinkensop 1976). More recent age dating research on the SLG using U-Pb zircon ages by Kerr, Dunning and Tucker in 1993 returned an age of 374 +/-2 Ma. This latest age determination places the SLG in the Late Devonian period. Recent U-Pb

zircon age dating of the rhyolite sills at AGS by Greg Dunning returned a preliminary age of 377 +/- 1.3 Ma (Magyarosi and Sparkes, 2019). This age is consistent with the SLG age within error limits, supporting the Teng (1974) emplacement hypothesis and observations from CFI geologists.

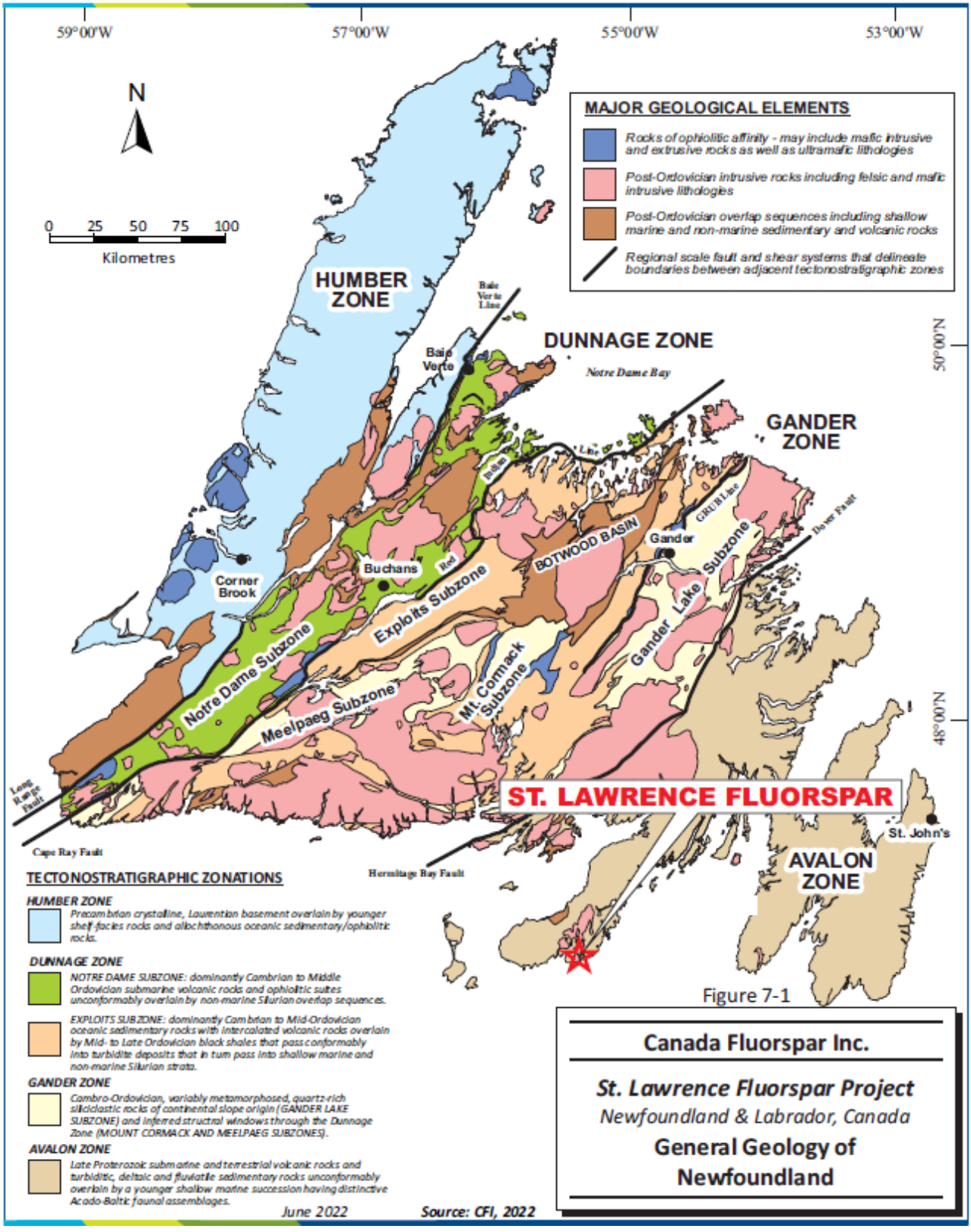



**Figure 3-1: General Geology of Newfoundland**

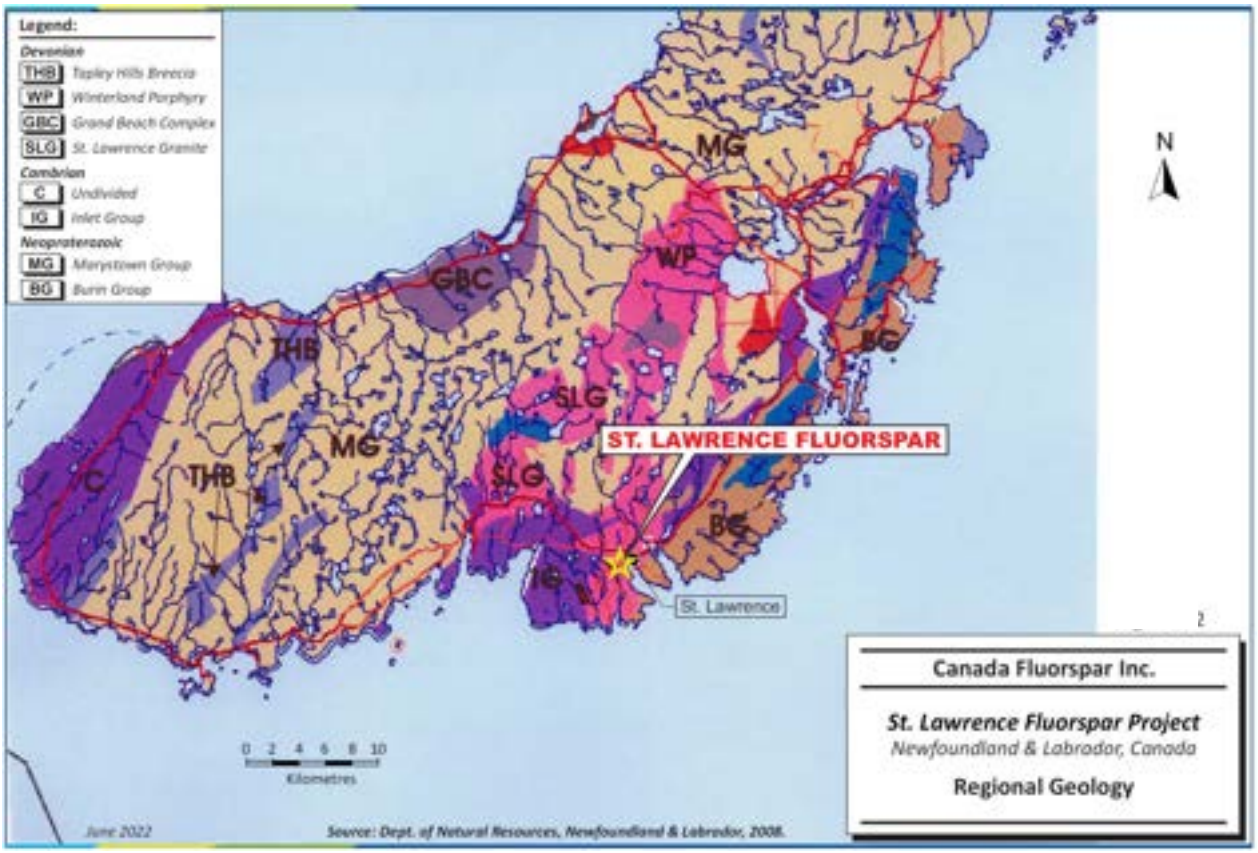



**Figure 3-2: Regional Geology**

## 3.2 Local Geological Setting

The St. Lawrence granite is host to over 40 significant fluorite bearing veins. These veins vary in width from a few centimetres to locally over 30 m, with a strike length ranging up to 3 km. The host rock is a porphyritic peralkaline granite pluton of Late Devonian age that has intruded Late Precambrian and Cambrian volcanic and sedimentary rocks. The grain size is characteristic of intrusive rocks and exhibits a decrease in grain size toward the contact with the older rocks. Within the granite, tuffisite, comprised of angular granite fragments in a fine matrix has been observed. Miarolitic structures are present in the granite adjacent to the contacts with the older rocks. Pink quartz-feldspar porphyry dykes are present within the granite batholith and outside the western margin of the granite intrusion.

The fluorite veins in the granite are associated with jointing and faulting within the batholith. The thicker fluorite veins exhibit features commonly associated with multiple periods of

movement (rehealed breccia) and fluid injection (multiple cross cutting veins). The veins exhibit features that are characteristic of boudinage type structures with a variation in thickness along strike and with depth. The veins contain higher grade pods or lenses and varying amounts of mineralized granite breccias along one or both sides of the vein structure.

Historically, fluorite mineralization in the St. Lawrence area has been associated with the granite batholith and past exploration has been directed toward areas known to be underlain by granite. The diamond drill program completed during 2013, identified a significant fluorite bearing structure hosted in the meta-sediments. Subsequent drill programs conducted in 2014 and 2015 have confirmed and defined a fluorite resource at AGS. Rhyolite sills and dykes are known to intrude the area containing the mineralized structure in the meta-sediments. As a result of the data obtained from the 2013-2015 drill programs, the number of major types of fluorite veins that have been identified in the area has been expanded to four. They are as follows:

- Low grade veins with an average width of 7.0 m and containing grades that vary from 35% to 70% $CaF_2$. This type of vein commonly has a north-south trend and includes Tarefare, North/South Ridge, Hares Ears and Blue Beach North and South veins;
- High grade veins with an average thickness of less than 1-metre and containing grades averaging 95% $CaF_2$. This type of vein commonly has an east-west trend and includes Black Duck, Lord and Lady Gulch, Iron Springs and Canal veins;
- Northwest-southeast trending veins identified in the meta-sediments and containing high grade mineralization of 30% to 80% $CaF_2$ over widths of 1 to 6 metres. The AGS Vein is presently the only known example of this type of vein; and
- The fourth type includes veins in the peripheral areas containing significant amounts of barite with fluorite. This type of vein is also commonly east-west trending and includes Meadow Woods, Lunch Pond, Clam Pond and Anchor Drogue veins.

Van Alstine, 1948, suggested that the mineralized veins in the peripheral areas of the SLG pluton might extend to a greater depth than those in the more central areas due to the effects of erosion.

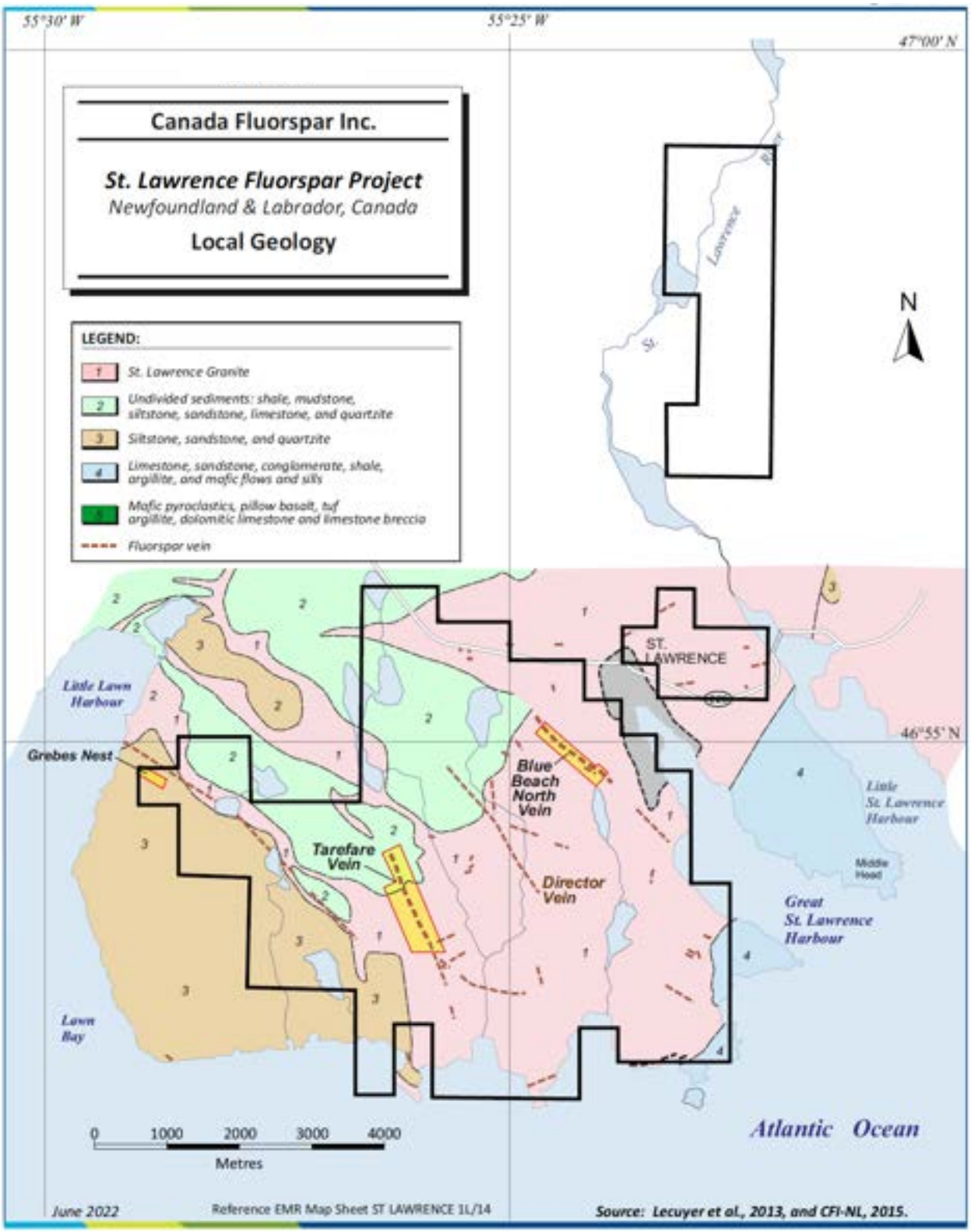



**Figure 3-3: Local Geology**

### 3.2.1 Property Geology

In general, seven rock types are recognized in the current drilling area on the Property. These are described below.

1. **St. Lawrence Granite (SLG):** Red, medium to coarse grained granite with porphyritic texture. Red to pink feldspar phenocrysts commonly present in a predominantly siliceous (quartz) matrix. Miarolitic cavities (2 - 5 mm) and vuggy quartz veins are common. In places, hematitic and manganese oxide staining along fractures is also present. Brecciated zones and calcite veinlets are common, and occasional intersections with chloritic-pyrophyllite alteration, up to 30 m wide, are also present. SLG is the dominant rock type throughout the Blue Beach North Vein area.
2. **Tuffisite:** This is a local name given to the fragmental variety of the SLG. It is commonly present as 0.5 m - 2.0 m intersections of dark brown-red, medium to coarse grained fragmental rock, with occasional banded texture. In general, tuffisite is associated with brecciated granite in the footwall (FW) contact of the fluorite vein. Several tuffisite intersections on both sides of the mineralized structure are present however, where they are associated with fluorite mineralization. The Blue Beach North Vein is associated with one of the largest tuffisite zones.
3. **Blastonite:** Also, a local name, describing a brecciated fluorite cemented by a mixture of microcrystalline quartz and fluorite. In places it exhibits faint banding and resembles mylonite. Blastonite may be present in different parts of the assemblage but is more commonly adjacent to and associated with the hanging wall (HW) contact of the fluorite vein.
4. **Fluorite Veins:** There are a range of different vein types, associated with different depositional phases, along with intervals of faulting with quartz/carbonate veining. This in turn has led to wide range of $CaF_2$ grades associated with the different vein types. Veins are generally steeply dipping and also vary greatly in width from 10s of centimetres to 10s of metres.
5. **Meta-sedimentary Rocks:** Also known as argillite in historic mine terminology, this is comprised of dark green to black chloritic schist which overlie the SLG and covers the

northern part of the Tarefare Vein. Concurrently, the SLG has been identified beneath the meta-sediments in the AGS and AGS North areas of the Property. Near the contact zone with the SLG, large blocks (greater than or equal to one metre) of the SLG occur within these meta-sedimentary rocks. These rocks exhibit local chlorite and potassic alteration, finely laminated bedding, and locally massive darker black-grey siliceous intervals.

6. **Rhyolite:** Consists of fine grained, pink-orange-red quartz-feldspar porphyry which contains quartz and feldspar phenocrysts in a fine-grained matrix. The meta-sediments overlying the SLG are cut by rhyolite sills and dykes. The sills have a low angle dip to the northeast and vary in thickness from less than a metre to in excess of 10 m. At least two and possibly more ages of rhyolite sills and dykes have been identified cutting the meta-sediments. The presence or absence of magnetite in the rhyolite intrusions is a distinguishing feature. Rhyolite dykes have also been observed to cut the granite. Fluorite mineralization in the AGS structure is possibly related to the intrusion of the rhyolite sills into the meta-sediments.
7. **Mafic Dyke:** Dark green, fine-grained rock of basaltic or lamprophyre composition. These rocks have been observed particularly near the south end of the Blue Beach North Vein. They are often intensely fragmented and altered to chlorite. It is possible that these dykes are of Cretaceous age (Harris et al., 2000).

In general, there are two sets of fractures and faults interpreted to be present on the Property. These are northwest and northeast trending faults. Neither one of these structures has been clearly identified in the drilling completed to date, although numerous fracture zones have been recorded in the drill logs. The isopach map of depth to the contact between the SLG and the overlying shale in the Tarefare Vein area indicates these two structures.

## 3.3 Mineralization

The following mineralization description is detailed from the 2023 Mineral Resource Estimate Technical Report. Review of the style of mineralization on the Property suggests that fine grained

quartz and fluorite are commonly present, and they occur as fine grained to microcrystalline intergrowths. The types of occurrences are described as follows:

- **Blastonite:** This is the name given to rock that is brecciated, with relatively coarse crystalline fluorite in a matrix of microcrystalline quartz and fluorite. This is also a local name, describing a brecciated fluorite cemented by a mixture of microcrystalline quartz and fluorite, and a specific gravity of the order of 2.83. In places, it exhibits faint banding and resembles mylonite. Blastonite may be present in different parts of the assemblage, but is more commonly adjacent to, and associated with, the HW contact of the fluorite vein when hosted by the SLG. At AGS, Blastonite is common but less abundant than the SLG hosted deposits. Blastonite and quartz-breccia veins are normally thin (2.0 - 15 cm in width) but locally reach greater widths. Commonly, it is associated with green-white fluorite veining hosted within a late fault zone that cuts the earlier main-phase fluorite deposition.
- **Nodular ore:** Microcrystalline quartz is present as zoned material around brecciated granite fragments on which fluorite nucleation has occurred. This is locally termed as 'nodular ore'. Nodules with granite centres are most common adjacent to the vein walls and can vary in size from a few millimetres to many centimetres in diameter. In the centre of a vein nodular ore more often contains earlier fluorite at its centre, however, all nodules exhibit similar banding of fluorite and intergrown microcrystalline quartz and fluorite (Wilson, 2008); and
- **Banded veins:** Veins exhibiting rhythmic deposition of fluorite in parts of all the veins on the Property. Typically, this occurs as very thin bands of fluorite (one millimetre to two millimetres each) forming a one centimetre to two-centimetre-thick banded vein bounded by more massive fluorite veins (0.5 cm to one centimetre) or aggregates of fine-grained quartz and fluorite in intimate intergrowth.

Fluorite mineralization in the Project area commonly occurs within veins. The thickness of individual mineralized zones ranges from less than one metre to locally over 30 m, with an average thickness ranging from 2.0 m to 7.0 m. The most common gangue mineral is quartz,

occurring in “blastonite” – although this is less abundant at the AGS Vein. Nodular forms of fluorite and calcite are common in larger veins, predominately along the FW. Calcite occurs in nearly all the fluorite veins, particularly in the eastern portion of the AGS grid and is related to late-stage faulting.

The St. Lawrence area of Newfoundland hosts over 40 fluorspar veins, predominantly within granitic rocks of Late Devonian age. Recent exploration has demonstrated that significant amounts of fluorite mineralization are also hosted by late Proterozoic meta-sedimentary rocks and undated rhyolitic sills, such as at the AGS Vein. Only a few of these, however, contain significant Mineral Resources and have been mined in the past. These include the North/South Ridge, Blue Beach North, Tarefare, Iron Spring, and Black Duck veins. The AGS Vein, although with some historic work, has recently been explored in detail and contains significant fluorspar resources.

The fluorspar veins are complex structures, commonly along fault zones within the SLG and related porphyries, meta-sedimentary rocks, and rhyolite dikes and sills at AGS. Commonly, the faults exhibit evidence for multiple episodes of movement. Typically, the veins have a high-grade core, and irregular amounts of mineralized brecciated granitic material along one or both walls. Regarding content, four major types of fluorite veins are recognized, as follows:

- Moderate to low grade veins, with grades ranging from 35% $CaF_2$ to 70% $CaF_2$, over widths commonly ranging from 5 m to 7 m, such as the North/South Ridge, Tarefare, Hares Ears, and Blue Beach North, and South veins. These veins commonly trend north;
- High grade veins, with an average thickness of less than one metre and grades averaging 95% $CaF_2$, such as the Black Duck, Lord and Lady Gulch, Iron Springs, and Canal veins. These veins commonly trend east;
- Moderate to high grade northwest trending veins identified in the meta-sediments and containing high grade mineralization of 30% $CaF_2$ to 80% $CaF_2$ over widths ranging from 1 m to 25 m. The AGS Vein is presently the only known significant example of this vein type;

- Mine Cove. The historic Mine Cove (AGS North) occurrence likely represents another example of this vein type; and occurs in the peripheral region and have significant barite intergrown with fluorite, such as the Meadow Woods, Lunch Pond, Clam Pond, and Anchor Drogue veins. These veins commonly trend east.

Fluorite is mostly massive and coarsely crystalline, filling veins. Close to the vein walls, the fluorite is commonly finely banded, suggesting a rhythmic deposition. In the larger veins, fluorite surrounds sharp fragments of granite. Fluorite occurs in a wide variety of colours. Garrison (1927) attributed this feature to the presence of hydrocarbons oxidized at the time of crystallization. Conversely, Tilsley (1975), suggests that colour in fluorite is caused by atomic disorder in the crystal rather than chemical impurities. Tilsley further reports that coloured fluorite crystals may dissolve in water as much as two and a half times as rapidly as the clear variety.

### 3.3.1 AGS Vein System

Most recent drill exploration has concentrated on the AGS Deposit. The main features of AGS include:

- The AGS deposit is located approximately 6km west of the town of St. Lawrence and is the most advanced of all the deposits in the Project. The deposit was discovered in 2013 and became an operating open pit mine in 2017 and continued until operations were suspended in February 2022, due to insolvency proceedings;
- The deposit consists of over 60 individually interpreted veins that are hosted in rhyolite and meta-sediment units and occur over a strike length of 1,200 m. The main trend of the veins is oriented at an azimuth of approximately 305° with veins varying from less than 20 m to up to 1,000 m (for the GP2 vein) in length and from less than 1 m to up to 30 m in thickness; and
- Interpreted fluorspar veins were updated for the SLR Mineral Resources in 2022, including the most recent drilling information from 2019 and 2020, and the inclusion of vein survey points where they were exposed on the floor of the working open pits.

The AGS Deposit is an east-southeast trending (Azimuth 110° to 125°) structure in the Grebes Nest area, which contains several significant fluorite veins over a strike length of approximately 2 km. The AGS Deposit is hosted by Proterozoic meta-sedimentary rocks, undated rhyolitic sills, and the Late Devonian SLG. This represents the first significant fluorite mineralization identified that is not hosted entirely by the SLG and the first major new discovery in the area in approximately 75 years. In general, the fault structure dips steeply to the southwest. Locally, north-dipping structures and structurally modified sections are also observed. Field observations and drill logs indicate that the AGS Vein structure is comprised of three main vein systems including the North Vein and South Vein in the western part of the grid, and the Grebes Nest Vein in the eastern part of the grid. The orebodies have two main economically significant phases of fluorite vein formation, plus other minor phases. The paragenesis of mineralization interpreted by CFI geologists is as follows:

- The AGS fault zone is penecontemporaneous with, and postdates, the intrusion of the SLG batholith. Observations in the exposed fault zone suggest that movement varied over time, with evidence for both sinistral and dextral movements during late events.
- Subsequent uplift caused by the intrusion of rhyolite sills in the area resulted in the dilation of the existing structure permitting quartz/carbonate/fluorite bearing solutions to circulate through these structures.
- Fluorite veins contain five depositional phases, separated by intervals of faulting with quartz/carbonate vein.
- The earliest phase of mineral deposition appears to be siliceous, with minor amounts of purple fluorite (fracture coatings, fault matrix flooding and stockwork) and calcite hosted in brecciated rocks and fracture zones.
- The second phase of fluorite vein formation contains primarily crystalline red, yellow, grey, black, clear, and white varieties of $CaF_2$ and forms the most significant phase at AGS. Near the end of this phase, fluorite is intergrown and synchronous with the deposition of banded sulphides in the structure including sphalerite, galena, and lesser amounts of chalcopyrite and pyrite.

- The third phase of fluorite deposition is primarily massive to vuggy, crystalline green $CaF_2$ with lesser amounts of white fluorite. This mineralization is deposited very close to the end of the period of sulphide deposition with sphalerite and galena forming disseminated grains. The veins of green fluorite are commonly less than 2m in width and cut the earlier red/yellow veins south of and parallel to the main AGS Vein. Green fluorite veins have also been noted in meta-sediments in drill core from the Tarefare area.
- A fourth, but volumetrically minor, phase of fluorite mineralization is represented by clear $CaF_2$ cubes forming on the green fluorite in vugs.
- A fifth fluorite phase occurs after a period of quartz-carbonate veining (with Blastonite) and is present in the form of calcite fluorite stockwork veinlets and massive veins. This phase is associated with late crosscutting fault structures and is prevalent at the eastern end of the North Vein and the western half of the Grebes Nest 2 vein. Fluorite is normally clear-white-grey-purple in colour. Calcite is the dominant component of this phase, having ratios of 3:1 to 10:1 versus fluorite. Areas containing this late phase mineralization are referred to as “High Carbonate” material.

The AGS Deposit consists of at least three major veins (North, South, and Grebes Nest veins) and several intermediate and minor subparallel veins in the HW and FW. The overall strike length of the AGS Deposit is approximately 2 km. The thicknesses of the veins vary, ranging from 2 m to approximately 31 m, and extend from the surface to approximately 350 m at depth. Of the major veins listed, individual strike lengths range from 400 m to 750 m and display typical pinch and swell geometries common in vein deposits. Several veins have demonstrated higher amounts of calcite related to late-stage vein stockwork and breccia event, particularly the Grebes Nest veins. Many areas of the AGS Deposit remain open for expansion and additional vein discoveries and will be continually explored on an ongoing basis.

Vein contacts were surveyed where they have been exposed during pit operations. This information has been used to re-interpret and refine the vein model wireframes. The impact of these adjustments was generally localised and were not anticipated to impact the overall mineral

resources. In some instances, during pit production splays or smaller mineralized veins have been discovered in exposure in the pits, that were not picked up from diamond drilling.

The GP2 Vein is the largest vein within the AGS structure. It has been tested by 47 holes and extends from the eastern part of the Grebes Nest Pond on Line 13+00 E to Line 20+00 E, a distance of 700 m, and extends approximately 350 m at depth. The thicknesses of the mineralized intersections range from 2 m to 31 m, with an average thickness of approximately 9.25 m, with thicker intersections closer to the surface. Contouring the grade x thickness indicates two pods with gentle northwesterly plunge. The contoured $CaF_2$ data also indicates a low grade "tongue" at moderate to lower elevations which is closely coincident with a zone of higher grade $CaCO_3$. CFI interprets that strong $CaCO_3$ veining is related to a later structural event and exhibits a relatively steep plunge compared with the earlier, main $CaF_2$ events.

The South Vein (SV) extends approximately 700 m along strike in the western part of the AGS grid. Currently, SV has been tested by 35 holes and traced until the western shoreline of Grebes Nest Pond, but due to the presence of the Grebes Nest Pond, and apparent offsets in the orientation of the vein, its eastern extent has been marked on Line 11+00 E. Diamond drilling indicates that fluorspar mineralization extends from the surface to approximately 225 m at depth. Further drilling may indicate it to be the western extension of the GP2 Vein. The thicknesses of the mineralized intersections range from 2 m to 18 m, with an average thickness of approximately 5.1 m. Contouring grade-thickness values indicate a moderate plunge in a south-easterly direction. The fact that the mineralized trends appear to be different in GP2 and SV is due to a phase with a significant increase in $CaCO_3$ veining that obscures the original $CaF_2$ grade distribution in the GP2 vein, whereas the SV is not affected by the late stage $CaCO_3$ veining. The fluorite content of the SV Vein is also of the same magnitude as the GP2 Vein, and therefore contoured the GT data is less complex and likely more representative of its original distribution.

### 3.3.2 Deposit Type

Vein hosted fluorite deposits of the St. Lawrence area are characteristically associated with intrusive rocks (Devonian to Carboniferous granites with miarolitic cavities) hosted within

sequences of Late Precambrian volcaniclastic and sedimentary rocks. As currently interpreted, the AGS and North Ridge and South Ridge deposits are subvertical and have a northwesterly trend, and their geometry is controlled by faults.

The alteration zone in the Project Area is marked by a silica, hematite, and feldspar alteration, which imprints a brick red colour on the rock. In places, where only fluorite veining occurs, the contact with the host granite is sharp, and the veins may be purple, grey to light green in colour.

## 3.4 Exploration to Date

The exploration methodology applied by Alcan in the early 1970s, and by CFI during recent exploration programs, has consisted of geological mapping and prospecting, geochemical sampling of streams and ponds in the Project area, as well as trenches, airborne and ground geophysical surveys (mainly ground EM and magnetometer surveys), and evaluating targets by drilling. The justification for this exploration approach is that ground geophysical targets are interpreted to be surface expressions of mineralized structures in bedrock, and geochemical anomalies in trenches are related to fluorspar mineralization within the underlying felsic intrusive (SLG) and meta-sedimentary rocks.

### 3.4.1 Trenching

From July 9 to October 12, 2013, CFI carried out a trenching program, whereby seven trenches approximately 2 m wide, were dug across the interpreted surface trace of the AGS Vein. In total, CFI carried out approximately 682 m of trenching using an excavator. The first three trenches, AGS-T1 to AGS-T3 were spaced 100 m to 200 m apart, and trench numbers AGS-T4 to AGS-T7 were spaced 200 m to 600 m apart. The latter trenches were not sampled, since the AGS Vein structure was not exposed in them.

Assay results from trenches AGS-T1 to AGS-T3 indicated fluorspar mineralization ranging from 59% $CaF_2$ to 84% $CaF_2$ over widths ranging from 2.6 m to 6.0 m, with some high-grade intervals of +97% $CaF_2$ over one metre.

### 3.4.2 Geophysical Surveys

#### *3.4.2.1 2012 Ground Geophysical Surveys*

In 2012, Abitibi Geophysics Inc. (Abitibi) Atlantic Division, carried out ground geophysical surveys (magnetometer and HLEM) on behalf of CFI, over three grid areas: North/South Ridge, AGS, and Black Duck areas. The purpose of the ground geophysical surveys was to detect fault zones, which may be conductive (HLEM) and associated with magnetic lows and fluorite mineralization. Abitibi completed 80 line-km of ground magnetometer and 64 line-km of HLEM surveys over the three grid areas.

Results of the 2012 ground magnetometer and HLEM surveys indicated weak to moderate EM conductors and magnetic lows are associated with the North/South Ridge Vein. Over the AGS and Black Duck grid areas, however, only magnetic lineaments were detected without association with conductive zones (Lambert, 2012). The geophysical anomalies have been drill tested at the North/South Ridge grid, and the AGS Vein area has now been extensively explored by three drilling campaigns. No drilling has been carried out on the Black Duck grid area, although some limited mining has occurred at the historic Black Duck Mine (CFI-NL, 2013).

#### *3.4.2.2 2015 Airborne Geophysical Surveys*

Geotech Ltd. carried out airborne geophysical surveys (magnetometer and VTEMplus) from May 29 to June 9, 2015, over the entire Property on behalf of CFI. Based on the successful results of the 2012/2013 ground geophysical surveys (in detecting magnetic lows associated with areas of fluorite mineralization), the purpose of this survey was to detect targets similar to those detected over the North/South Ridge, Tarefare, and Grebes Nest Pond deposits.

Geotech Ltd. completed 846.1 line-km of helicopter borne geophysical surveys over the two blocks of the Property. For the main (southern) No. 1 block, the flight lines were oriented northeast-southwest, i.e., the same orientation as the cross sections of the drill holes. For the northern No. 2 block, the flight lines were oriented north-south. For both blocks, the flight lines were spaced approximately 75 m apart.

Results of the magnetic survey indicated that the southern block exhibits two distinct domains of magnetic susceptibilities separated by a northeast trending lineament. The northern block exhibits similar magnetic responses as the southern block. The survey results also indicated a number of relatively weak EM anomalies, generally associated with magnetic highs. In particular, these survey results demonstrate that:

- The AGS structure and associated veins are situated within the western magnetic domain with generally low magnetic susceptibilities, but the actual structure is associated with a west-northwest trending narrow magnetic high. CFI notes that there are similar features (narrow magnetic highs) in this area that are not yet tested by drilling;
- The Tarefare Vein is situated within the magnetic high domain; and
- The North/South Ridge Vein is situated along the eastern margin of the magnetic high domain.

#### *3.4.2.3 2016 Ground Geophysical Surveys*

The results of the 2015 airborne geophysics outlined several priority targets for follow-up testing. As a result, significant grid cutting extensions were completed in late 2015 including the Mine Cove, AGS South and, Iron Springs grids. The Mine Cove and AGS South grids were extended from the main AGS Grid while the Iron Springs Grid was tied into the North/South Ridge Grid, originally cut in 2012. Ground magnetics and HLEM geophysical surveys were completed on the 2015 extended grids by Abitibi during February of 2016. An additional compilation and merging of data from the AGS and North/South Ridge grids were completed within the scope of the 2016 program. Abitibi outlined multiple geophysical anomalies on the Mine Cove and AGS South areas that trend parallel (or nearly so) to the AGS Deposit.

A significant east-west trending, coincident magnetics and HLEM anomaly was also identified at Iron Springs. From February 8 to 28, 2016, HLEM and magnetometer surveys were conducted over the area of the new grids. Readings were recorded at a 25 m interval (12.5 m readings for the magnetometer) along the grid lines including the tie lines and the base lines. In order to maintain a degree of continuity between the 2012, 2014, and 2016 surveys, similar equipment

and survey procedures were followed in all surveys. Data from the three surveys has been merged to allow for the preparation of compilation maps of the surveyed areas.

The geophysical survey of the AGS South Extension and Mine Cove grids identified a number of SE-NW trending HLEM and magnetic anomalies. On the Mine Cove Grid, three HLEM anomalies were identified. One anomaly was identified on the north side of the baseline on Line 2W and trended approximately parallel the baseline to Line 26E, where the strike shifted to a SE trend and continued to the end of the grid coverage on Line 44E. A second shorter HLEM anomaly was identified along the baseline between Lines 14E and 32E. This anomaly paralleled the baseline to Line 27E where the strike shifted to a SE trend. The third HLEM anomaly was identified to the south of the baseline on Line 0+00 and traced east to Line 29E. This anomaly strikes approximately parallel to the baseline up to Line 26E where the trend of the anomaly shifts to the SE. All three HLEM anomalies strike approximately parallel and have a trend that shifts to the southeast in the same location, suggesting the presence of a NE-SW striking, crosscutting structure. Magnetic low anomalies were identified in close proximity to the HLEM anomalies; these commonly occur parallel to the HLEM anomaly, rarely crosscutting its trend.

Three significant HLEM anomalies were identified on the AGS South Extension Grid. One anomaly was identified on Line 5E and was traced east to the end of the grid coverage on Line 39E. The HLEM anomaly occurs at the junction of the southern extension of the original AGS Grid and the northern extension of the new AGS South Extension Grid.

#### *3.4.2.4 2019 UAV-MAG Airborne Geophysical Survey*

CFI completed a regional exploration assessment during 2018 to 2019 to focus on areas of high potential for additional resource definition and new discoveries. In order to concentrate efforts efficiently, selected areas were chosen including the St. Lawrence North area where known mineralization is present (Ex. Clam Pond, Ryan Hill, Salmon Brook, and Black Duck veins. In addition, the AGS area and region to the north of the AGS Deposit was considered highly prospective. The historic Mine Cove occurrence and CFI generated ground geophysical anomalies are present north of the AGS Deposit. Exploration further north of the AGS Deposit is of interest to CFI. A decision was made to perform high-resolution Unmanned Aerial Vehicle (UAV)-MAG

surveys in both areas. Drone supported (UAV) geophysical surveying is in the early stages of experimentation and practical application and as such, the 2019 AeroVision UAV-MAG survey is considered experimental in its application. Two survey blocks were completed on the Property, totalling 397.5-line km from May 16 to May 25, 2019.

The St. Lawrence North Grid data was collected along 70 traverse lines, oriented north-south and spaced 50 m apart. Two detailed blocks were flown in areas of known high potential with traverse lines at 25 m spacing. The survey produced very high-quality, high-resolution data that could be used immediately for follow up evaluation. Two regional scale domains were observed including a high magnetic region in the northwest corresponding to the siliciclastic sedimentary rocks as mapped in the area and the area to the east and southwest mapped as part of the SLG pluton. The internal complexities reveal numerous east-west, northwest-southeast trending and "curved" features assumed to be associated with structures that may or may not pertain to fluorspar mineralization. Screening of these structures will form the basis of future follow up exploration.

The AGS Grid data was collected along 59 lines oriented in a northeast direction at an azimuth of N33° and spaced 50 m apart. A detailed grid was flown over the western part of the AGS Deposit at 25 m spacing. The rationale was to collect detailed data over the known fluorspar host structure and apply it as an exploration analogue in the area to the north based on similar geological settings. The data identified a very complex network of west-northwest and northwest trending fault structures similar to that of the AGS Deposit in orientation and internal "disruption". Several of the anomalies are persistent over the entire survey area, indicating major tectonic structures are present. CFI designed a diamond drilling program to test several of these features in the summer of 2019. The results were successful in identifying fault structures associated with each anomaly, including the discovery of significant fluorspar mineralization in two areas.

### 3.4.3 Soil Sampling

An orientation soil sampling survey was conducted at AGS over the North and South veins in 2016. Samples were collected at 25 m intervals along a composite line chosen to coincide with vegetative cover with the best opportunity to collect B-horizon soil material. A total of 49 samples were collected and 27 samples were analysed for fluorine using inductively coupled plasma (ICP) at SGS Laboratories, in Lakefield, ON (SGS). The program was successful in detecting anomalies for several metals in soils that are coincident with fluorspar veins.

### 3.4.4 Drilling

#### *3.4.4.1 Drilling Up to 2008*

From the 1940s to 1990, exploration was done by Alcan and Newfluor Drilling, representing 29% (22 holes – 7,173 m) of the drilling done on the Tarefare Deposit (TF). In 1999, the TF drilling was done by the then-owners, Burin Minerals Ltd. (BML), for 23% (16 holes – 5,769 m) of the TF drilling. Finally in 2008, drilling was done by CFI, for 48% (39 holes – 12,177 m) of the TF drilling. All of this diamond drilling recovered NQ core.

In the BML phase, these drillholes were downhole surveyed using the Wellnav system. RPA (2011) reported the BML and CFI drilling being done to industry standards.

#### *3.4.4.2 CFI Exploration Drilling (2013-2015)*

During the 2013, 2014, and 2015 exploration programs, CFI completed 61,149 m of drilling in 287 diamond drill holes, as follows:

- **2013:** 15,165 m of drilling in 80 diamond drill holes on; North/South Ridge Vein extensions and western part of AGS grid and seven holes at Hares Ears;
- **2014:** 23,400 m of drilling in 112 diamond drill holes on In-fill drilling and eastern part of the AGS Vein structure; and
- **2015:** 22,580 m of drilling in 89 diamond drill holes, including 57 exploration holes (18,678 m), nine geomechanical holes (total: 1,278 m), and fourteen condemnation holes (2,335

m). 58 of the exploration holes (16,457 m) were completed on the AGS grid and nine holes (2,036 m) were completed on the North/South Ridge North grid.

The SLR (2022) report states that approximately 127,184 m of diamond drilling in 672 holes has been completed on the Property by CFI and its predecessors during the past 72 years.

#### *3.4.4.3 CFI Drilling (2016-2019)*

From 2016 through 2019, CFI completed several phases of delineation drilling on the AGS Deposit as well as exploration projects and drilling on other target areas. Additionally in 2016, CFI completed a major core re-sampling program in order to capture lower grade mineralization that would be modelled with lower cut-off grades and ultimately, mined at lower cut-off grades in the open pit. A drill program targeting aggregate was completed in 2017 to collect material for test work and further define the waste rock mass. CFI met the objectives for continued evaluation of the AGS Deposit which included:

- Resource conversion from Inferred to Indicated categories;
- Expansion and delineation of numerous smaller fluorspar veins that are within the pit shells; and
- Overall increased definition and delineation of the fluorspar veins at AGS in the upper 150 m of stratigraphy, in order to evaluate the mineable open pit reserves and maximize open pit mine life.

#### *3.4.4.4 CFI Drilling (2020-2021)*

From December 3, 2020, to March 5, 2021, a 5,311 m in-fill and expansion drilling program at AGS was conducted. The 34-hole program focused on further vein definition in the Center Pit as well the transition zone between the Grebes Nest and Center pits (known as Pond Pit). Expansion drilling was also targeted the NV footwall structure on the north side of the Center Pit. CFI Geology Department staff managed the program and retained contract geologists to log drill core. The drilling contract was awarded to Majors Contracting Limited (Majors). A single Duralite 1000 track-mounted rig was used to drill NQ sized core drill holes. Assays for $CaF_2$ and $CaCO_3$ were performed at Eastern.

The 2020 to 2021 program was successful in meeting all planned technical objectives outlined above. Infill drilling focused on the Center Pit and further refined the complex nature of vein bifurcations in the area. Ultimately this information was used to aid in the interpretation and wireframe modelling of the South and North Veins, in addition to associated intermediate sized veins. Six drill holes were completed in the Center Pit to Pond Pit transition area providing further clarification of this complex zone. This is important to both short and medium term mine planning and pit design.

These holes were also successful in intersecting high grade fluorspar in relatively narrow veins and displaying vertical continuity to veins present in this area. The presence of high-grade material within the North Vein structure at deeper elevations was also confirmed. Drilling conducted on the north side of the Center Pit was focused on resource expansion and in-fill drilling on 50 m spacing. The 2020 to 2021 program was successful in further defining the North Vein footwall structure and confirmed high grade fluorspar in relatively narrow veins up to a depth of 200 m below surface. It should be noted that drill hole GS-2021-302 intersected a 30 m interval which assayed 19% $CaF_2$ including 7.65 m at 52% $CaF_2$ at an elevation of 150 m below surface.

Results from the drilling program were positive, with intersections averaging one metre to 40 m in width. Assays of fluorspar mineralization predominately returned moderate to high grades, with values ranging from 5% $CaF_2$ to 90% $CaF_2$. Drill hole GS-2020-281 assayed 41% $CaF_2$ over 20.3 m including a 10.3 m interval grading 52% $CaF_2$. Furthermore, GS-2021-296 assayed 58% $CaF_2$ over 11.57 m including an 8.5 m interval grading 82% $CaF_2$. Drill hole GS-2021-305 assayed 19% $CaF_2$ over 39.9 m interval including a 7.65 m interval grading 52% $CaF_2$.

**Table 3-1: Recent Exploration Activities**

| Year | Drilling (m) | No. of Drillholes | Type | Comments |
|---|---|---|---|---|
| 2013 | 1,005 | 7 | Exploration | Exploration drilling Hares Ears. |
| 2013 | 5,029 | 25 | Exploration | Testing North Ridge and South Ridge Director Vein extensions. |
| 2013 | 9,131 | 48 | Exploration | Testing western part of AGS vein structure. |
| 2014 | 23,404 | 112 | Infill | Infill drilling at eastern part of the AGS Vein structure. |
| 2015 | 16,457.10 | 58 | Infill and Exploration | Infill drilling and testing eastern part of the AGS Vein structure. |
| 2015 | 1,278 | 9 | Geomechanical | Geomechanical drilling of AGS vein structure. |
| 2015 | 2,036.26 | 9 | Infill and Exploration | Infill and exploration drilling testing North/South Ridge Vein. |
| 2015 | 2,335 | 15 | Condemnation | Condemnation drilling at AGS. |
| 2016 | 2013-2016 drill core archive | - | Core Relogging and Resampling | 3,365 additional core samples assayed. |
| 2016 | 418 | 4 | Exploration | Iron Springs exploration drilling. |
| 2016 | 1,237 | 15 | Metallurgical (Ore Variability) | Testing various vein domains and collecting metallurgical samples from the AGS Deposit. |
| 2016 | 1,296 | 6 | Condemnation | Condemnation drilling at AGS. |
| 2017 | 2,928.41 | 24 | Infill and Delineation | Mainly Drilling under Grebes Nest Pond (Pond Pit area). Updated Resource Estimate. |
| 2017 | 1,187 | 18 | Aggregate | Sample collection for aggregate testwork and geological definition at AGS. |
| 2019 | 4,220 | 43 | Infill and Expansion | Mainly Center Pit Phase 2 and Grebes Nest Phase 2. Updated Resource Estimate. |
| 2019 | 3,156 | 27 | Exploration | Drill-testing geophysical anomalies; discovery of two fluorspar veins at AGS North. |
| 2019 | 2,444 | 24 | Infill and Expansion | Infill drilling of South Ridge deposit. |
| 2020 | 2,552 | 20 | Infill and Expansion | Mainly expansion drilling of South Ridge deposit toward south. |
| 2020-2021 | 5,311.60 | 34 | Infill and Expansion | Mainly Center Pit north, west and deeper holes. |
| 2021 | 4,090.50 | 30 | Infill and Expansion | Phase 1 infill, resource expansion, and definition drilling at AGS North. |
| 2021-2022 | 7,762.89 | 61 | Infill and Expansion | Phase 2 infill, resource expansion, and definition drilling at AGS North. |
| 2023-2024 | 1,465 | 15 | Geotechnical | Geotechnical drilling for pit wall and slope design at AGS. |
| 2024 | 768.50 | 10 | Geotechnical | Geotechnical drilling for pit wall and slope design at South Ridge. |
| **Total** | **99,512** | **614** | | |

### 3.4.5 Re-Logging and Re-Sampling Programs

#### *3.4.5.1 2016 and 2017 AGS Core Re-Logging and Re-Sampling Program*

In 2016 and 2017, CFI conducted a large scale AGS core re-sampling and logging program. The program was initiated on July 20, 2016, and included evaluation and re-sampling of 210 exploration diamond drill holes, eight geomechanical drill holes, 15 metallurgical drill holes, and 20 condemnation drill holes that had been completed at AGS from 2013 to 2016. All holes were reviewed for potential re-sampling opportunities, with the exception of the condemnation holes. A total of 3,365 samples were generated from the program and sent for assaying.

The AGS Deposit re-evaluation involved three phases:

- Re-model the deposit vein wireframes in three dimensions (3D) using GEMS software to encompass lower grade samples already available in the database that did not meet the previous modelling criteria. A new block model and resource estimate was generated giving positive results. Phase 2 was then initiated;
- Complete core re-sampling of all prospective drill core that contained lower grade zones not meeting previous sampling criteria, expanding shoulder sampling where moderate grade $CaF_2$ was present, and sample smaller vein zones that had not been sampled because open pit mining had not been considered in the early stages of exploration; and
- Re-model the AGS deposit again using revised criteria and complete a new block model and resource estimate. Prior to re-modelling, a 2,928 m in-fill drilling program was completed during the summer of 2017 to allow an upgrade in resource classification in certain parts of the deposit.

The updated data from this program is what was used in the current estimation study for the affected holes.

## 3.5 Geology Plan View Drawing

Due to the density of drilling data, there are a series of three geology plan view drawings covering the range of drilling years. Figure 3.4 details the drilling history pre-2015, Figure 3.5 from 2015 to 2017, and Figure 3.6 from 2017 to 2022 (current). High-definition copies of these drawings are available in Appendix D.

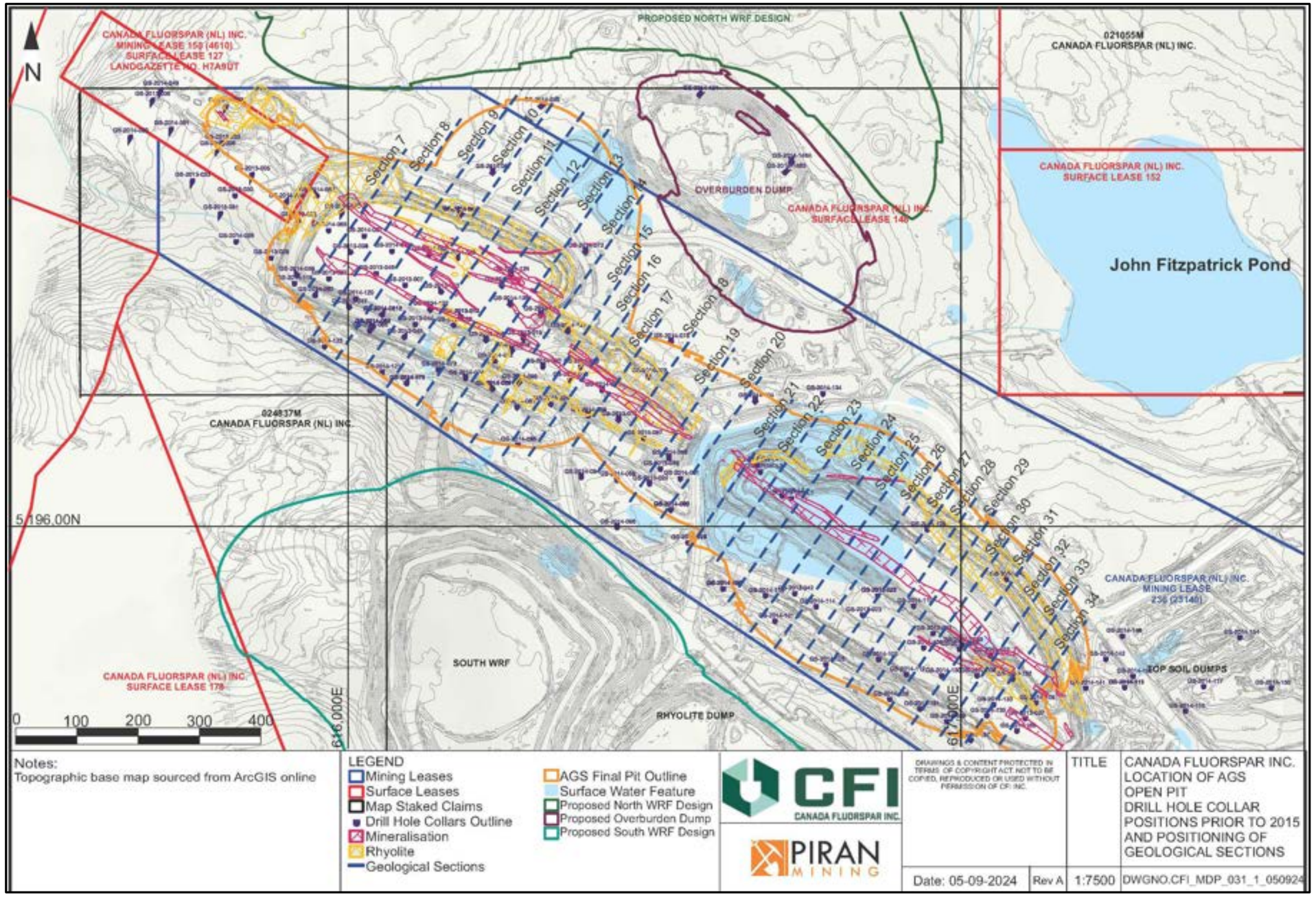



**Figure 3-4: Geology Plan View Drawing - Pre-2015 (in Appendix D)**

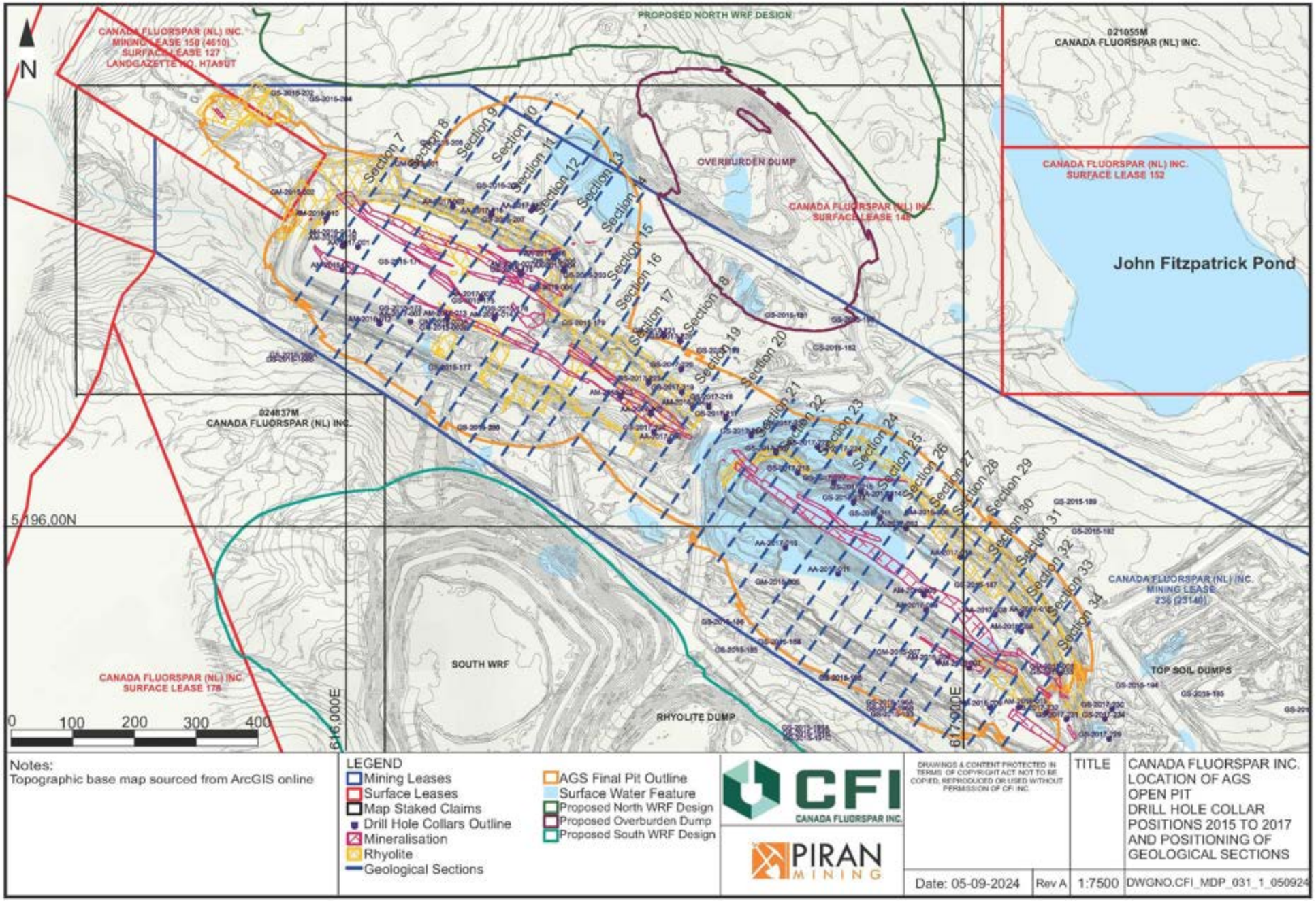



**Figure 3-5: Geology Plan View Drawing - 2015-2017 (in Appendix D)**

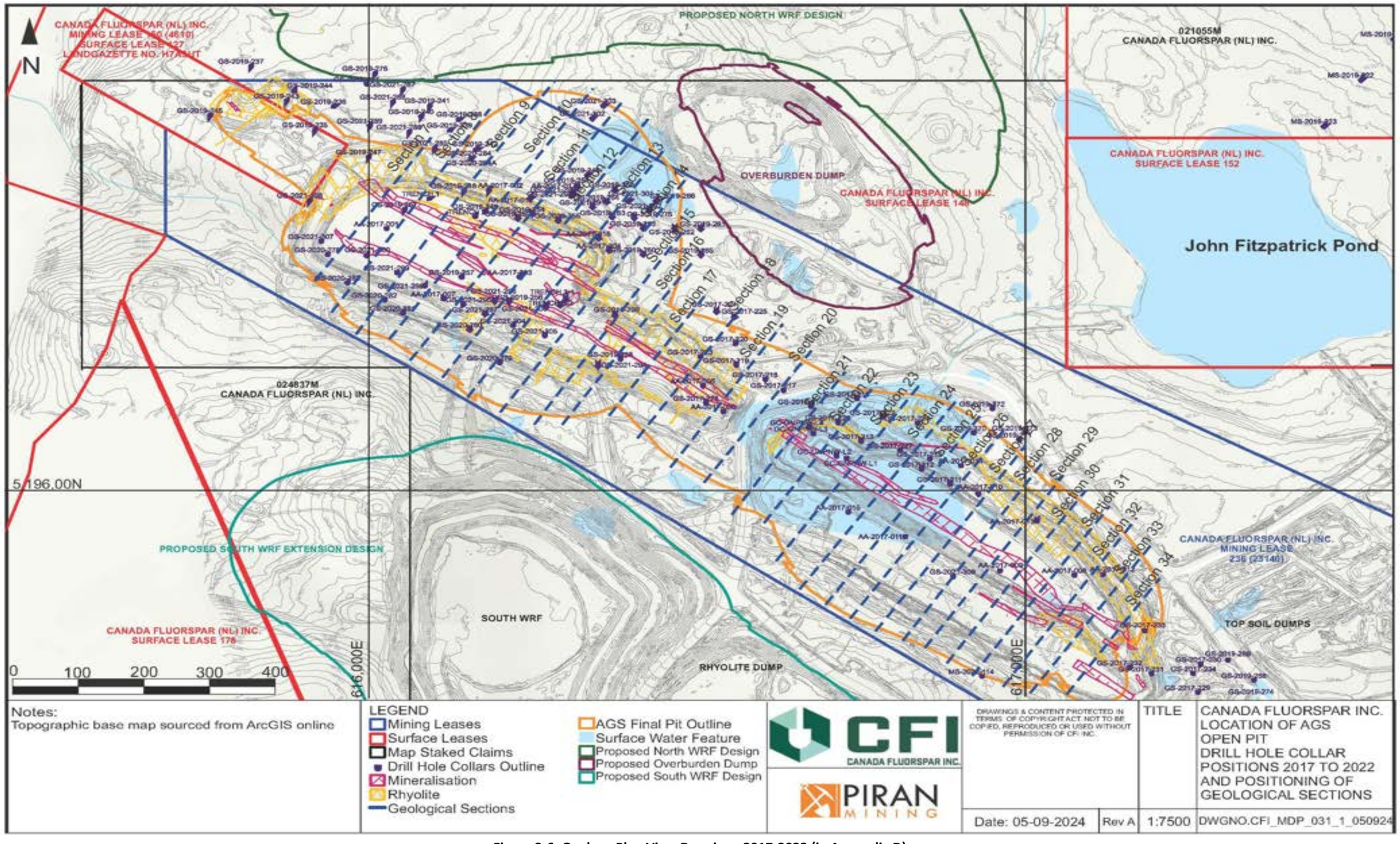



**Figure 3-6: Geology Plan View Drawing - 2017-2022 (in Appendix D)**

## 3.6 Geological Cross Sections

A series of geological cross-sections have been systematically spaced across the AGS Deposit to give a detailed overview of mineralization, lithology with respect to designed open pit limits. All sections are projected vertically at an azimuth of 305° and are displayed at a scale of 1:2000. All cross sections have been included in Appendix D.

## 3.7 Future Exploration Activities

CFI plans to continue exploring for fluorite on the St. Lawrence property with systematic exploration programs to assess the potential for additional economic open pit, aggregate and possible underground fluorite deposits. Multiple project areas and deposits will be assessed with an ultimate focus to establish updated mineral resources across the Property.

**Table 3-2: Summary of Planned Exploration Activities**

| Location | Activity | Planned Year |
|---|---|---|
| North Ridge | Exploration and Infill drilling | 2024 |
| St. Lawrence North Mineral Licenses | Trenching | 2024 |
| Tarefare | Infill and Resource drilling | 2025 |
| Blue Beach North | Infill and Resource drilling | 2025 |
| AGS North | Relogging and Core Resampling | 2025 |
| AGS North | Infill and resource drilling | 2025 |

# 4 Acid Rock Drainage (ARD) and Metal Leaching (ML)

## 4.1 Description of ARD/ML Program

Golder Associates Ltd. (Golder) was retained by CFI to complete a geochemical characterization program for the Project. The results of this program are presented in Golder's Final Baseline Geochemistry Program Report (Golder, 2016). The program was conducted to determine the acid rock drainage (ARD) and metal leaching (ML) characteristics of the various mine materials that are managed at site (i.e., ore, tailings, DMS rejects, and waste rock). The approach to sample selection, collection, analytical testing, and interpretation of results are consistent with international guidelines (Price, 1997; MEND 2009; INAP, 2012). Ore, tailings, and DMS float samples were collected from pilot-scale processing (DMS rejects) and locked cycle testing (tailings). Since 2016, the kinetic testing was established for the waste rock and tailings materials to assess the reaction rates over time (Golder 2017 and Golder 2019). The following is a summary of geochemical characterization of the mine materials based on Golder 2016, 2017, and 2019. The reports were signed off by David Brown, M.Sc, P.Geo, acting as the Qualified Person with Golder Associates Ltd.

Between 2014 and 2016 a total of 68 samples were collected and analyzed, which included 60 waste rock core samples, two ore samples, two DMS float samples, and four tailings samples. All samples were submitted for testing to determine solid-phase whole rock and elemental composition, acid-base accounting (ABA), and net acid generation (NAG). Select samples were submitted for short-term leach testing, mineralogical analysis, and kinetic testing. Based on the results of the geochemistry test work, an assessment was completed that forms the basis of the conclusions made regarding the potential for acid generation and metal leaching from the waste rock. Based on the data analysis, four waste rock samples and four tailings samples were submitted for kinetic testing.

## 4.2 Sampling

Samples for ARD/ML testing were collected under the direction of Golder. Waste rock samples were taken from drill core from different areas around the property (Figure 4.1, Table 4.1), whilst the remaining samples were generated as a result of laboratory test work. Rock core samples of the main rock units associated with the Project deposit (metasediment and rhyolite) were taken from exploration drillholes. Drillholes were selected across the potential ore zone to ensure the proposed samples were spatially representative of the Project. Samples of both low and high carbonate ore, low and high carbonate DMS floats, and low and high carbonate tailings (one each with sulphide, one each without sulphide) were collected from pilot scale processing (DMS floats) and locked cycle testing (tailings) and submitted for geochemical analysis. Tests performed included SFE and humidity cell, with full description and results in the test work report Appendix E.

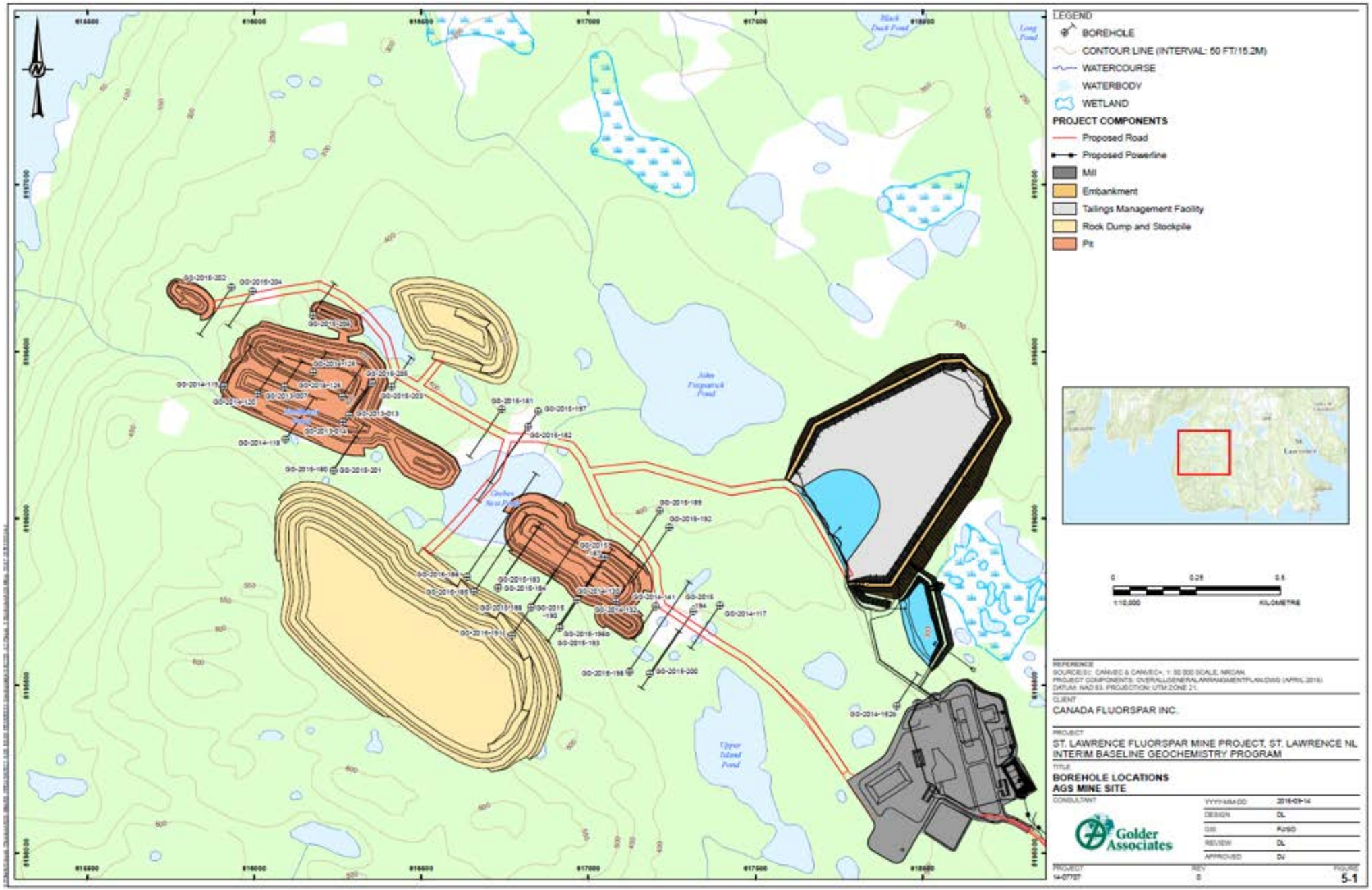



**Figure 4-1: Borehole Locations (Golder, 2016)**

**Table 4-1: Sample Selection List (Golder, 2016)**

| Sample ID | Borehole ID | CFI ID | Sample Interval (m) | | Lithology |
|---|---|---|---|---|---|
| | | | From | To | |
| **Waste Rock** | | | | | |
| 14-CF-001 | GS-14-117 | GS-14-117 MS 184-194m | 184 | 194 | Metasediment |
| 14-CF-002 | GS-14-119 | GS-14-119 MS15-25m | 15 | 25 | Metasediment |
| 14-CF-003 | GS-14-125 | GS-14-125 RHY 6.88-15.08m | 6.88 | 15.08 | Rhyolite |
| 14-CF-004 | GS-14-125 | GS-14-125 MS 50-60m | 50 | 60 | Metasediment |
| 14-CF-005 | GS-14-126 | GS-14-126 MS 124-134m | 124 | 134 | Metasediment |
| 14-CF-006 | GS-14-126 | GS-14-126 RHY 160-169m | 160 | 169 | Rhyolite |
| 14-CF-007 | GS-14-130 | GS-14-130 MS 50-60m | 50 | 60 | Metasediment |
| 14-CF-008 | GS-14-132 | GS-14-132 RHY 37-47m | 37 | 47 | Rhyolite |
| 14-CF-009 | GS-14-132 | GS-14-132 MS 103-113m | 103 | 113 | Metasediment |
| 14-CF-010 | GS-14-152B | GS-14-152B MS 170-180m | 170 | 180 | Metasediment |
| 15-CF-001 | GS-15-180 | GS-15-180 MS (5.50m-95.00m) | 35 | 45 | Metasediment |
| 15-CF-002 | GS-15-180 | GS-15-180 RHY (95.00m-129.07m) | 114 | 124 | Rhyolite |
| 15-CF-003 | GS-15-181 | GS-15-181 MS (116.13m-154.00m) | 136 | 146 | Metasediment |
| 15-CF-004 | GS-15-181 | GS-15-181 MS (88.00m-103.68m) | 91 | 101 | Metasediment |
| 15-CF-005 | GS-15-181 | GS-15-181 RHY (103.68m-116.13m) | 106 | 116 | Rhyolite |
| 15-CF-006 | GS-15-181 | GS-15-181 RHY (11.40m-28.63m) | 16 | 26 | Rhyolite |
| 15-CF-007 | GS-15-182 | GS-15-182 MS (57.11m-296.62m) | 74 | 84 | Metasediment |
| 15-CF-008 | GS-15-182 | GS-15-182 RHY (21.25m-37.14m) | 27 | 37 | Rhyolite |
| 15-CF-009 | GS-15-183 | GS-15-183 MS (3.55m-250.02m) | 141 | 151 | Metasediment |
| 15-CF-010 | GS-15-184 | GS-15-184 MS (5.40m-303.63m) | 215 | 225 | Metasediment |
| 15-CF-011 | GS-15-185 | GS-15-185 MS (4.85m-134.12m) | 300 | 310 | Metasediment |
| 15-CF-012 | GS-15-186 | GS-15-186 MS (378.78m-458.29m) | 402 | 412 | Metasediment |
| 15-CF-013 | GS-15-187 | GS-15-187 MS (107.35m-141.27m) | 117 | 127 | Metasediment |
| 15-CF-014 | GS-15-187 | GS-15-187 RHY (4.15m-24.06m) | 9 | 19 | Rhyolite |
| 15-CF-015 | GS-15-188 | GS-15-188 MS (5.40m-280.98m) | 81 | 91 | Metasediment |
| 15-CF-016 | GS-15-189 | GS-15-189 MS (50.86m-302.61m) | 156 | 166 | Metasediment |
| 15-CF-017 | GS-15-190 | GS-15-190 MS (4.65m-92.30m) | 40 | 50 | Metasediment |
| 15-CF-018 | GS-15-191C | GS-15-191C MS (4.00m-237.31m) | 60 | 70 | Metasediment |
| 15-CF-019 | GS-15-192 | GS-15-192 MS (390.85m-421.00m) | 405 | 415 | Metasediment |
| 15-CF-020 | GS-15-192 | GS-15-192 RHY (3.12m-23.70m) | 13 | 23 | Rhyolite |
| 15-CF-021 | GS-15-193 | GS-15-193 MS (6.10m-261.80m) | 60 | 70 | Metasediment |
| 15-CF-022 | GS-15-194 | GS-15-194 MS (122.61m-152.84m) | 136 | 146 | Metasediment |
| 15-CF-023 | GS-15-196B | GS-15-196B MS (5.35m-331.30m) | 130 | 140 | Metasediment |
| 15-CF-024 | GS-15-197 | GS-15-197 MS (81.76m-335.12m) | 301 | 311 | Metasediment |
| 15-CF-025 | GS-15-197 | GS-15-197 RHY (43.78m-81.76m) | 49 | 59 | Rhyolite |
| 15-CF-026 | GS-15-198 | GS-15-198 MS (191.93m-248.62M) | 233 | 243 | Metasediment |
| 15-CF-027 | GS-15-198 | GS-15-198 MS (2.67m-188.72m) | 4 | 14 | Metasediment |
| 15-CF-028 | GS-15-200 | GS-15-200 MS (196m-206m) | 196 | 206 | Metasediment |
| 15-CF-029 | GS-15-200 | GS-15-200 MS (96.0m-106m) | 96 | 106 | Metasediment |
| 15-CF-030 | GS-15-201 | GS-15-201 MS (40m-50m) | 40 | 50 | Metasediment |
| 15-CF-031 | GS-15-201 | GS-15-201 RHY (82m-92m) | 82 | 92 | Rhyolite |
| 15-CF-032 | GS-15-202 | GS-15-202 MS (79m-89m) | 79 | 89 | Metasediment |
| 15-CF-033 | GS-15-203 | GS-15-203 RHY (30m-40m) | 30 | 40 | Rhyolite |
| 15-CF-034 | GS-15-203 | GS-15-203 MS (94m-104m) | 94 | 104 | Metasediment |
| 15-CF-035 | GS-15-204 | GS-15-204 MS (208m-218m) | 208 | 218 | Metasediment |
| 15-CF-036 | GS-15-205 | GS-15-205 MS (115m-125m) | 115 | 125 | Metasediment |
| 15-CF-037 | GS-15-205 | GS-15-205 RHY (50m-60m) | 50 | 60 | Rhyolite |
| 15-CF-038 | GS-15-206 | GS-15-206 RHY (82m-92m) | 82 | 92 | Rhyolite |
| 15-CF-039 | GN-13-14 | GN-13-14 | 30 | 40 | Metasediment |
| 15-CF-040 | GS-14-120 | GS-14-120 MS (6.70m-62.78m) | 6.7 | 62.78 | Metasediment |
| 15-CF-041 | GS-14-120 | GS-14-120 MS (128.61m-185.58m) | 128.61 | 185.58 | Metasediment |
| 15-CF-042 | GS-14-141 | GS-14-141 | 15.5 | 25.5 | Rhyolite |
| 15-CF-043 | GS-15-180 | GS-15-180 RHY (95.0m-129.07m) | 95 | 129.07 | Rhyolite |
| 15-CF-044 | GS-15-180 | GS-15-180 MS (204.30m-244.0m) | 204.5 | 244 | Metasediment |
| 15-CF-045 | GS-15-180 | GS-15-180 MS (5.50m-95.0m) | 5.5 | 95 | Metasediment |
| 15-CF-046 | GS-14-118 | GS-14-118 | 5 | 15 | Metasediment |
| 15-CF-047 | GS-13-07 | GS-14-07 MS (124.25m-166.0m) | 124.25 | 166 | Metasediment |
| 15-CF-048 | GS-13-07 | GS-14-07 RHY (21.89m-41.55m) | 21.89 | 41.55 | Rhyolite |
| 15-CF-049 | GS-13-13 | GS-13-13 RHY (130.72m-163.90m) | 130.72 | 163.9 | Rhyolite |
| 15-CF-050 | GS-13-13 | GS-13-13 MS (59.15m-130.72m) | 59.12 | 130.72 | Metasediment |
| **Ore** | | | | | |
| Low Carb Ore | - | Head-3/4" (Low carbonate Ore Head Sample) | - | - | Ore |
| High Carb Ore | - | High Carb-1/2" (High Carbonate Ore Head Sample) | - | - | Ore |
| - | | | | | |
| Low Carb DMS | - | DMS Float (DMS Float For The Low Carbonate Ore) | - | - | DMS Float |
| High Carb DMS | - | DMS Float (DMS Float For The High Carbonate Ore) | - | - | DMS Float |
| LC Tailings | - | | - | - | Low Carbonate Tailings |
| LC Tailings+S | - | | - | - | Low Carbonate Tailings |
| HC Tailings | - | | - | - | High Carbonate Tailings |
| HC Tailings+S | - | | - | - | High Carbonate Tailings |

**Table 4-2: Primary Depletion Calculations (Golder, 2017)**

| Lab ID | Lithology | Selected Static Test Results | | | | Sulphide | | | NP Depletion Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NPR | $CO_3$/MPR | AP (t/1000t as $CaCO_3$) | PAG Classification | Initial (%) | Depletion Rate (mg/kg/wk) | Time to Depletion Years | Initial (t/1000t as $CaCO_3$) | Depletion Rate (mg/kg/wk) | $CO_3$-NP Years | NP Years | PAG Classification |
| Waste Rock | | | | | | | | | | | | | |
| 15-CF-002 | Rhyolite | 22.4 | 0.3 | 0.3 | Non-PAG | <0.01 | 0.3 | 6 | 7 | 3 | 0.2 | 40 | Non-PAG |
| 15-CF-009 | Metasediment | 36.4 | 0.3 | 0.3 | Non-PAG | <0.01 | 0.6 | 3 | 12 | 8 | -0.06 | 30 | Non-PAG |
| 15-CF-017 | Metasediment | 32.0 | 0.3 | 0.3 | Non-PAG | 0.01 | 0.4 | 4 | 10 | 2 | -0.90 | 78 | Non-PAG |
| 15-CF-020 | Rhyolite | 12.5 | 0.3 | 0.3 | Non-PAG | <0.01 | 0.4 | 4 | 4 | 1 | -0.261 | 62 | Non-PAG |
| Tailings | | | | | | | | | | | | | |
| LC Tailings | | 7.0 | 5.2 | 13 | Non-PAG | 0.43 | 6.58 | 12 | 94 | 34 | 39 | 53 | Non-PAG |
| LC Tailings<5 | | 3.6 | 1.9 | 27 | Uncertain | 0.87 | 9.6 | 17 | 97 | 49 | 19 | 37 | Non-PAG |
| HC Tailings | | 18.1 | 14.5 | 9 | Non-PAG | 0.56 | 4.78 | 12 | 170 | 21 | 126 | 157 | Non-PAG |
| HC Tailings<5 | | 8.5 | 6.9 | 20 | Non-PAG | 0.76 | 8.1 | 14 | 170 | 32 | 81 | 101 | Non-PAG |

Notes:
1.0 This indicates a potential for acid generation – time of depletion of NP or $CO_3$NP is less than time of depletion of sulphide minerals.
Calculations based on the last 6 weeks of available data.

**Table 4-3: Depletion Calculations (Golder, 2019)**

| Lab ID | Lithology | Selected Static Test Results | | | | Sulphide | | | NP Depletion Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NPR | $CO_3$/MPR | AP (t/1000t as $CaCO_3$) | PAG Classification | Initial (%) | Depletion Rate (mg/kg/wk) | Time to Depletion Years | Initial (t/1000t as $CaCO_3$) | Depletion Rate (mg/kg/wk) | $CO_3$-NP Years | NP Years | PAG Classification |
| Waste Rock | | | | | | | | | | | | | |
| 15-CF-017 | Metasediment | 32.0 | 0.3 | 0.3 | Non-PAG | 0.01 | 0.1 | 19 | 10 | 1 | 0 | 212 | Non-PAG |
| 15-CF-020 | Rhyolite | 12.5 | 0.3 | 0.3 | Non-PAG | <0.01 | 0.1 | 18 | 4 | 1 | 0 | 114 | Non-PAG |
| Tailings | | | | | | | | | | | | | |
| LC Tailings<5 | | 3.6 | 1.9 | 27 | Uncertain | 0.87 | 1.2 | 137 | 97 | 6 | 166 | 321 | Non-PAG |
| HC Tailings<5 | | 8.5 | 6.9 | 20 | Non-PAG | 0.76 | 1.1 | 105 | 170 | 5 | 528 | 654 | Non-PAG |

Notes:
1.0 This indicates a potential for acid generation – time of depletion of NP or $CO_3$NP is less than time of depletion of sulphide minerals.
Calculations based on all available data; 171 weeks for waste rock and 105 weeks for tailings.

## 4.3 ARD/ML Monitoring Plan

Based on the geochemical characterisation work discussed above and on-site monitoring of water quality, mine impacted (contact) water will continue to meet CoA limits after solids (TSS) have been allowed to settle. As such, water treatment, other than the addition of settling aids (e.g., flocculants), is not required to treat mine or mill effluent water prior to discharge.

Ongoing monitoring of surface and groundwater is carried out to verify the contact water quality. Monitoring of mine effluent and seepage will be carried out in accordance with the CoA and the EEMP during the construction, operation, and closure phases.

The Polishing Pond, Mill Site Event Pond, and Sediment Basin SB-05 are designed to settle out suspended sediments to the greatest extent practical without the use of flocculants; however, settling aids (e.g., flocculants) are utilized as necessary to meet CoA effluent discharge limits.

## 4.4 Disposal Locations

As all materials are determined to be non-PAG, all waste rock will be deposited in the waste rock facility, and all mill tailings will be deposited in the tailings pond. The DMS waste stream will be deposited in the waste rock facility, used for road construction, or sold as aggregate. Quantities of each are shown in other sections.

Material balances for all materials can be found in Table 6.9 for the Mine and Table 7.5 for Processing. The completed material balance spreadsheet has been included in Appendix P.

## 4.5 Results and Recommendations

The following recommendations were provided by Golder Associates Ltd. in the 2016 geochemistry report and 2019 technical memorandum, signed off by David Brown, M. Sc., P. Geo.

### 4.5.1 Ore

The following summary is based on the static test results obtained from two ore samples (one high carbonate sample and one low carbonate sample):

- The ore is not expected to generate acidic conditions. The ore samples have NPR and CO3-NPR values greater than 2 and are classified as non-potentially acid generating based on MEND (2009) NPR criteria. The ABA and NAG pH results confirm the ore types are non-potentially acid generating.
- The results of the shake flask extraction (SFE) tests indicate that metal leaching will not be an issue; no parameters exceeded the CoA limits.

### 4.5.2 Tailings

The following summary is based on the static and kinetic test results on four tailings samples:

- The four tailings samples are considered non-acid generating considering the depletion calculations and mineralogy (i.e., sphalerite, which does not generally

contribute to acid generation, is the major sulphide mineral). The long-term (166 weeks) humidity cell test results indicate that acid generation is not likely to occur over time.

- SFE test results indicate all parameters had concentrations below their respective CoA limits. Similarly, most parameters, with the exception of Zn, in the humidity cells samples reported concentrations below their respective CoA limits and concentrations are consistent with baseline water quality. It should be noted, that after 166 weeks of humidity cell testing, the concentration of cadmium and zinc were elevated. Cadmium concentrations did not exceed the CoA, though there were some exceedances noted for Zn. To date, no exceedances of these parameters have been measured on site.

### 4.5.3 Tailings Supernatant

The following summary is based on the results obtained from one sample of tailings supernatant water:

- The combined tailings sample had a pH of 8.2, which is within the CoA limits.
- All parameters tested had concentrations below their respective CoA limits.
- Concentrations of fluoride, arsenic, copper, iron, and lead were elevated compared to average baseline water quality.

### 4.5.4 DMS Rejects

The following summary is based on the results obtained from two DMS rejects samples:

- The DMS samples have NPR and CO3-NPR values greater than 2 and are classified as non potentially acid generating based on MEND (2009) NPR criteria. The NAG pH results confirm the DMS rejects are non-potentially acid generating.
- The results of the SFE tests indicate that metal leaching will not be an issue; no parameters exceeded the CoA limits.

### 4.5.5 Waste Rock

The following is a summary of the acid generating and metal leaching potential of the waste rock. The acid generating potential is based on the static test results obtained from 60 waste rock samples and the kinetic test results obtained from four (4) waste rock samples. The following is a summary of the key results:

- ABA testing completed indicated the waste rock samples had neutral to slightly alkaline pH values and low sulphide content (i.e., <1% wt% as S).
- All waste rock samples had NPR values greater than 2 and thus are classified as non-potentially acid generating based on MEND (2009) NPR criteria.
- NAG pH values were greater than 4.5, which also classifies the samples as being non-acid generating.
- Mineralogical studies indicate the sulphide content present in the waste rock is mainly sphalerite and not reactive pyrite. Oxygenation of sphalerite does not result in the generation of acidity, unlike pyrite. As such, the majority of the waste rock samples (92%) would be classified as non-acid generating based on ABA classification criteria (MEND, 2009).
- The long-term (171 weeks) humidity cell test results indicate that there is no indication of acid conditions occurring over time.

The metal leaching potential is based on the static test results from 28 waste rock samples and from the kinetic test results obtained from four (4) waste rock samples. The following is a summary of the key results:

- SFE test results indicate all parameters had concentrations below their respective CoA limits.
- Similarly, all parameters in the humidity cells reported concentrations below their respective CoA limits and concentrations are consistent with baseline water quality. Concentrations of parameters in the humidity cell testing are generally lower than the

SFE results. Based on 171 weeks of testing completed no parameters exceeded the CoA.

### 4.5.6 Summary

Overall, the geochemical characterization completed indicates the tailings, DMS rejects, and waste rock will be non-acid generating.

Short term leach tests completed on samples of the waste rock, ore, DMS rejects, and tailings, as well as humidity cell testing, indicate metal leaching will not likely be an issue. However, monitoring of cadmium and zinc downstream of the tailings pond is recommended since zinc exceeded the CoA limits during the HCT of the LC Tailings sample.

Overall, the geochemical characterization work completed (Golder 2016, 2017, 2019; Appendix E) indicates the mine wastes (i.e., waste rock, tailings, and DMS rejects) are non-acid generating, and metal leaching will not be an issue during operations or at closure. Based on this information, there is no need to modify the operational or closure phase waste handling/management plans presented within this Plan or the Updated Mine Rehabilitation and Closure Plan (KP, 2021).

- Certain parameters including fluoride, arsenic, cadmium copper, iron, lead, and zinc will continue to be closely monitored as part of the Environmental Effects Monitoring Plan (EEMP). This is due to the elevated concentrations (in comparison to the average baseline concentrations) of the parameters in the tailings supernatant, tailings leachate, and waste rock leachate from static and kinetic testing.

Waste rock and tailings HCT results, and depletion calculations indicate that both waste rock and tailings sample types are non-PAG. HCT results for waste rock have become relatively stable, and while tailings HCT results are less stable, direct observation of metal leaching characteristics occurs via site water quality monitoring. Continued operation of HCTs is not anticipated to change the understanding of the potential long-term leaching characteristics of either waste rock or tailings beyond the information gained from on-site monitoring. Therefore, based on the Golder 2019 report, it was recommended that all HCTs be terminated. Information supporting

the termination of HCTs was previously submitted and accepted by IET in May 2019, given that the concentrations have stabilized, and that CFI continues to monitor water quality at various locations via the site water quality monitoring program.

## 4.6 Recommendation Implementation

As per recommendations from Golder in the 2019 Technical Memo, direct observation of metal leaching characteristics via site water quality monitoring is underway and continued operation of the HCTs is not anticipated to change the understanding of the potential long-term leaching characteristics of either waste rock or tailings beyond the information gained from on-site monitoring. Therefore, it was recommended that all HCTs be terminated.

The 2019 Golder report and a letter of notification for the termination of humidity cell testing as part of CFI's Geochemistry Program was provided to and accepted by IET in 2019 given that the concentrations have stabilized, and CFI continues to monitor water quality at various key locations via the site water quality monitoring program. As all CFI ore, waste rock, and tailings are determined to be non-PAG, ongoing monitoring of surface and groundwater is carried out to verify the contact water quality. Monitoring of mine effluent and seepage will be carried out in accordance with the CoA and the EEMP during the construction, operation, and closure phases.

After the release of the 2019 Geochemistry Update report (Golder), CFI did not conduct any additional ARD test work beyond the established monitoring programs. CFI will commit to undertaking appropriate static, kinetic testing, and confirmation sampling to characterize the acid generating and metal leaching potential of mine waste.

# 5 Mineral Resource and Reserve Estimate

## 5.1 Mineral Resource Statement

Adam Wheeler of Adam Wheeler Mining Consultant Ltd. was retained to complete an updated Mineral Resource Estimate (MRE) and Statement in 2023 for the Project. The MRE Technical Report was completed in December of 2023 while the resource statements are valid as of October 31st, 2023. The 2023 MRE Technical Report has been included as Appendix F and the statement summarized below. The mining plan submitted in this Mine Development Plan is based on the 2023 Resource Block Model detailed in the December 2023 MRE Technical Report.

A computerised block modelling approach has been applied for resource estimation. Mineralised vein wireframe envelopes have been updated with reference to previous interpretations, based on a cut-off of 5% $CaF_2$. This cut-off level stems from parameters developed from previous experience, updated with current studies and specifically focussed on potential open pit mining.

Samples were selected inside these interpretations, and statistics analysed. In all of the deposits analysed here, the $CaF_2$ grade populations generally appear to form three approximate groups: internal waste, low grade and high-grade material, split according to the $CaF_2$ grade distributions for each zone. These grade categories, along with the vein structures, were used to control subsequent modelling and grade estimation. Capping levels were assessed by vein and applied prior to compositing the data to 1m lengths.

Geostatistical analysis was used to assist with the setting of estimation parameters and resource category criteria. Primary block model grades of $CaF_2$ and $CaCO_3$ were estimated using Ordinary Kriging (OK). Grades were also estimated using Inverse Distance Weighting (IDW2) and nearest neighbour estimation (NN) for validation purposes.

Separate resource block models were developed for each deposit, based on parent blocks of 10 m x 10 m x 10 m. Internal sub-cells with a cross-strike length of 2 m were used for the modelled veins. Model rotation was applied to each deposit, so that blocks were aligned along-strike, with

respect to the local veins' general orientation. Previously mined blocks were assigned with a mined flag.

For modelling and mine planning purposes, the elevation coordinates of all drillholes and modelling data have had 1000 m added to them, so that all the model and resultant pit bench elevations are positive. This elevation shift has been applied to all of the resource models described in this report.

Resource classification risk matrices were developed for each deposit and used to help develop and apply resource classification criteria.

Data sets for all available samples were supplied for the following deposit areas:

- Arthur Gordon Stollery (AGS)
- AGS North (MS)
- North/South Ridge (NS)
- Tarefare (TF)

An overall plan of the sample data for these four areas is shown in Figure 5.1. The data were supplied in the form of Excel files, with separate tables for drillhole collars, survey, assays and lithology data. Table 5.1 lists all of the supplied drillhole data, summarised by deposit area. The assayed variables $CaF_2$ and $CaCO_3$ were estimated into the different block models for each deposit area. The data for the Tarefare deposit is based on a mine grid conversion and the accuracy of the transformation is under review.

**Table 5-1: Summary of CFI Diamond Drilling Data**

| Deposit | Holes | Total Length m | Avg. Length m | Holes Sampled | Length Sampled m | Number of $CaF_2$ Samples | Proportion of Holes Sampled % |
|---|---|---|---|---|---|---|---|
| **AGS** | 365 | 65,282 | 179 | 316 | 8,306 | 9,514 | 87% |
| **MS** | 118 | 17,009 | 144 | 49 | 940 | 1,012 | 42% |
| **DS** | 102 | 15,187 | 149 | 84 | 1,488 | 1,570 | 82% |
| **TF** | 77 | 25,120 | 326 | 65 | 529 | 831 | 84% |
| **Total** | **662** | **122,598** | **185** | **514** | **11,263** | **12,927** | **78%** |

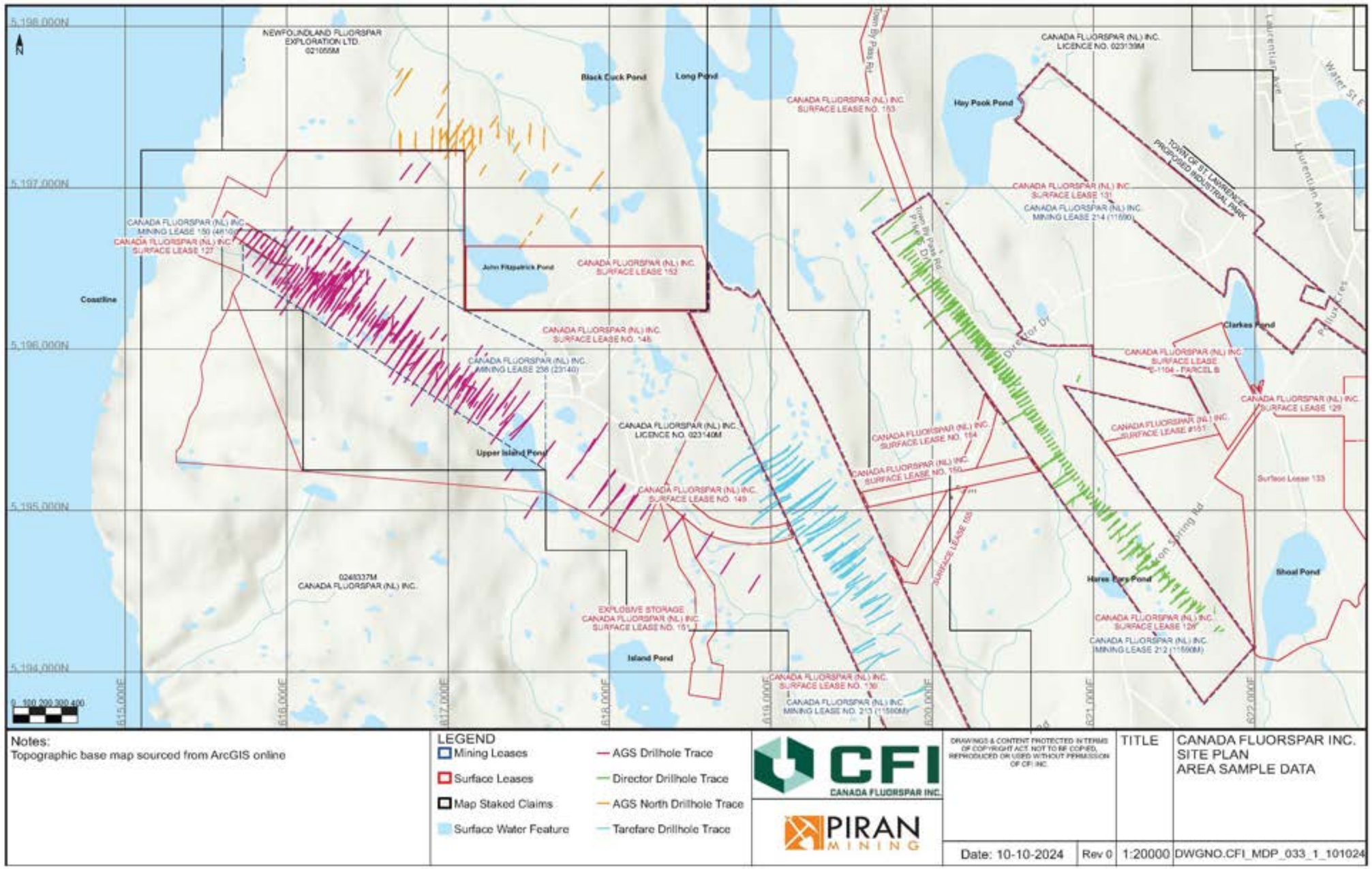



**Figure 5-1: Overall Plan of Estimated CFI Areas Sample Data (in Appendix Q)**

The 2023 MRE Technical report was prepared so as to provide an updated resource estimation for CFI. It is not an NI 43-101 report and should therefore not be used for publication of updated resources in the public domain. However, all of the chapters shown in this MRE are compliant with CIM definitions and Guidelines, and so can be used within directly with an NI 43-101 document. The other chapters required to qualify as an NI 43-101 document would be related to Mineral Processing, Project Infrastructure and Environmental Studies, as well as Reserve Estimation and Economics if the 43-101 was to include Reserves as well.

This report was prepared by Adam Wheeler, along with assistance from Mark Owen. Adam Wheeler visited the site during August 2023. Adam Wheeler is a professional Fellow (FIMMM) in good standing of the Institute of Materials, Minerals and Mining. He has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking as a Qualified Person ("QP"). Adam Wheeler has more than 40 years' international experience in the field of resource and reserve estimation.

CIM (2014) definitions have been used for Mineral Resources. The reported mineral resources, amenable to open pit mining, in this statement have been constrained within optimised pit shells. For each deposit area, the optimisation has been run with both Indicated and Inferred resources enabled. A summary of the combined mineral resources for the 4 deposits covered in the current study for Open Pit and Potential Underground resources is shown in Tables 5.2 and 5.3, respectively. A relatively optimistic $CaF_2$ price was applied in the resource calculations, so as to capture all potential mineral target areas that could feed into a project delivery pipeline for the next 20-30 years.

**Table 5-2: Summary of Constrained Open Pit Resources – Combined**

As of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | *Indicated* | | | *Inferred* | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| AGS | 7,459 | 25.2 | 7.6 | 1,443 | 22.3 | 4.5 |
| AGSN | | | | 1,325 | 20.6 | 9.9 |
| NS | 1,579 | 23.5 | 1.7 | 288 | 20.0 | 1.5 |
| Tarefare | 744 | 45.1 | | 1,003 | 48.4 | |
| **Total** | **9,782** | **26.5** | **6.1** | **4,059** | **28.0** | **4.9** |

**Notes:**

- **The Mineral Resources reported above are within optimised pit shells, based on a concentrate price of $550/t $CaF_2$ Conc.**
- **Resources reported above are undiluted, with no mining factors.**
- **It is considered that these resources have reasonable prospects for economic extraction.**
- **Cut-off applied = 5%$CaF_2$.**
- **Tonnages and grades are rounded appropriately.**
- **Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

**Table 5-3: Summary of Potential Underground Resources – Combined**

As of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | *Indicated* | | | *Inferred* | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| AGS | 1,800 | 29.8 | 12.1 | 3,704 | 31.8 | 10.2 |
| AGSN | | | | 449 | 22.7 | 13.8 |
| NS | 808 | 59.5 | 2.0 | 3,116 | 45.2 | 1.9 |
| Tarefare | 1,018 | 47.5 | | 3,988 | 48.1 | |
| **Total** | **3,626** | **41.4** | **6.4** | **11,258** | **40.9** | **4.4** |

**Notes:**

- **The Mineral Resources reported above are below the optimised pit shells.**
- **Resources reported above are undiluted, with no mining factors.**
- **It is considered that these resources have reasonable prospects for economic extraction.**
- **Cut-off applied = 15%$CaF_2$.**
- **Tonnages and grades are rounded appropriately.**
- **Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

The conclusions of this MRE can be summarized as follows:

- Updated resource block models have been developed for the AGS, AGS North, North/South Ridge and Tarefare deposits, which provide a reasonable basis for the

calculation and declaration of mineral resources, classified according to CIM (2014) definitions.

- These block models are suitable for use in open pit and underground mine planning, such that mining reserves can be calculated.

## 5.2 Mineral Reserve Statement

The Mineral Reserve estimate was prepared by Mr. Tim Peters of Piran Mining UK Limited (Piran) using optimal pit shells generated in DM NPVS™ software that utilises the Whittle evaluation process. Tim Peters is a professional Fellow (FAusIMM) in good standing of the Australasian Institute of Mining and Metallurgy. The September 2024 Mineral Reserve Estimate Report has been included in Appendix G and the statement is summarized below. The mining plan submitted in this Mine Development Plan is based on the Sept 2024 Mineral Reserve Estimate.

The AGS Open Pit cut-off grade of 5.7 % $CaF_2$ COG was calculated by Piran using the product pricing, operating costs, applicable capital costs and exchange rates provided by CFI, or developed from CFI's preliminary budget model. The Project's Mineral Reserve estimate as of 1st September 2024, is summarized in Table 5.4 and is reported on a 100% basis. The Mineral Reserve estimate was prepared by Piran using optimal pit shells generated in Whittle and subsequently designed in Studio OP™ and scheduled in EPS™ software using mining rates agreed with the preferred mining tenderer.

**Table 5-4: Summary of Mineral Reserves as of 1st September 2024**

| Category | Tonnes (Mt) | Grade (% $CaF_2$) | Contained (Mt $CaF_2$) |
|---|---|---|---|
| **AGS Deposit** | | | |
| | | | |
| Probable | 7.1 | 20 | 1.4 |
| Total Mineral Reserve | 7.1 | 20 | 1.4 |

**Notes:**

1. **CIM Definition Standards (2014) were adopted for reporting of this Mineral Reserve estimate**
2. **Rounding is applied in alignment to the confidence of the Mineral Resource and Mineral Reserve estimation**
3. **Mineral Reserves are estimated using a long term Acidspar grade fluorspar concentrate price of US$500/dmt (FOB)**
4. **The exchange rate used was 1:1.348 US$: CAD$**

5. **The AGS Open Pit Mineral Reserves are estimated at a COG of 5.7% $CaF_2$**
6. **Open pit assumptions include:**
    a. **COG's applied to a regularized model using 2.5 m x 5.0 m x 2.5 m cells, the mine planning block model is generated from re blocking the original resource model. Additional modifying factors include an ore loss factor of 5 % is applied.**
    b. **Fluorspar recovery is estimated to be a constant value of 79.7 % for head grades greater than 10 % $CaF_2$ and 60 % recovery of head grades below 8 % $CaF_2$.**
7. **At the time of reporting the qualified persons responsible for the inputs to this Mineral Reserve estimate are not aware of any mining, metallurgical, infrastructure, permitting or other relevant factors that could materially affect the mineral reserve estimate**
8. **The effective date of the Mineral Reserve is 1st September 2024**

**The existing stockpile is excluded from this reserve estimate due to insufficient data available to assess its quality, resulting in low confidence. The total quantity is 102,380 tonnes.**

### 5.2.1 Dilution and Extraction

The original resource block model was regularised to 2.5 m x 5.0 m x 2.5 m in line with the characteristics of the mining fleet and hence this includes a realistic level of planned dilution. This planned mining dilution is attributed according to the location of each block relative to the economic boundary and level of variability in the geometry of the modelled mineralisation. On average across the whole deposit, it is assessed this planned dilution constitutes approximately 25 % by tonnage when reconciled to the Mineral Resource model. Based on experientials this value is considered to align to first quartile industry performance within narrow, high grade vein open pit deposits. This value is considered appropriate based on the understanding that CFI intend to undertake systematic grade control (GC) drilling in the pit to a density of no less than 10 m x 10 m. Current resource drill density averages approximately 40 m x 40 m, hence without GC drilling a notably greater amount of dilution will be at risk. In addition, this level of dilution is selected on the basis that pre-spilt blasting will be applied along the modelled average Mineral Reserve contacts.

Some ore loss will be inevitable due to the more selective mining process, the narrow nature of the veins in places and the blast movement of the contacts. To account for this the mining recovery is set at 95%.

Both the planned dilution and mining recovery are accounted for within the software when running the open pit optimisation process.

It is worth noting that in some areas of the planned pit the Mineral Reserve is located adjacent to Inferred Resources. Whilst no benefit from this material is taken into consideration within this Mineral Reserve estimate there is potential to increase the Mineral Reserve if the appropriate resource drilling, assaying, etc, are conducted and incorporated into a Mineral Resource update. Alternatively, if these areas are left "as is", there is a strong possibility this Inferred mineralisation will create a material positive bias to the mine reconciliation process when mining in these specific areas. This will create a misleading result if then used to review or adjust modifying factors.

### 5.2.2 Cut-Off Grade

The AGS Open Pit COG was calculated by Piran using the product pricing, costs and recovery assumptions provided by CFI or developed from CFI's budget model. These pit optimisation parameters were used to calculate the cut-off grade based on steady state process plant throughput of 1.1 Mtpa. The input parameters are presented in Table 5.5.

**Table 5-5: Cut-Off Grade Assumptions**

| Economic Parameter | Unit | Value |
|---|---|---|
| **Commodity Price** | | |
| Acidspar (97.5 % $CaF_2$) | US$/dmt conc. FOB | 500.00 |
| Acidspar (97.5 % $CaF_2$) | $/dmt conc. FOB | 674.00 |
| **Exchange Rate** | | |
| Exchange Rate | CA$ to US$ | 1.348 |
| **Payability** | | |
| Payability | % | 100.00 |
| **Mining Costs** | | |
| Rock Mining Cost | $/t | 4.28 |
| Overburden Mining Costs | $/t | 4.28 |
| Dewatering | $/t | 0.10 |
| **Processing Costs** | | |
| Processing Costs | $/t processed | 16.25 |
| **Selling Costs** | | |
| Logistics & Transport Cost | $/dmt conc. | 4.50 |
| **G & A** | | |
| G & A | $/t processed | 5.11 |
| **$CaF_2$ Recovery** | | |
| DMS $CaF_2$ Recovery | % | 93.00 |
| Floatation $CaF_2$ Recovery | % | 85.65 |
| Overall Recovery >10 % $CaF_2$ | % | 79.66 |
| Overall Recovery <10 and >8 % $CaF_2$ | % | 76.00 |
| Overall Recovery <8 % $CaF_2$ | % | 60.00 |
| **COG** | | |
| COG | % $CaF_2$ | 5.70 |

## 5.3 Recommendations

### 5.3.1 Mineral Resource Recommendations

Adam Wheeler acting as QP for the recent Mineral Resource Statement has made the following recommendations as highlighted in the 2023 MRE Technical Report.

#### *5.3.1.1 Drilling*

**North/South Ridge Drilling.** The North/South Ridge's deposit is open to the south-east and to depth, so in the future, further follow-up drilling is recommended in these directions, for resource expansion.

**Geotechnical Drilling.** At the current time there seems to be hardly any holes angled outwards into the probable pit wall areas. In the future, it is recommended that such holes are considered to assist with geotechnical modelling.

**Triple Tube Drilling.** The use of Triple Tube diamond drilling should be considered, to improve the core recovery and reduce losses associated with fault zones. Data from this would also help with modelling and prediction of fault clay gouge zones.

**Possible RC Drilling.** To improve speed and to reduce drilling costs, the use of RC drilling to the top of initial vein intersections, followed by diamond drilling, should be considered in the future. This could be particularly useful for planned deeper holes.

#### *5.3.1.2 Drillhole Logging*

**Logging.** Future drillhole logging should include additional mineralogical investigation, including mineralisation grain size distribution; vein mineralogy and morphology; composition of gangue minerals and ratio of vein to gangue; and the proportion of clay gouge. This will allow a better understanding of the ore composition and grade distribution, prior to milling.

**Recovery Logs.** Total core recovery (TCR) for all drilling and entered/converted into digital form. In addition, specific recording of solid core recovery (SCR) for all drilling should be logged for any new drilling. This is related to the proportion of core with an intact core diameter.

**Lithology.** A rigidly applied lithology/structural code should be entered, where possible for all core, so as allow future modelling/estimation of fault/rubbilised zones.

**Mineralization.** Currently there are no logged codes recorded for the type of mineralisation e.g. Blastonite/Nodular/Banded veins. Discussion is required between mineral processing and

geological personnel, to determine if such mineralisation information would be useful for processing purposes, and how feasible it is to code the drillhole data in this way, leading onto modelling, and subsequent use in mine planning.

**Blasthole Logging.** In future pit production, logging of blast holes should be considered to help identify changes in the nature and dip of the veins, and thickening/ thinning in order to adjust ore/waste layouts and related blast hole patterns. Faults and clay gouge intersections should also be recorded. Use of UV light would also help with this type of logging. For example, in tungsten (scheelite) open pit operations, it is common practice to use UV light to assist with blasthole logging.

#### *5.3.1.3 Sampling*

**AGSN Sampling.** The 2022 drill program was halted at the time of suspension of operations. Sample analysis was stalled at that time but has recently been restarted in September 2023. It is recommended that these outstanding holes' samples assayed as soon as possible. The assays need to also include Pb and Zn.

**Pb/Zn Assays.** It appears Pb/Zn need to be considered as important deleterious elements with respect to $CaF_2$ concentrates. It is therefore important that the resource models are updated in the future to also Pb/Zn estimates. Any Pb/Zn assay available needs to be also collated and added to the master database. All exploration drilling in the future, as well as blastholes, needs to be assayed for Pb and Zn.

**Sampling Low Grades.** It is an international standard that all core runs through the mineralised section of each hole, regardless of anticipated grade or quality of recovery, should be sampled where possible. It must be highlighted that sample gaps can result in over-estimation of grade as a consequence.

**Sampling Review.** Where possible, all core should be reviewed again, with any un-sampled sections being assayed to improve assay profiles of the lower grade material., and lost core intervals marked as such.

**Blasthole Sampling.** In future pit production, blasthole sampling should also be considered, to augment and improve geological interpretation from bench floor mapping. QAQC controls should also be applied to these samples. For a fast assay turnover, it may be better to refurbish the on-site laboratory for the analysis of blasthole samples.

#### *5.3.1.4 Density*

**Density Database.** An improved density measurement database needs to be created, so that coordinates and grades can be cross-referenced. Any unreliable values should also be flagged as such, with reasons.

**Density Measurements.** Density measurements in the future should make use of a cellophane wrapper on whole core density billets. This will allow for any potential vugs present. Density measurements of at least 1 every 10 m in recommended in external waste.

**Density Sample Coverage.** The number of density measurements taken for vein material is very small. It is recommended that many more density measurements are taken so that average density values can be determined by individual vein structures, and for very large veins, local density variations can be reflected in the block models. As a minimum, density values should be obtained spaced at least 100 m apart horizontally and vertically per vein.

**Fault Modelling.** In connection with more detailed logging and fault and clay gouge structures, it is recommended that such faults are taken into account in the assignment of resource model densities.

**Core Box Weights.** In future drilling campaigns, it would be useful to also record overall core box weights, prior to any sampling, with overall FROM/TO measurements for the start and end downhole distances of each box. These data are also very useful with respect to density variations and core recovery.

##### 5.3.1.4.1 Density Measurements

Localized specific gravity measurements were carried out on drill core from previous exploration programs. As described in the MRE (2023) report, in 2013, CFI carried out 126 specific gravity

measurements on mineralized intersections and wall rock material in drill core from the AGS and North/South Ridge deposits. The density measurement technique and procedures were as follows:

- Weighing the dry sample on an accurate beam balance (Wair);
- Weighing the sample in water (Wwater) by hanging the sample with a thread attached to the bottom of the balance. The difference in the two weights is the displaced volume of water; and
- Density is calculated as: Density = [Wair] / [Wair - Wwater]

Systematic density measurements conducted by CFI in 2013 resulted in a density reference for the North/South Ridge and the AGS deposit areas. The samples were not wax coated or sealed in cellophane.

Between 2013 and 2015, CFI carried out approximately 587 specific gravity measurements on mineralized intersections and wall rock material from diamond drill core from the AGS and North/South Ridge deposits. Additional core density measurements were also carried out in 2017. Density averages from these measurements by deposit and lithology were applied in the current study and detailed in the recent MRE report.

#### 5.3.1.4.2 Density Methods

The recent MRE report has indicated the best practice for ensuring the consistency of collecting future density measurements and reporting methodology. Going forward, improvements to the exploration program will include:

- Collecting regular specific gravity measurements in-house at a rate of 1 measurement every 20 meters and/or during a lithology change.
- The addition of wax or plastic wrap to density billets to allow for the existence of vugs (open space) within the drill core.
- External lab check verification of specific gravity measurements at a rate of 5% (or 1 in 20 samples).
- A density database and analysis of density variation with respect to coordinates and grade.

#### *5.3.1.5 QAQC*

**Preparation.** As previously, exploration samples' preparation and assaying should be completed by a proprietary lab company.

**Standards.**

- Any on-site prepared samples should be externally certified.
- If reference standards cannot be certified, then standards should be obtained by outsourcing.
- Additional low grade (<10% $CaF_2$) samples should be prepared. This should give an overall suite of 3 types of Certified Reference Materials (CRMs): low, medium and high grade.

**Reports.** QAQC results should be regularly reported, and any failures or controls' insufficiencies rectified. If results are checked as they are received, and reported monthly, that would be sufficient.

**Controls.** Pulp duplicates and fine blanks should also be requested and reported as part of the QAQC procedure. An overall insertion rate of all QAQC controls of at least 20% is recommended. Each hole should also have at least one set of QAQC controls.

**Twin Holes.** To drill some twin-holes in NS and TF, so as to help verify the historical data being used at these deposits.

##### 5.3.1.5.1 Historic Quality Assurance/Quality Control

QAQC methods for the Project have varied historically, as such the methods have been broken out into program years and referenced from the most recent Mineral Resource Report (2023).

##### 5.3.1.5.2 2013 to 2016

The following is taken from Lycopodium (2016) and Agnerian (2013). The QA/QC procedures used by CFI for the 2013, 2014, 2015, and 2016 AGS drill programs are the same as those for the 1999 and 2008 drilling programs and have been reviewed by AGP. QA/QC procedures for 2016 in-house NMR assaying had an increased frequency of control samples. Data verification was

carried out by CFI personnel and included comparing the list of samples sent to the laboratory and sampling results from the laboratory.

In particular, the CFI QA/QC program includes:

- Insertion of a blank sample at the frequency of approximately one in every 20 regular samples. Blank material taken from local granite quarry;
- Insertion of an internal standard, also at the frequency of approximately one in every 20 regular samples. This was prepared by mixing visibly high fluorite content material with SLG material; and
- Insertion of duplicate samples at a frequency of one in every 20 regular samples.

**Standard Samples, 2013-2016**

- In 2013, CFI inserted 27 samples of an in-house standard;
- In 2014, CFI inserted 82 samples of the same in-house standard, with a mean concentration of 59.2% CaF2, within the batches of regular drill core samples; and
- In 2015, CFI inserted 10 samples of in-house Standard A, 11 samples of in-house Standard B, and 7 samples of in-house Standard C, with mean concentrations of 22.2% CaF2, 47.6% CaF2, and 73.6% CaF2, respectively.

**Coarse Duplicate Sampling, 2013-2016**

Assays results for the 43 duplicate samples in 2013, 68 samples in 2014, and 41 samples in 2015 indicate good assay reproducibility, with a correlation coefficient of 0.999. For example, the 153 duplicate assays are comparable to the original assays.

Also, a report of 37 duplicate assays carried out at SGS Lakefield, indicating that there was very good assay reproducibility, for instance, the original and duplicate assays are comparable.

**External Lab Duplicate Assays, SGS**

Results of 37 duplicate assays carried out at SGS Lakefield indicate that there is very good assay reproducibility, meaning, the original and duplicate assays are comparable.

#### 5.3.1.5.3 2017

The 2017 drilling and re-sampling program used the onsite laboratory for CaF2 and CaCO3 analysis. QA/QC procedures varied from previous drill programs by analyzing samples by drill holes and increasing the number of standards used per drill hole. The CFI QA/QC program for this period is reported as:

- Insertion of standard samples at the frequency of one in every five regular samples. Some standard samples were duplicated per drill hole: and
- Insertion of coarse duplicate samples at one in every 10 regular samples.

Blank materials were not used during these analyses. Repeated measurements taken on several QA/QC control plots for the 2017 drilling and re-sampling program were not available for review. Assay analysis certificates indicate that control samples used were greater than 50% of the total analyses recorded.

For the onsite laboratory, CFI used several standards for its QA/QC program, 16 different standards for CaF2 and eight standards for CaCO3.

In October 2017, CFI submitted 209 samples from the 2017 re-sampling program to Eastern for duplicate analysis for CaF2. Results indicated inaccuracies in the lower grade CaF2 results (<10% CaF2). These lower grades were considered below cut-off grade at the time and were allowed to be used in the database. With the ramping up of mine operations at AGS at the time, however, resources were reduced for maintaining the onsite laboratory. CFI suspended the onsite laboratory in favour of using Eastern for all subsequent analyses from exploration programs.

#### 5.3.1.5.4 2019-2021

The QA/QC procedures used by CFI for the 2019 to 2021 drill programs, are similar to those used for the 2013 to 2015 drill programs and have been reviewed by AGP. QA/QC data verification was carried out regularly by CFI personnel, including comparing the list of samples sent to the laboratory and sampling results from the laboratory.

The CFI QA/QC program included:

- Insertion of a blank sample at a frequency of one per drill hole or one in every 20 regular samples;
- Insertion of standard samples at a frequency of one per drill hole or one in every 20 regular samples; and
- Insertion of coarse duplicate samples at a frequency of one per drill hole or one in every 10 regular samples.

For the 2019 to 2021 drilling programs CFI collected 1,892 samples and inserted a total of 308 control samples.

**Coarse Blanks**

Coarse blanks, as for all drill programs, were sourced from a Precambrian Granite from the Swift Current Batholith (circa 577Ma ± 3Ma) collected from a road cut on the Burin Peninsula, near Sandy Harbour River. Coarse blanks were inserted into the sample stream at one per drill hole or, for longer drill holes, at one per 20 samples. During the 2019 to 2021 drill programs, no failures were encountered in the blank samples.

**Standard Samples, 2019-2021**

Two standards were used for QA/QC control during the AGS drill programs, Standard A and Standard B, which represent a medium CaF2 grade standard and a higher CaF2 grade standard, respectively. A standard was deemed suspect as a failure if the result fell outside three standard deviations (± 3STDEV) from its expected value as defined by the standard's certificate. Any assays outside of this threshold were reviewed on a case-by-case basis to determine if any corrective action was required.

In 2019, there were five failures out of 54 standard samples early in the sample analysis. These samples were reviewed by CFI, and it was determined that no re-sampling was required. There were no failures in the standard results for the 2020 to 2021 drill program.

In this period, reference standards had been prepared on site. Documentation supporting these standards' preparation are not currently available. However, for on-going resource work,

material for two standards' have been prepared, and subsequently certified externally by Laboratory Quality Services International. The reference values are 20.5% and 58.7% CaF2.

**Duplicate Assays, 2019-2021**

Duplicate samples were used as part of the QA/QC program for the AGS drill programs. CFI created its own split of the crushed core duplicates at the mine site and submitted these as separate samples. The duplicate data demonstrates expected similarities in grades, however, only in lower grade material of less than 10% CaF2 are their differences of greater than ±20% between samples. These are not considered failures as the absolute difference at lower grades tends to indicate higher percentage differences.

#### 5.3.1.5.5 QAQC Methods

The recent MRE (2023) has highlight some shortcomings with historical QAQC methodology, especially with limited certification for in-house standards and lower insertion rates for certified reference materials. Additionally, failures returned were not adequately addressed. Going forward, the QAQC methodology will be revised to include the recommendations outlined in the MRE report and include:

- Exploration samples preparation and assaying to be completed by a proprietary lab.
- Reference standards will be prepared by an externally certified laboratory and will include standard homogeneity testing and repeatability.
- If in-house standards are prepared, they will be held to the same standard of rigorous test work and certification as external laboratories noted above.
- Two low-grade certified reference standards are currently being prepared at LQSi, external laboratory. Once prepared and tested for repeatability, they will be used in addition to the higher grade CaF2 standards currently in stock.
- Increased insertion rate of control samples at least 20%. In addition to ensuring every drillhole contains one set of QAQC controls.
- QAQC results will be regularly reported and any failures or insufficiencies rectified.

#### *5.3.1.6 Database*

**Database Update.** An updated master database needs to be created. Logging dates, assaying dates, assay types and assaying companies also need to be referenced. It is also needs to record where and when sample preparation was done and flagged if any sample has been superseded by subsequent re-assaying, i.e., it must be easy to filter the database to retrieve current finally accepted assay results.

**Removal of Zeros.** Anything assayed with results below the level of detection should be recorded in the database with some clear code, like 'TR', or -1, meaning trace. Assay results recording zeros should not exist, as they create confusion.

#### *5.3.1.7 Modelling*

**Fault Modelling.** To further assist with the prediction and handling of potential gouge problems, it is recommended that previous bench floor mapping data be collated and combined with fault intersection data from exploration drilling. These data sets can be used to attempt fault modelling or flagging of the resource block models with respect to the probable fault intersection occurrence.

**North/South Ridge's Fault Modelling.** Modelling of this fault, relative to the NS vein, would be very useful.

**Geological Modelling.** More detailed work should consider the existence of payshoots related to "pinch and swell" structures. For NS and TF, this will require review of underground sampling and geological mapping, so that any dip and dip-directions can be established. Improved lithological models are also recommended for all deposits.

**Underground Mine Plans/Sections.** Available data from underground geological and interpretation need to be collated, to assist with structural interpretation and improve any associated geological models. Just recently, more historical plans have been found, which were archived by the government in St Johns. A brief review of these plans has revealed considerably more information than currently held digitally by CFI.

#### *5.3.1.8 Other*

**Core Storage Security.** At the current time, the core storage area is within a lockable boundary. It is highly recommended that all of the core storage area is within a lockable fence and is regularly checked by security staff. As the primary source of data associated with the resources, not having these facilities secure could be assigned as a Fatal Flaw in any external audits.

**Winterization.** Full winterization of outside conveyors and belt scrapers.

**Exploration.** The identification of future exploration targets should use results supported by previous geophysical exploration.

**Tailings.** A lower cut-off is now being considered for open pit mine planning, with corresponding processing improvements to treat lower grades. With lower grades potentially being economic, it is possible that some of the old tailings (wherever they are located), resulting from underground mining at much higher cut-offs, could now be retreated profitably. It is therefore recommended that the tailings should be considered as a potential resource and should be drilled so as to evaluate it. This will probably require triple-tube or sonic drilling.

**Metallurgical Testing.** Testing of lower grade material is recommended, to verify that the resource cut-off being applied (5% $CaF_2$) is justified. At the current time, global processing recovery figures have been applied in the cut-off calculation, irrespective of feed grade.

### 5.3.2 Mineral Reserve Recommendations

The following information associated with recommendations associated with mineral reserves, has been referenced from the Technical Report on the St. Lawrence Fluorspar Project (SLR, 2022).

1. Complete the geotechnical study for the AGS Open Pit that includes kinematic stability and equilibrium modelling to assess the stability of the inter- ramp and overall slopes.
2. Implement GC drilling and support systems to enable ongoing updates of the mining model to ensure minimal unplanned dilution of ore.

These recommendations are mirrored in the updated Mineral Reserve Estimate (Piran, 2024) as well as the geotechnical report (Dempers, 2024).

## 5.4 Plan View Drawings (Mining Elevations)

Flitch plans of the AGS Open Pit showing the projected block grade model by bench are presented in Figures 5.2 to 5.16 and included in Appendix G. A Reserve plan drawing showing the mine advance and the mineralization has been added to Appendix G2

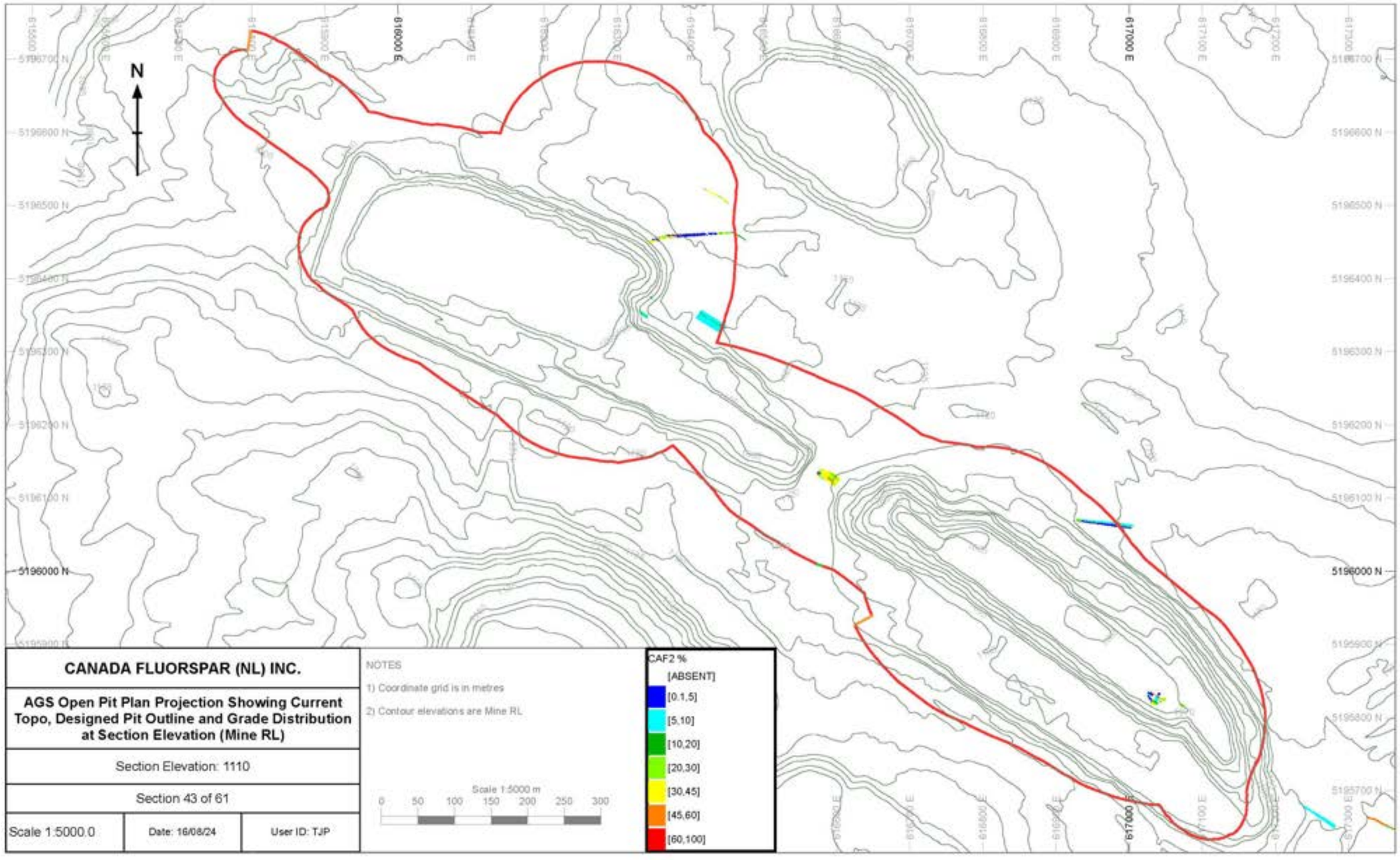



**Figure 5-2: Grade Flitch Plan of the 1110m RL Bench**

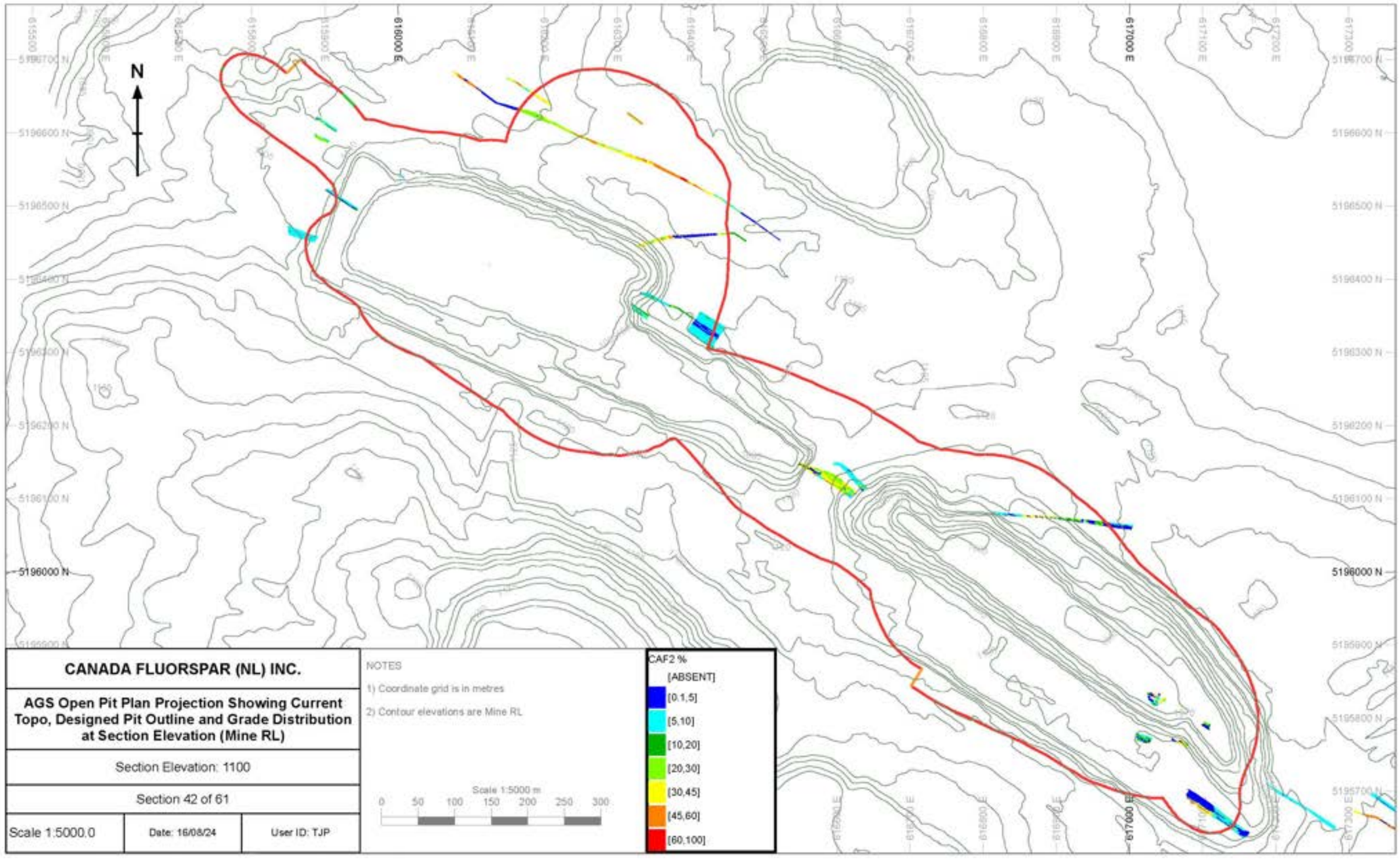



**Figure 5-3: Grade Flitch Plan of the 1100m RL Bench**

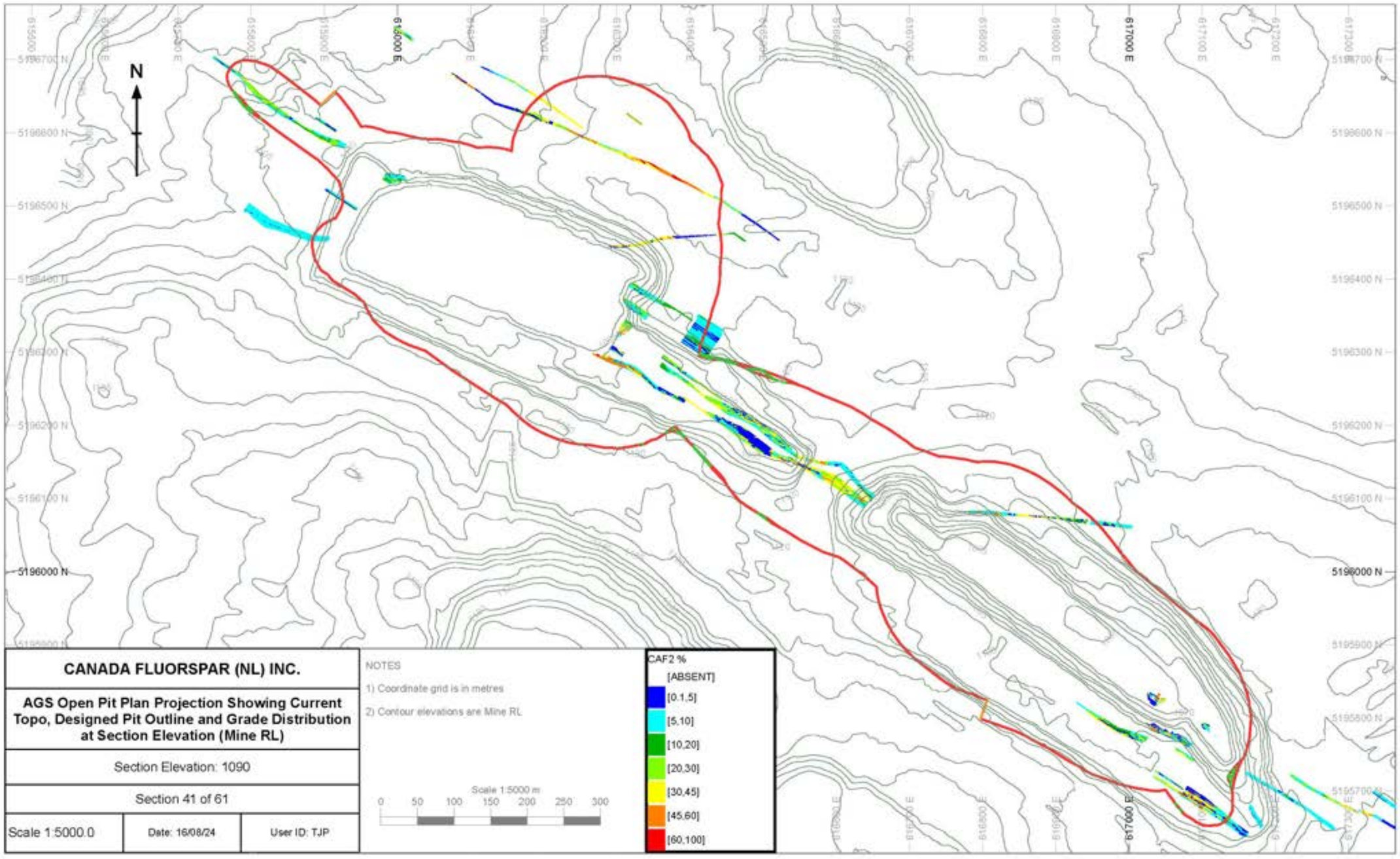



**Figure 5-4: Grade Flitch Plan of the 1090m RL Bench**

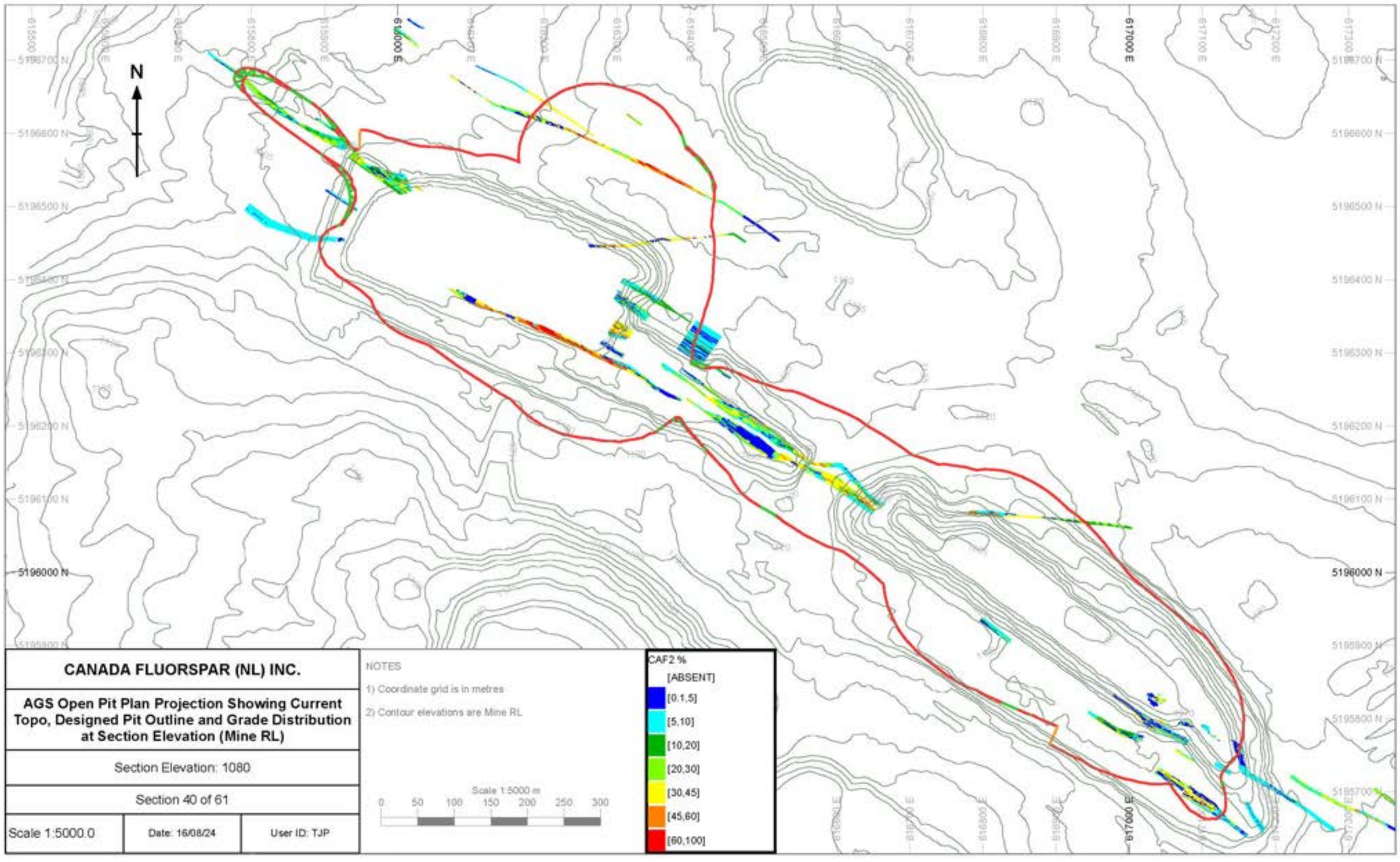



**Figure 5-5: Grade Flitch Plan of the 1080m RL Bench**

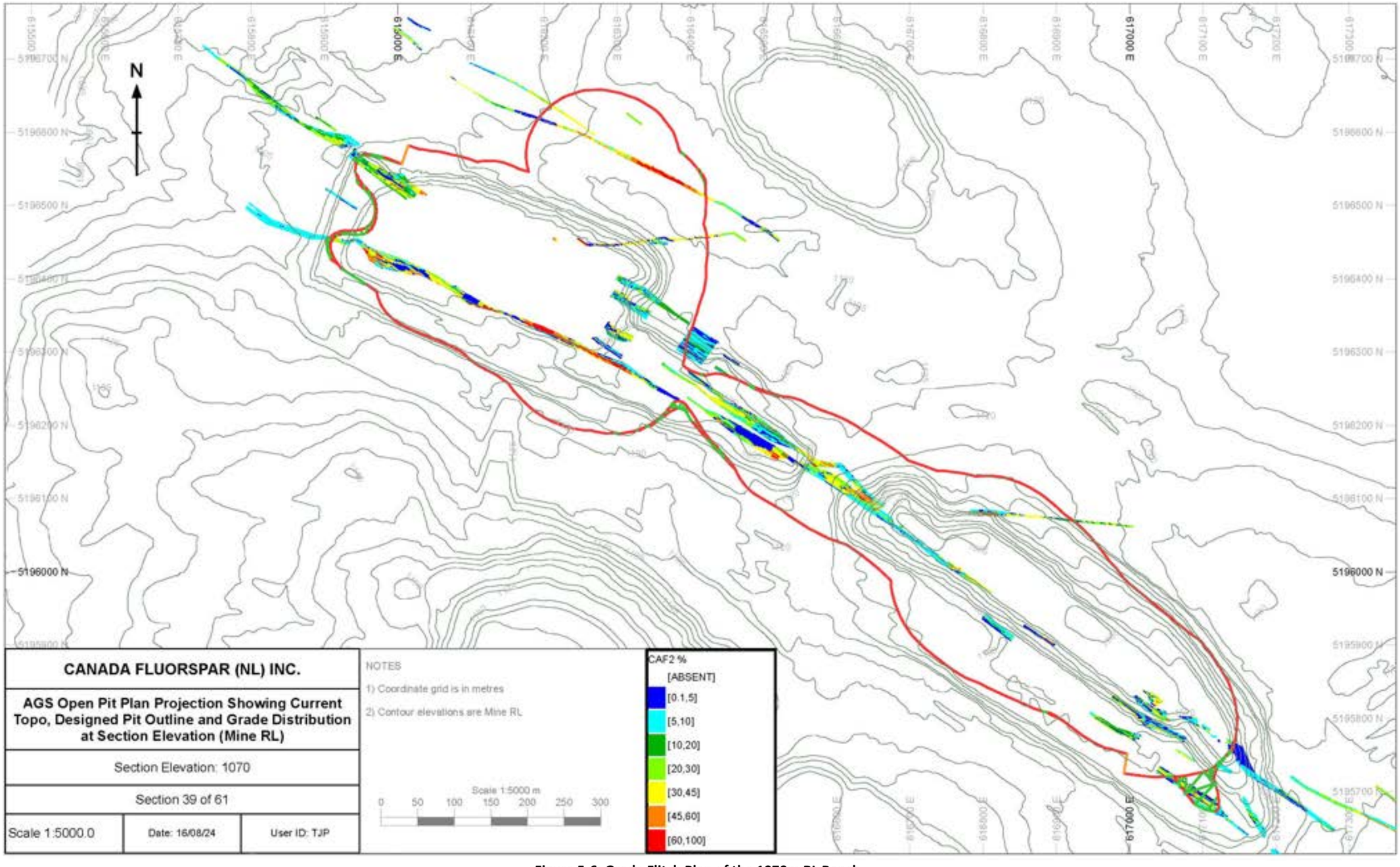



**Figure 5-6: Grade Flitch Plan of the 1070m RL Bench**

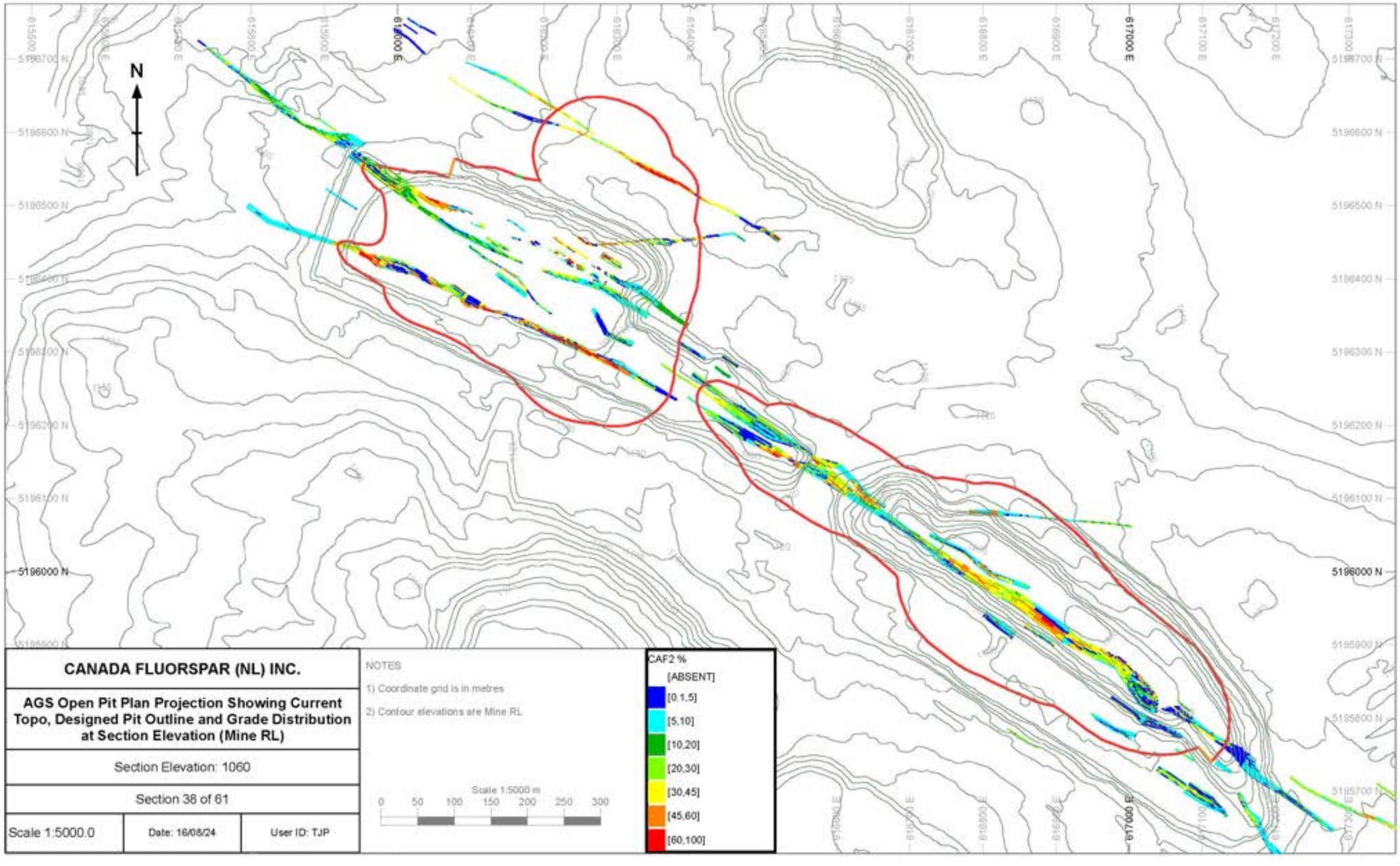



**Figure 5-7: Grade Flitch Plan of the 1060m RL Bench**

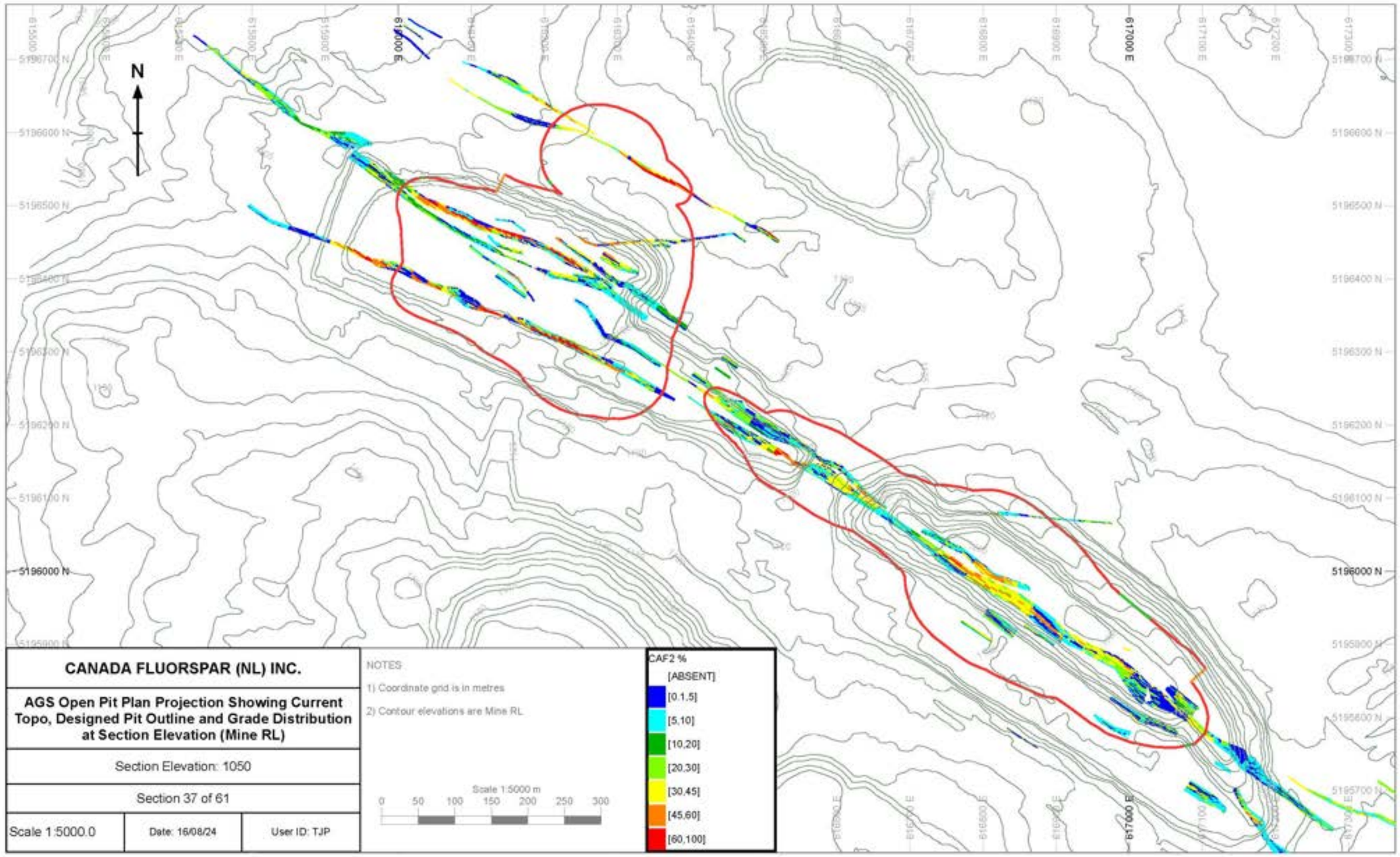



**Figure 5-8: Grade Flitch Plan of the 1050m RL Bench**

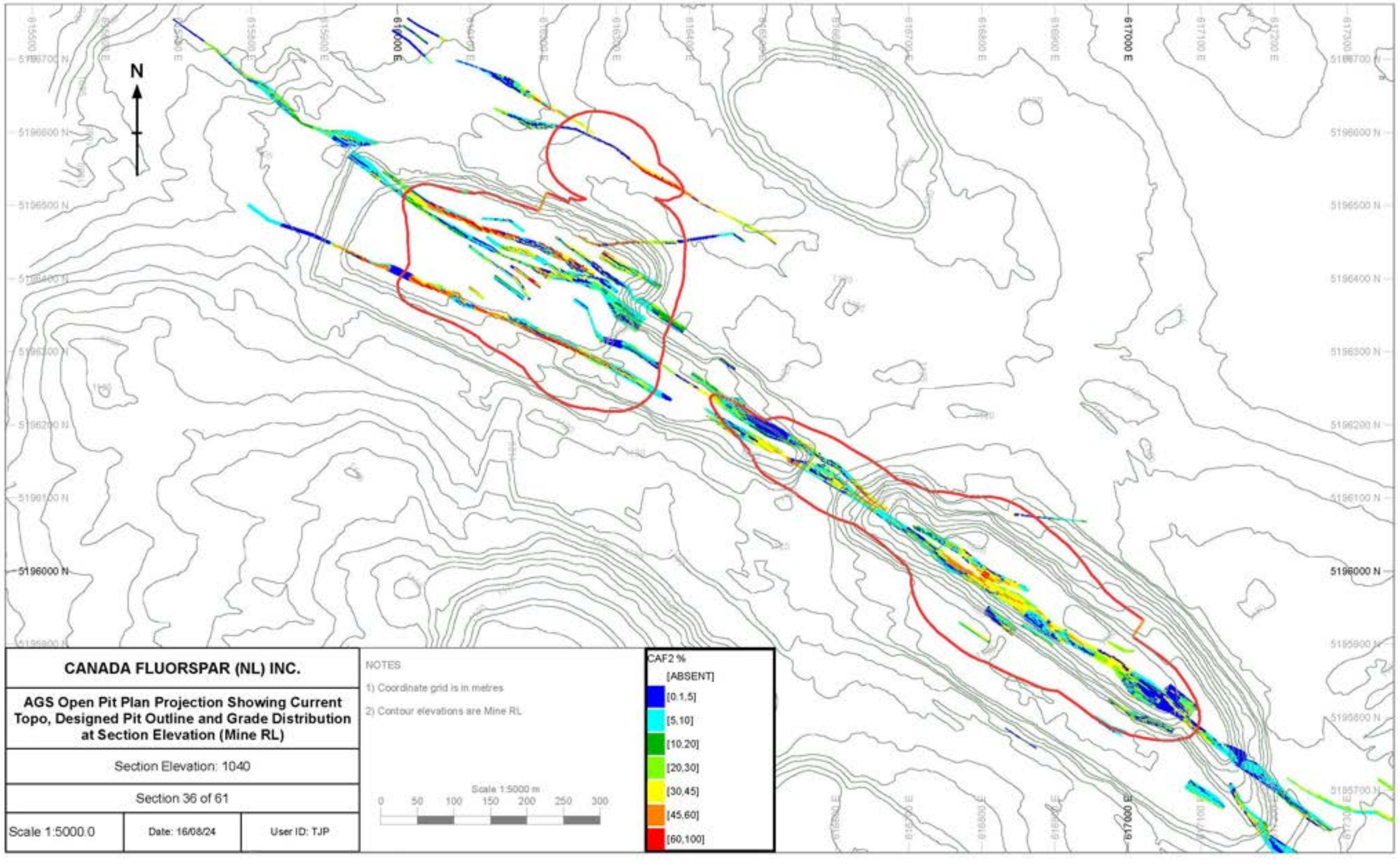



**Figure 5-9: Grade Flitch Plan of the 1040m RL Bench**

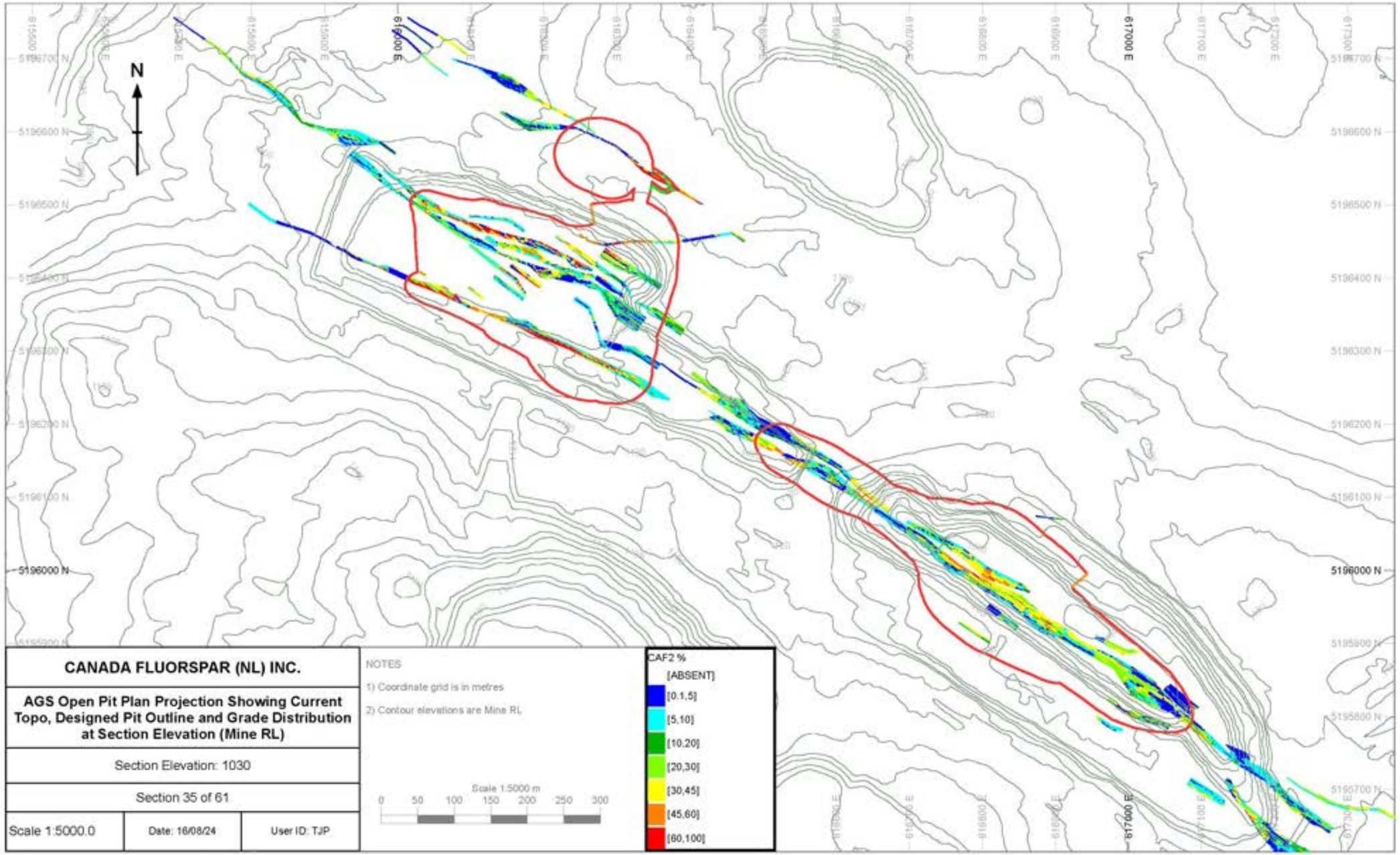



**Figure 5-10: Grade Flitch Plan of the 1030m RL Bench**

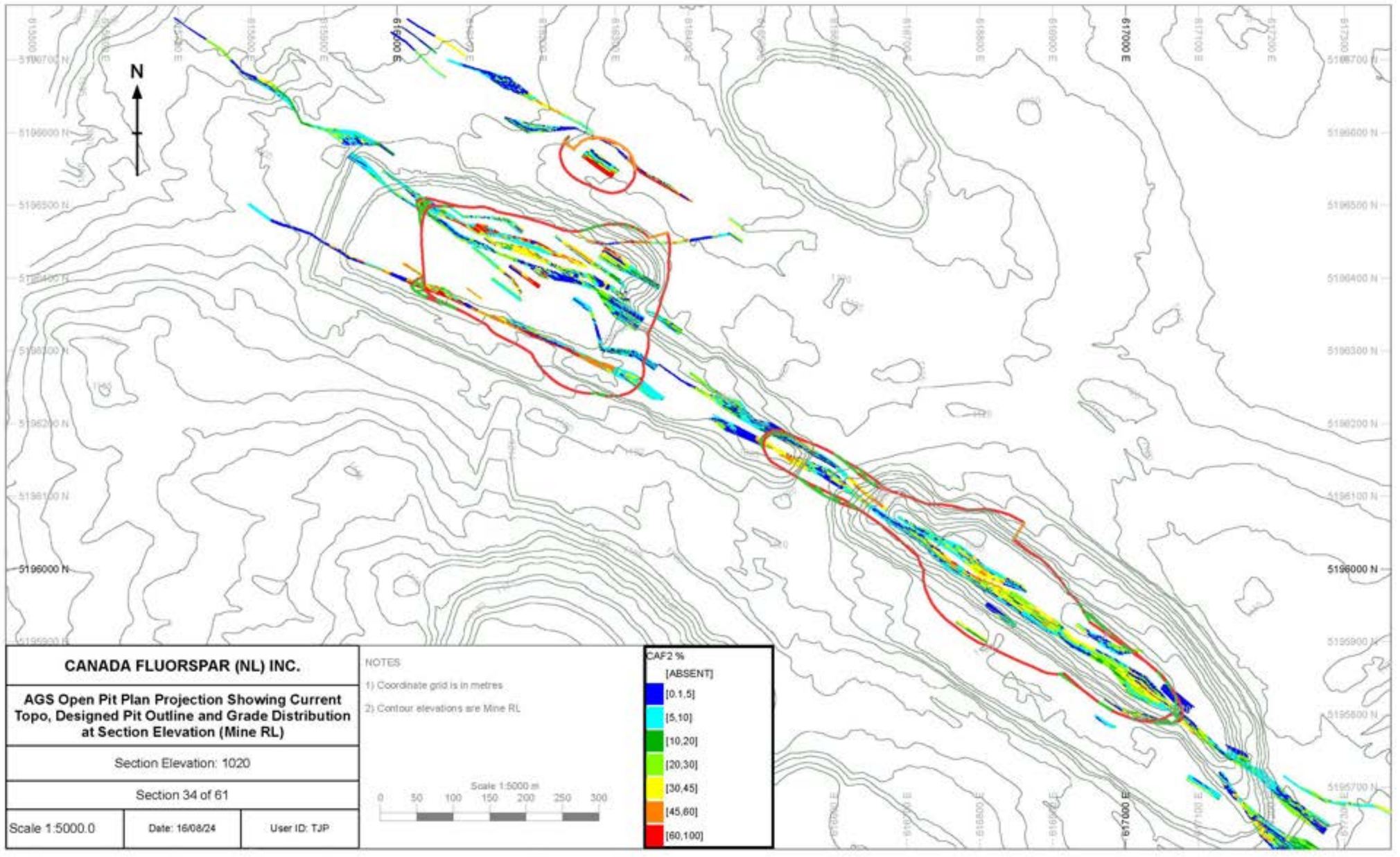



**Figure 5-11: Grade Flitch Plan of the 1020m RL Bench**

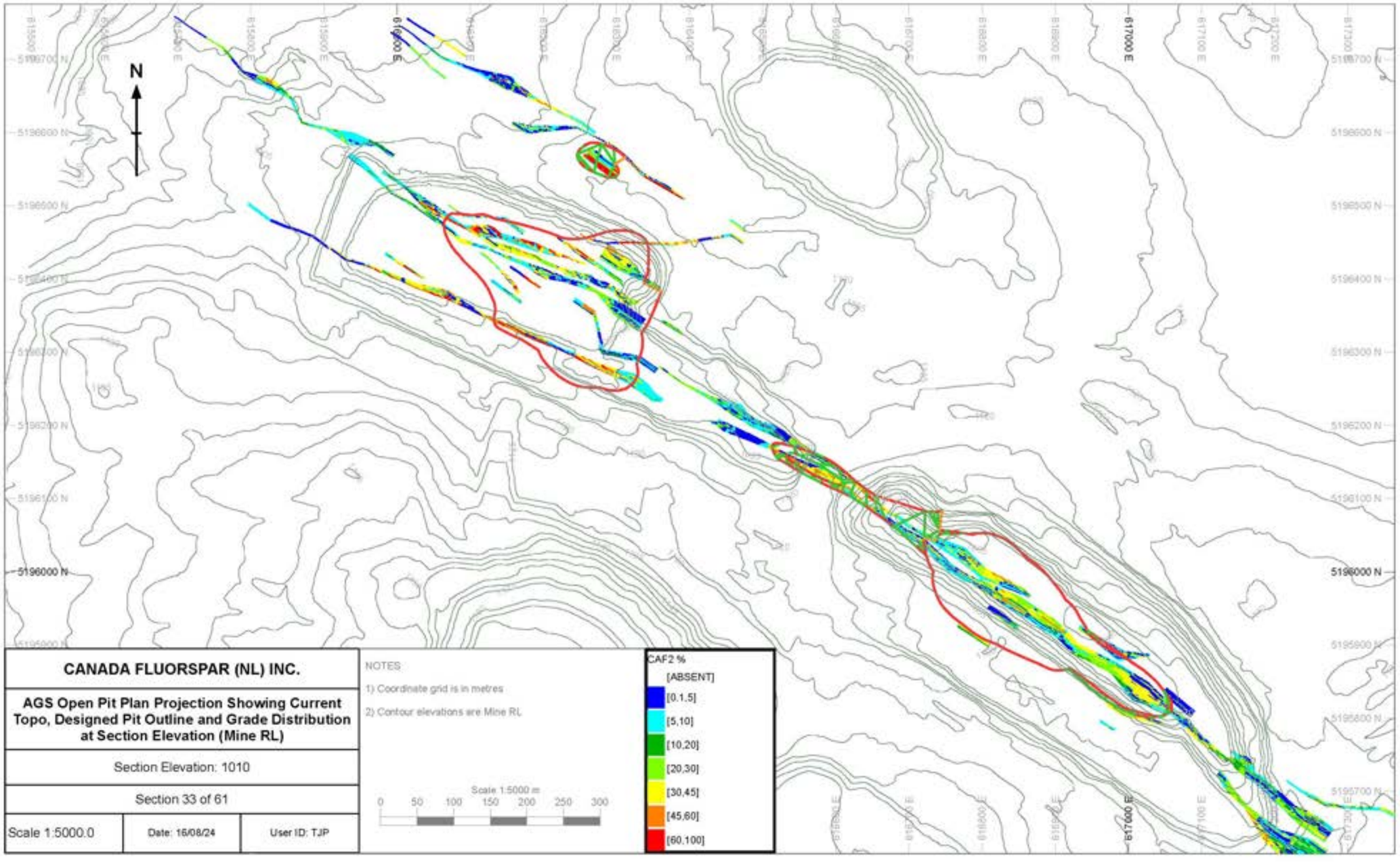



**Figure 5-12: Grade Flitch Plan of the 1010m RL Bench**

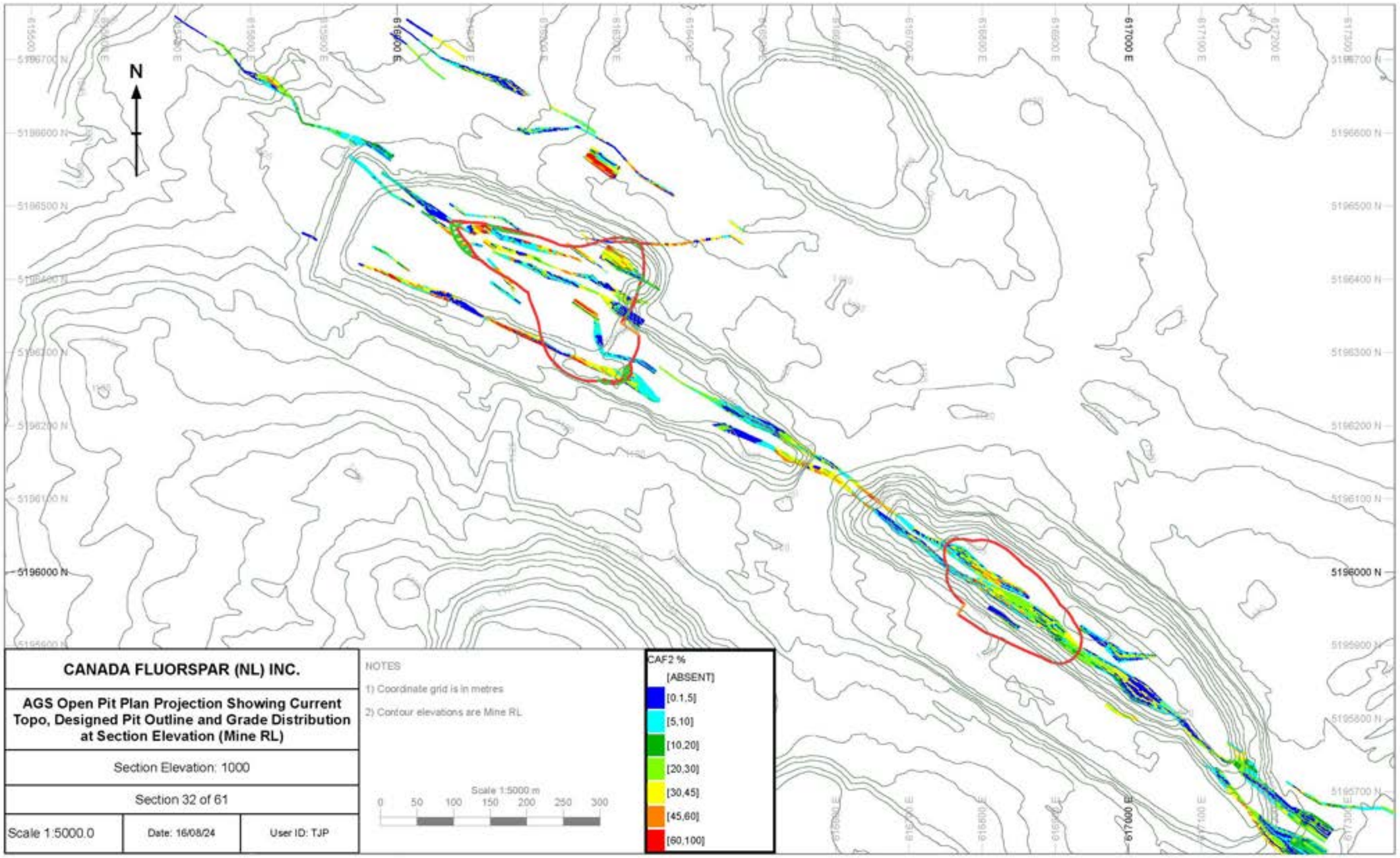



**Figure 5-13: Grade Flitch Plan of the 1000m RL Bench**

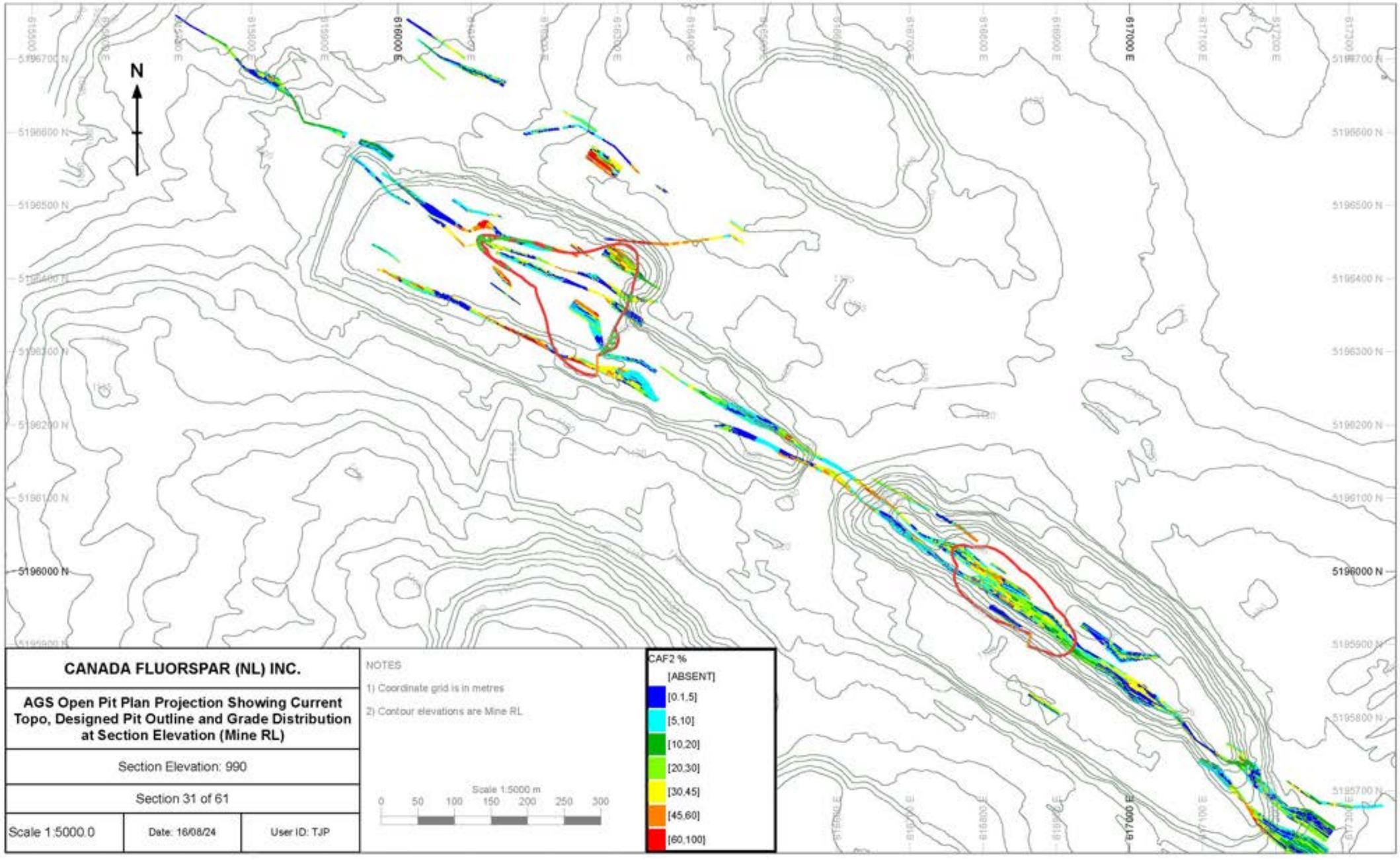



**Figure 5-14: Grade Flitch Plan of the 990m RL Bench**

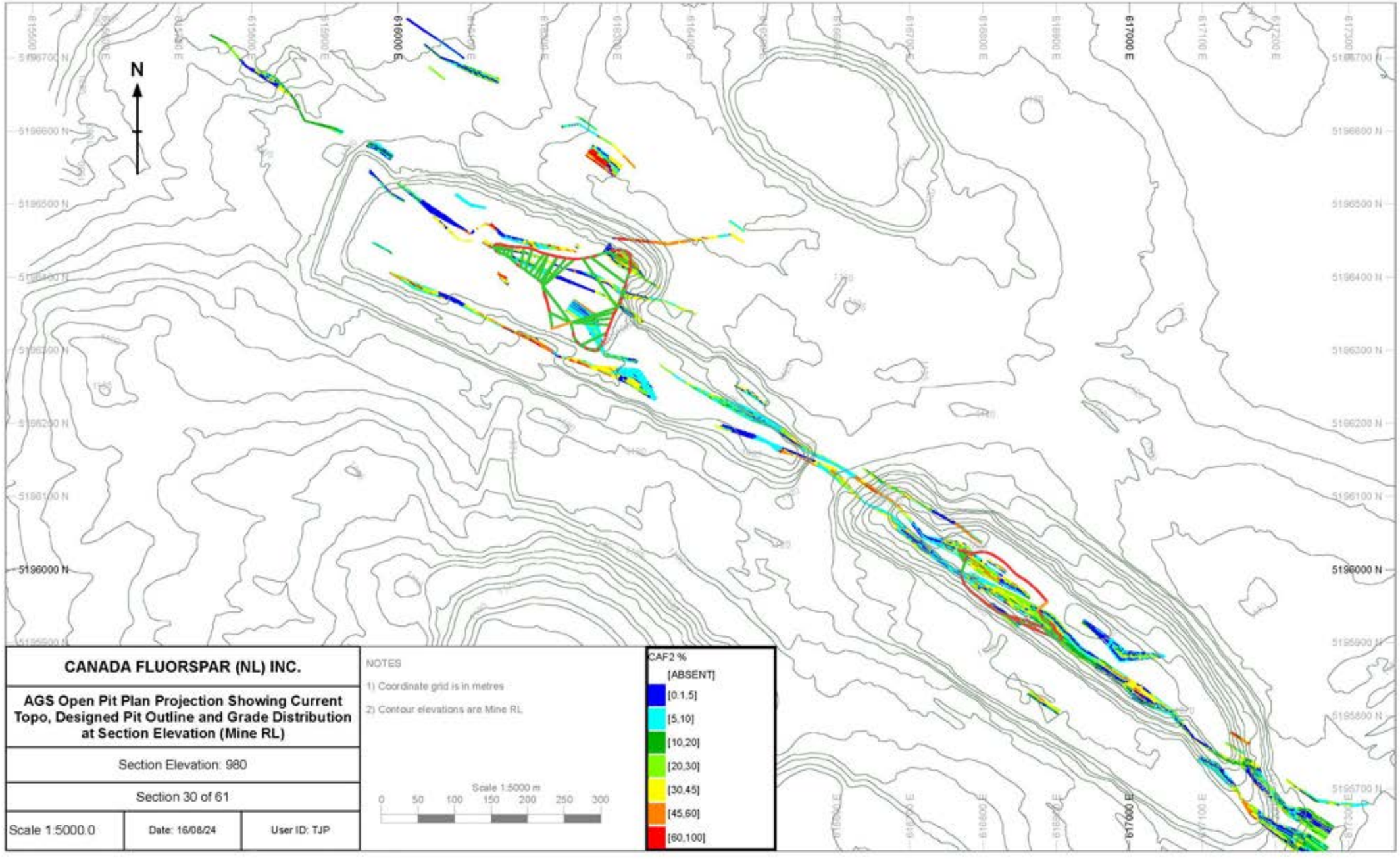



**Figure 5-15: Grade Flitch Plan of the 980m RL Bench**

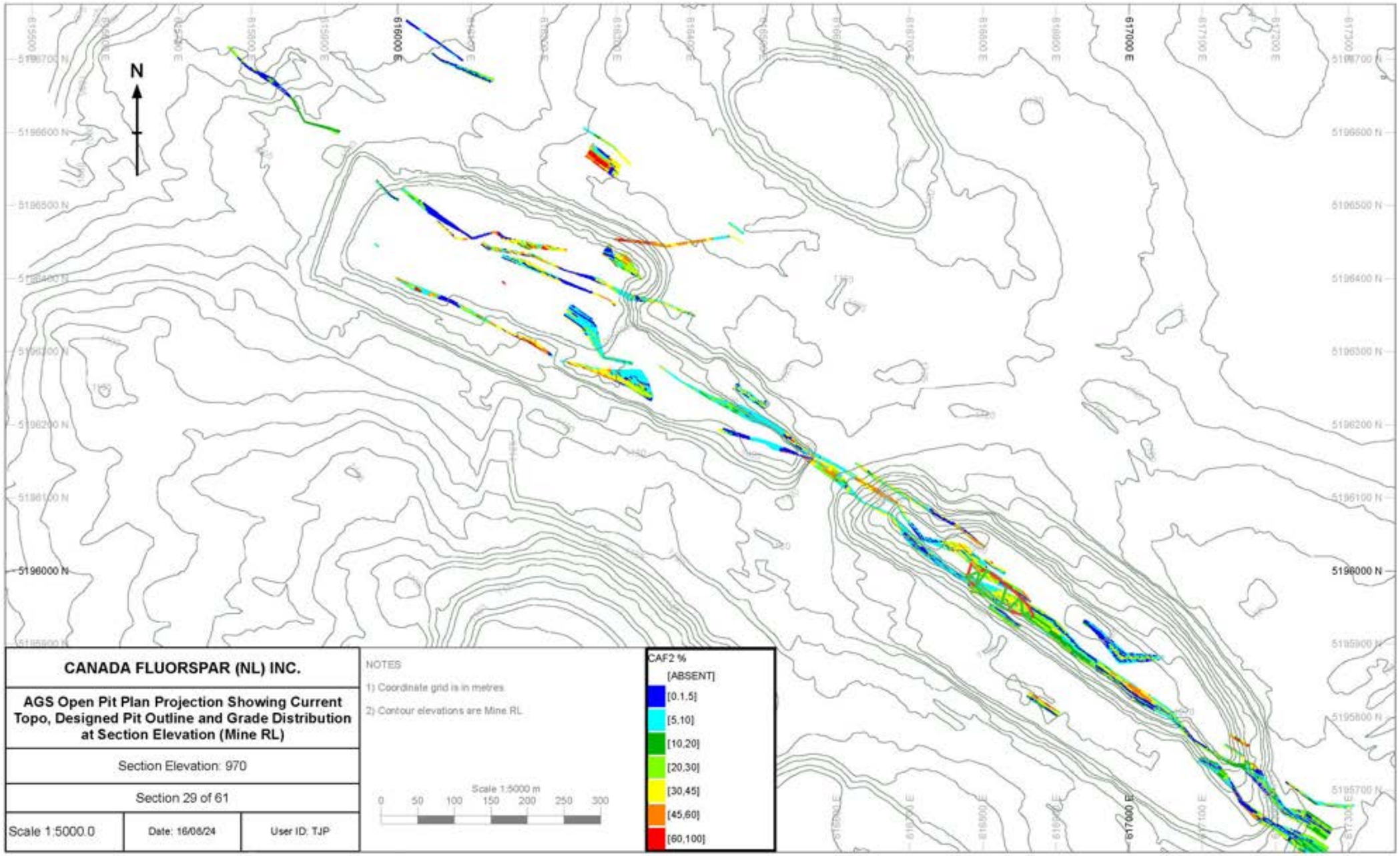



**Figure 5-16: Grade Flitch Plan of the 970m RL Bench**

## 5.5 Mineral Resource Sections

Geological cross sections across the AGS Deposit have been highlighted in Section 3.6 and a full suite of sections have been included as Appendix D.

## 5.6 Reconciliation Sheet

The new mineral resources include several updates in the interpreted mineralized veins. Primarily there has been an increase in resource tonnes due to the re-interpretation of the mineralization based on revised cut-off grades for both open pit and underground resources for the AGS and the North Ridge and South Ridge Deposits. Tables 5.6 and 5.7 show the comparison of the January 26, 2022, and the October 31st, 2023, mineral resources for the AGS Deposit and North/South Ridge Deposits.

**Table 5-6: Comparison of January 2022 and October 2023 Mineral Resources for the AGS Deposit (combined open pit and underground resources)**

| Classification | 6 Jun 2022 Resource | | | 31 Oct 2023 Resource | | | Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | COG > 5% OP, > 20% UG | | | COG > 5% OP, > 15% UG | | | | | |
| | Tonnage | $CaF_2$ | Contained $CaF_2$ | Tonnage | $CaF_2$ | Contained $CaF_2$ | Tonnage | $CaF_2$ | Contained $CaF_2$ |
| | ('000 t) | (%) | ('000 t) | ('000 t) | (%) | ('000 t) | ('000 t) | (%) | ('000 t) |
| Measured | 13 | 27.52 | 4 | | | | -13 | -27.52 | -4 |
| Indicated | 9,864 | 25.46 | 2,511 | 9,259 | 26.09 | 2,416 | -605 | 0.63 | -95 |
| Inferred | 184 | 33.56 | 62 | 5,147 | 29.14 | 1,500 | 4,963 | -4.42 | 1,438 |

**Table 5-7: Comparison of January 2022 and October 2023 Mineral Resources for the North/South Ridge Deposit (combined open pit and underground resources)**

| Classification | 6 Jun 2022 Resource | | | 31 Oct 2023 Resource | | | Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | COG > 5% OP, > 20% UG | | | COG > 5% OP, > 15% UG | | | | | |
| | Tonnage | $CaF_2$ | Contained $CaF_2$ | Tonnage | $CaF_2$ | Contained $CaF_2$ | Tonnage | $CaF_2$ | Contained $CaF_2$ |
| | ('000 t) | (%) | ('000 t) | ('000 t) | (%) | ('000 t) | ('000 t) | (%) | ('000 t) |
| Indicated | 2,599 | 43.27 | 1,125 | 2,387 | 35.69 | 852 | -212 | -7.58 | -273 |
| Inferred | 1,381 | 42.62 | 589 | 3,404 | 43.07 | 1,466 | 2,023 | 0.45 | 878 |

# 6 Description of the Mining Process

## 6.1 Existing Mine Workings

Prior to February 2022, the primary areas of mining production included the Grebes Nest, Center, and Pond pits. Pond Pit is a relatively new addition identified in 2018 between the Grebes Nest and Center pits as a result of in-fill drilling in 2017 beneath the former Grebes Nest Pond. The smallest pit location to the northwest of Center Pit is the Open Cut Pit.

At AGS open pit, there is the South Waste Rock Facility (South WRF), Overburden Stockpile to the North, and AGS East Tailings Facility to the South-East. Figure 6.1 shows the current workings and layout at AGS.

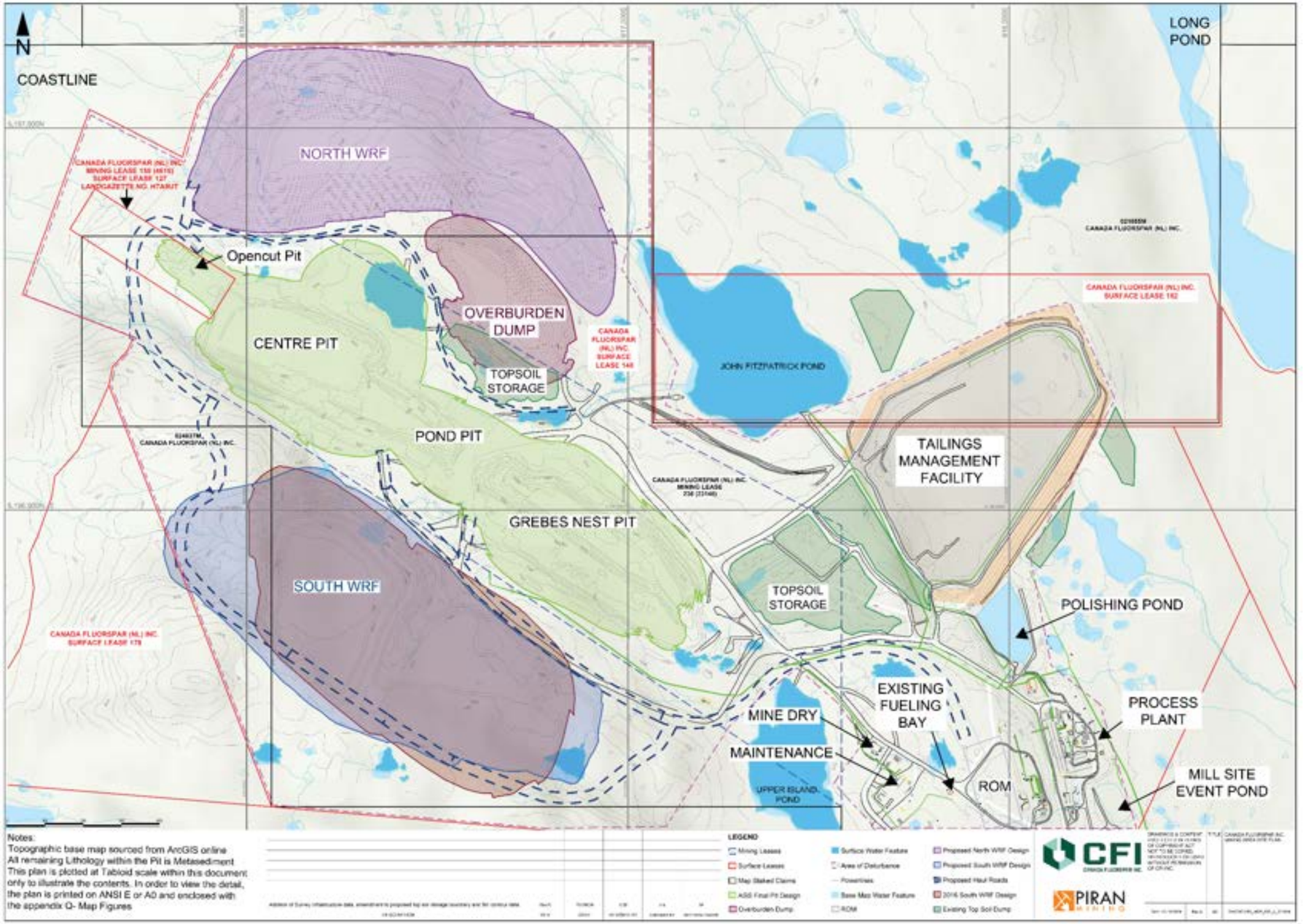



**Figure 6-1: Current AGS Mine Workings (in Appendix Q)**

## 6.2 Mining Method

### 6.2.1 Open Pit Mining

The proposed mining method for the AGS deposit is conventional Open Pit mining utilizing standard equipment. Open Pit Mining. Open Pit Mining will operate on 10 m benches. Mining will occur on 2 x 12-hour shifts, 7 days per week.

Any topsoil or overburden is expected to be removed with the use of 7 $m^3$ hydraulic excavators and 40 tonne articulated dump trucks. This material is stockpiled for later use in reclamation of the mine.

Rock and ore mining in the pit will use 100 tonne rigid frame trucks loaded by 7 $m^3$ hydraulic excavators and ~20 $m^3$ loaders respectively. Waste rock and ore rock are drilled, blasted, and loaded. The ore and waste will be sub drilled to ensure adequate blasting to the correct floor reduced level (RL). High precision GPS survey systems will be fitted to the drills, excavators, and dozers to ensure the pit floor is maintained at the correct RL.

Drilling and blasting will be conducted on 10 m benches and mining ore on 5 m flitches. The reason for this is to allow better powder distribution and fragmentation in the ore. Drilling may use various diameter holes from 76 mm to 165 mm. This will be driven by pattern, powder factor required and the performance of the blasts relative to the lithology being blasted.

Initial blast pattern design criteria for AGS Open Pit mining are provided in Table 6.1. It is expected that these criteria will be refined and developed further once data from the initial blasts is analyzed.

**Table 6-1: Blast Design Criteria for Open Pit Mining**

| Parameter | Unit | Ore | Waste |
|---|---|---|---|
| Bit Size | Mm | 89 | 165 |
| Bench Height Drilled | M | 10 | 10 |
| Sub-drill | M | 0.5 | 0.5 |
| Total Hole Depth | M | 11 | 11 |
| Pattern Spacing | M | 2.3-2.8 | 4.5-5.5 |
| Pattern Burden | M | 2-2.4 | 4.5-5.5 |
| Powder Factor | kg/tonne | 0.39 | 0.29 |
| Powder Factor | kg/bcm | 1.1 | 0.8 |

A mining contractor will be engaged to undertake all mining activities including drill and blast.

Loading of ore will be conducted on 5 m spilt benches to accommodate the reach of the mine equipment.

Trucks will haul waste directly to the waste rock facilities via the system of ramps and roads. Ore is hauled to the Run of Mine (ROM) pad located adjacent to the primary crusher. Ore will not be directly dumped into the crusher, instead it will be stockpiled and rehandled by loader according to the ore blend required by the processing plant.

Mine support equipment includes track dozers for floor preparation, blast pattern cleanup, waste stockpile maintenance, and reclamation. Graders and loaders patrol the roads for debris to minimize tire damage and are also responsible for site road clearing of snow and road/ramp maintenance. Smaller backhoes are used for cleaning ditches and water diversion channels as required. They also accommodate a rock hammer to reduce the size of oversized ore material if necessary. Fugitive dust from the roads is controlled with a water truck, which also supplies water to the drills to minimize dust from the drilling operations.

It has been previously determined that ore blending is required to ensure a relatively consistent head grade to the mill that in turn supports optimal steady-state operations. The presence of higher clay content in the ore proved difficult for milling and initial bulk blasting techniques

resulted in a high degree of “refractory ore” contamination. As a result, selective blasting and ore mucking was initiated with success in order to provide the mill with ore feed with lesser clay material.

Systematic ore blending will be applied once ore stockpiles increase beyond plant consumption quantities. Ore blending parameters will depend on the grade distribution, grade variation, and amount of refractory ore materials mined. Material will be mucked from the pits to the ROM and stockpiled into four segregated piles, including a low-grade, medium-grade, high-grade, and refractory ore stockpile. Maintaining a refractory ore stockpile provides blending flexibility and management to reduce the amount of clays in individual blends. Ultimately, the results received from grade control drilling will determine the optimal mill feed blend once ore has been stockpiled on the ROM.

Refinement of ore/waste contacts will be determined from the results of a systematic grade control (GC) drilling program. The GC program would target three 10m benches at any particular timeframe and therefore would occur every 3rd bench to ensure adequate time is provided to update the existing resource model for the subsequent benches. Once the GC model is updated this will be fed into the drill / blast design. The subsequent drill patterns will then be uploaded to the drill rigs via the private 5G network. The 5G network will support the use of high precision GPS that will guide the drill rig operator and will record real time the positioning of the rig mast for each hole drilled. Any excess variance in actual drill position versus design will trigger an alarm with mine control. Likewise, the required charging and timing of each blast hole will be uploaded to the shotfirer via the 5G network.

After blasting, the ore/waste separation will be inspected in the field under the direction of the grade control geologist. Mark up of the interface will be completed using portable high precision GPS. This data will then be checked and uploaded to the excavator or loader units. Ore will be separated into sub-low, optimal and high grades and placed in separate stockpiles on the ROM pad. Any refractory ore with high clay content will be placed in a separate stockpile. Blends will be determined accordingly to provide the mill with feed that falls within the preferred target feed

grade range. This is generally between 18 and 21% $CaF_2$. Refractory ore will be blended at a controlled, small component of the overall blend.

The key technology enabling a somewhat variable feed grade is the DMS, as discussed in the Mill Process section. The DMS works by separating the feed based on specific gravity, thus pre concentrating the ore by removing the less-dense waste rock. The net result of this is the product feed to the milling circuit is more consistent and ultimately less variable than the ore being fed to the DMS, as shown by studies performed on the variability of the ore. The average mass rejection from the DMS of the variability study ore was 59.6%, meaning ore of a lower grade can be mined, and the waste rock rejected, without expending extra energy in the milling and flotation circuits.

The pre-concentration and lessening of the variability of the ore after passing through the DMS circuit contributes to the cut-off grade of the ore being reduced, which in turn enables the mine to extract more resources, ultimately extending the life of the mine.

ROM ore stockpile will be built over time to provide security of supply to the plant and sufficient blend material. This stockpile will be comprised of high, medium, low-grade and refractory ore stockpile.

## 6.3 Mine Design

The AGS open pit is designed to feed a maximum of approx. 1.1 Mt per year to DMS circuit over the life of the mine. The capacity of the process plant will be optimized to efficiently perform at a 79.7% recovery of fluorspar concentrate in order to produce a maximum of 200,000 dmt of $CaF_2$ concentrate annually.

### 6.3.1 Open Pit Design

The mine design is based on the current information regarding geology, geotechnical data, and hydrogeology. The following supporting documentation has been appended to this plan:

- AGS Deposit: Preliminary Open Pit Slope Designs for the Center Pit (BGC Engineering, 2016; Appendix H)
- Geotechnical Assessment, CFI. (Dempers & Seymour, 2024) Appendix H
- South Rock Dump and Overburden Stockpile Stability Analysis (KP, 2018,2024; Appendix I)
- Hydrogeology Site Investigation Summaries (Golder, 2015; Appendix J)
- Geological Sections produced by CFI (Appendix D)
- Mineral Reserve Estimate report Piran Mining UK Limited Sept 2024 (Appendix G)

AGS Open Pit will mine out the Grebes Nest Pit, Center Pit, Pond Pit and Open Cut Pit. These will merge into one pit. The AGS Pit will be mined in two phases. Phase one will be the southern portion (mainly Grebes Nest area), and Phase two will be the northern portion (mainly Center Pit area). Refer to sections figures below (cross-sections).

The mine design parameters utilized are shown in Table 6.2 and Figure 6.2 illustrates the mine design elements.

**Table 6-2: Open Pit Mine Design Parameters**

| Parameter | Unit | Value |
|---|---|---|
| Batter Angle | ° | 80 |
| Mining Bench Height | m | 10 |
| Berm Width | m | 8 |
| Distance Between Berms | m | 10 |
| Inter-Ramp Angle | ° | 45.7 |

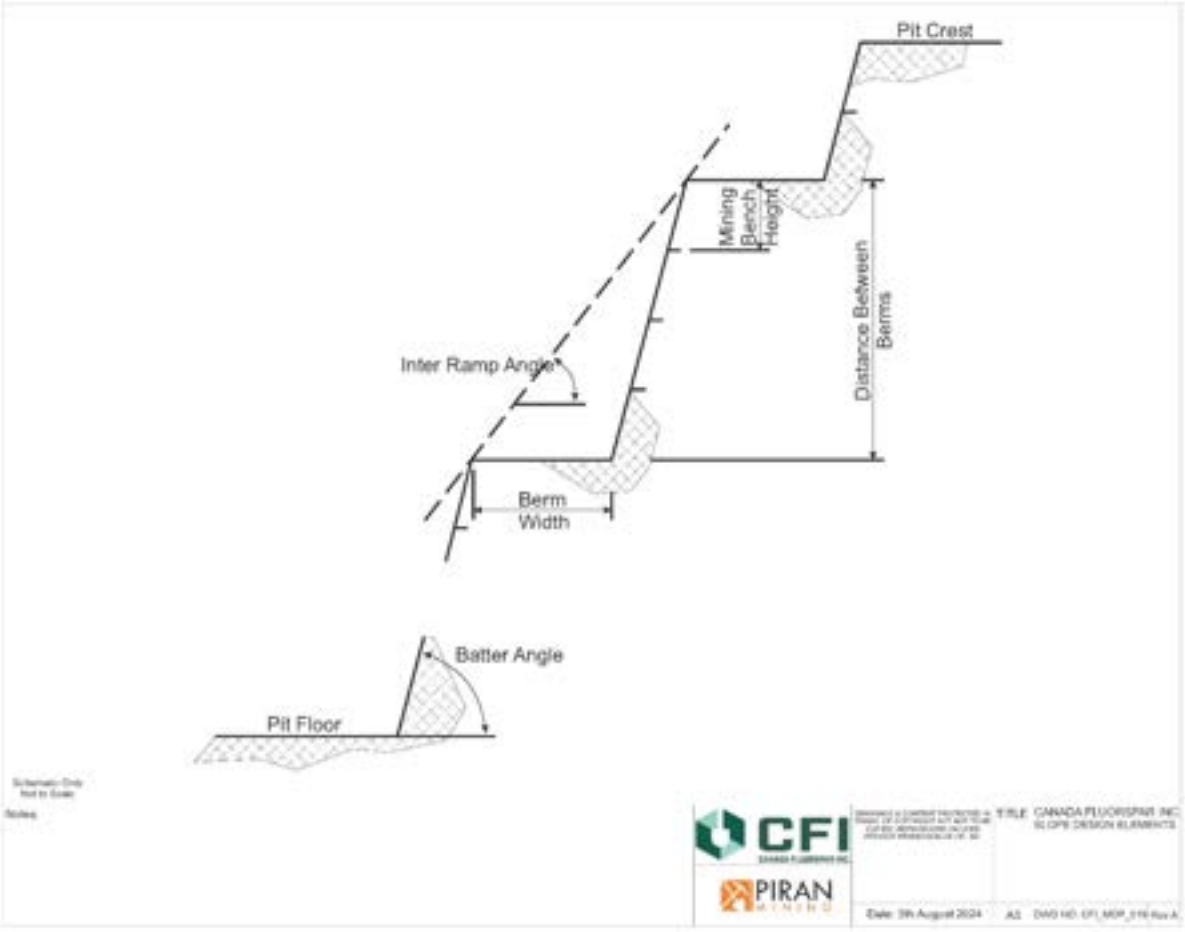



**Figure 6-2: Open Pit Mine Design Elements**

Two-way traffic Pit Ramps will be three times the truck width plus drain (1.5 m) on one side and a 1.6 m high bund (4.9 m wide base) on the outer edge. These ramps will have a maximum grade of 10 %.

The tonnes and grades of the AGS Open Pit are summarized in Table 6.3.

**Table 6-3: Open Pit Mining Summary**

| Area | Ore (Mt) | $CaF_2$ (%) | Waste (Mt) | Total (Mt) | Waste to Ore Ratio |
|---|---|---|---|---|---|
| AGS Open Pit | 7.1 Mt | 20 | 58.6 Mt | 65.7 Mt | 8.2 |

Table 6.4 presents the maximum and minimum meters above sea level for the current design of AGS Open Pit

**Table 6-4: Open Pit Mining Elevations and Depth (With Reference to Mine RL)**

| Parameter | AGS Open Pit |
|---|---|
| Top of Pit Elevation | 1120 |
| Bottom Bench Elevation | 970 |
| Pit Depth | 150 |

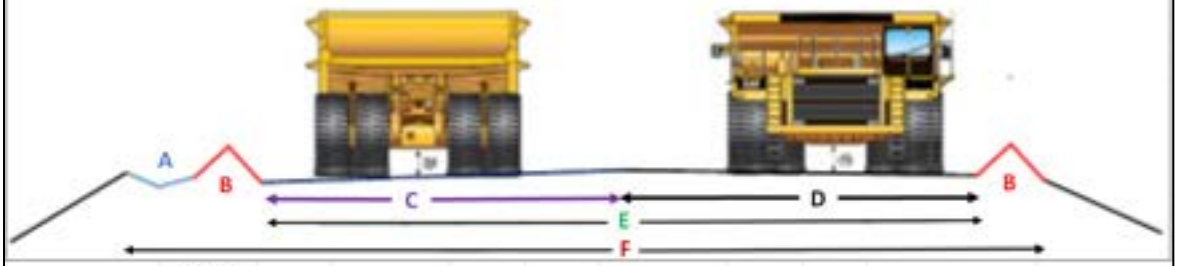
AGS Open Pit has an existing waste rock facility (South WRF) located south of the pit, however, an extension is proposed. In addition, a new WRF to the north of the AGS Pit has been proposed in order to store additional rock. The layout of the AGS Pit design and current and proposed WRF's are shown in Figure 6.1. Inpit waste disposal into the Phase 1 pit will also be utilised when mining progresses to Phase 2.

### 6.3.2 Waste Rock Facilities and Haul Road Design

Haul and access roads were previously constructed as fill roads with blasted development rock from the Grebes Nest Pit as well as from the Open Cut Pit quarry. These haul roads were originally constructed with a width of 23.5 m, including berms and ditches. The haul roads and ramp systems were designed to provide a running surface of 17.1 m, equivalent to three-operating-truck-widths. Berm heights were designed at 1.6 m high (4.9 m wide base) and ditches at 1.5 m width. Roads and ramps were previously designed with 2% cross-slopes to allow for proper drainage and operating safety.

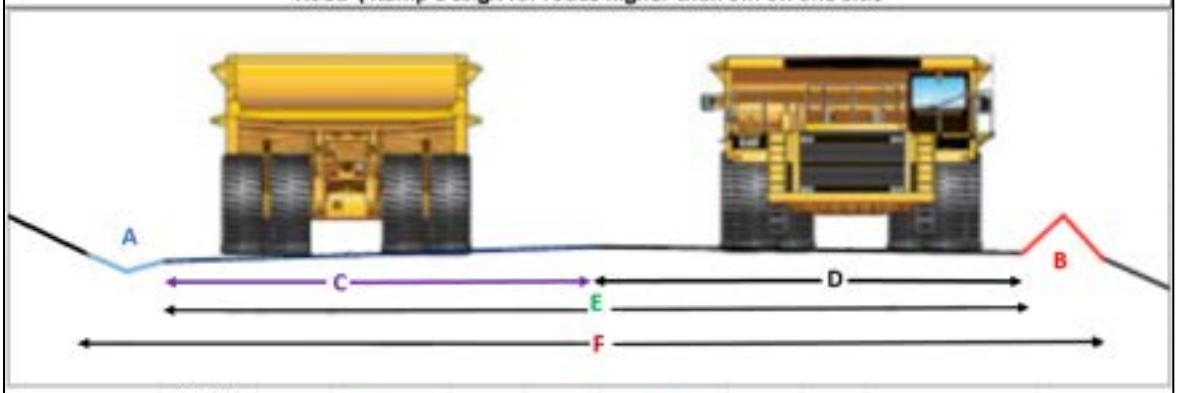
The new mining plan requires larger trucks to be utilized, currently CAT 777F or equivalent dump trucks are proposed. As such, the pit ramps will be designed to accommodate these units. Haul roads will also be widened to accommodate the bigger trucks. Haul roads and ramp systems are to be designed to provide a running surface of 20.1 m (equivalent to three-operating-truck-widths), berm heights to be 1.6 m high (4.9 m wide base) and ditches at 1.5 m width. Roads and ramps will be designed with 2% cross-slopes to allow for proper drainage and operating safety (refer to Figure 6.3).

**Road \ Ramp Design for roads higher than 3m on both sides**



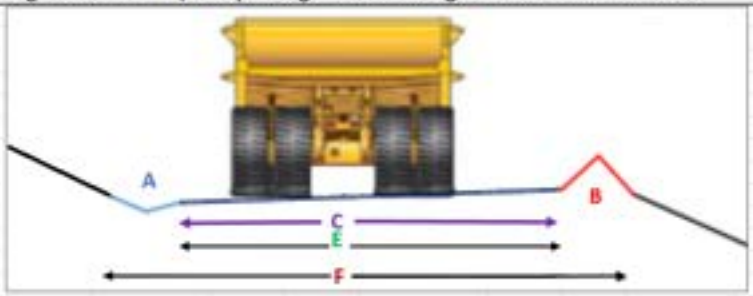

| Road Design Input | Double Lane | A (Ditch) | | B | | | |
|---|---|---|---|---|---|---|---|
| Truck Operating Width (m) | 6.7 | Ditch Depth (m) | 1 | Berm Height (m) | 1.6 | Road Cross Fall Angle | 2% |
| Operating Width (m) | 20.1 | Ditch Width (m) | 1.5 | Ditch Width (m) | 4.9 | C (Lane 1) (m) | 10.05 |
| Total Road Width (m) | 28 | | | | | D (Lane 2) (m) | 10.05 |

**Road \ Ramp Design for roads higher than 3m on one side**




| Road Design Input | Double Lane | A (Ditch) | | B | | | |
|---|---|---|---|---|---|---|---|
| Truck Operating Width (m) | 6.7 | Ditch Depth (m) | 1 | Berm Height (m) | 1.6 | Road Cross Fall Angle | 2% |
| Operating Width (m) | 20.1 | Ditch Width (m) | 1.5 | Ditch Width (m) | 4.9 | C (Lane 1) (m) | 10.05 |
| Total Road Width (m) | 26.5 | | | | | D (Lane 2) (m) | 10.05 |

**Single Lane Road \ Ramp Design for roads higher than 3m on one side**




| Road Design Input | Double Lane | A (Ditch) | | B | | | |
|---|---|---|---|---|---|---|---|
| Truck Operating Width (m) | 6.7 | Ditch Depth (m) | 1 | Berm Height (m) | 1.6 | Road Cross Fall Angle | 2% |
| Operating Width (m) | 13.4 | Ditch Width (m) | 1.5 | Ditch Width (m) | 4.9 | C (Lane 1) (m) | 13.4 |
| Total Road Width (m) | 19.8 | | | | | | |

**Figure 6-3: Typical Mine Road Section**

The overburden stockpile is situated north of the Center and Pond pits. Since the 2016 design, the overburden stockpile has been redesigned to cater for the additional overburden to be mined by widening the pits. The design parameters in use are summarized in Table 6.5 and illustrated in Figure 6.4. There is still overburden to be mined. Due to Waste Rock Facility (WRF) capacity requirements, the AGS Overburden stockpile footprint had to be elongated toward the east to avoid sterilizing the potential mining area to the south. An additional WRF, North-West of the AGS Overburden stockpile, is proposed to enable additional waste rock storage generated from the latest AGS Pit design. Project summaries for the proposed South WRF expansion and North WRF were submitted to the Environmental Assessment Division and are currently under review pending approval. The projects involve expanding the capacity and footprint of the WRFs released from environmental assessment in 2015 to accommodate additional waste rock storage required for mining of the AGS open pits. Future works will assess the feasibility of an aggregate sales project which would further enhance the operations' economic viability and environmental performance by converting waste rock into a marketable product. This undertaking would also significantly reduce the size of the operations waste rock facilities.

The South WRF is comprised of two separate facilities, one which stores rhyolitic materials (southeast side) and the other metasediments and mixed waste rock (northwest side). CFI segregated waste rock in this manner to allow for future development of an aggregate facility and repurposing a portion of the mined waste rock for sale to local and regional aggregate users. The South WRF footprint is proposed to be extended to the North-West in order to store the additional waste rock generated in the new design. Figure 6.1 shows the location of the proposed extension to the South WRF and the proposed new North Waste Rock Facility.

**Table 6-5: Overburden Stockpile and WRF Design Parameters**

| Parameter | Unit | Overburden | Waste Rock Facilities |
|---|---|---|---|
| Bench Face Angle | ° | 27 | 38 |
| Catch BW | m | 8 | 10 |
| Bench Height | m | 10 | 15 |
| Overall SA | ° | 18.7 | 27.2 |
| Lift Height | m | 5 | 5 |
| Ramp Width | m | 22 | 27 |
| Ramp Grade | % | 10 | 10 |
| Bottom Bench | Mine RL | 1120 | 1095 to 1125 |
| Top Bench | Mine RL | 1155 | 1175 to 1195 |
| Overall Height | m | 35 | 40 to 80 |

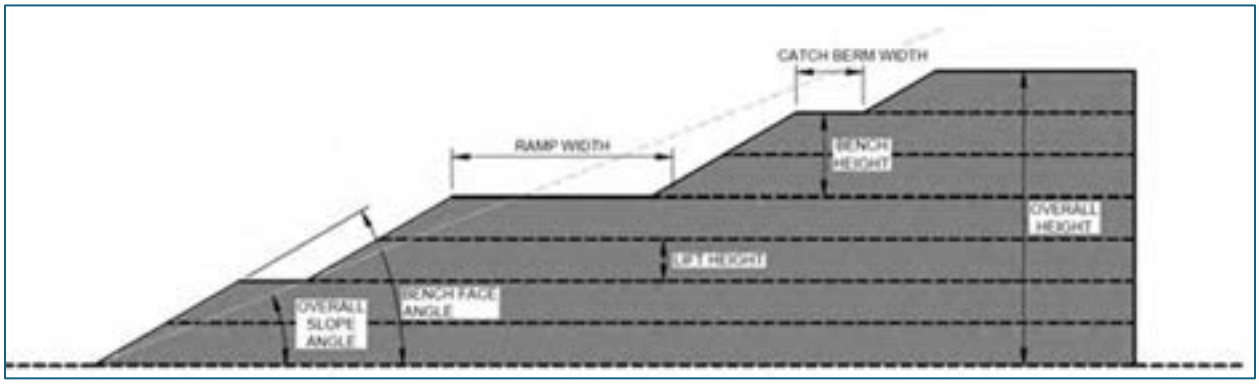



**Figure 6-4: Overburden Stockpile and WRF Design Elements**

The approximate RL, height and volume for the proposed WRFs (See Figure 6.4 and Figure 6.6) around AGS listed in Table 6.6, Table 6.7 and Table 6.8. The current volume of the various dumps was based on the 1st September 2024 survey topography.

**Table 6-6: Approximate RL and height for the proposed WRFs for AGS**

| Waste Management Facility | Maximum RL (Mine RL) | Approximate Height (m) |
|---|---|---|
| **Overburden Stockpile** | 1155 | 35 |
| **Proposed South WRF Extension** | 1195 | 70 |
| **Proposed North WRF** | 1155 | 85 |
| **Inpit Backfilling (Phase 1 Pit)** | 1110 | 140 |

**Table 6-7: Capacity of Waste Rock Facilities for AGS in cubic meters**

| Waste Management Facility | Current Volume (Million $m^3$) | Planned Volume (Million $m^3$) | Ultimate Volume (Million $m^3$) |
|---|---|---|---|
| **Overburden Stockpile** | 1.1 | 1.3 | 2.4 |
| **Proposed South WRF Extension** | 9.3 | 8.9 | 18.2 |
| **Proposed North WRF** | - | 9.2 | 9.2 |
| **Inpit Backfilling (Phase 1 Pit)** | - | 8.4 | 8.4 |
| | | | |
| **Total** | **10.4** | **27.9** | **38.3** |

**Planned volume is ultimate volume minus current volume*

**Table 6-8: Capacity of Waste Rock Facilities for AGS in tonnages**

| Waste Management Facility | Current Tonnage (Million t) | Planned Tonnage (Million t) | Ultimate Volume (Million t) |
|---|---|---|---|
| **Overburden Stockpile** | 1.6 | 1.9 | 3.5 |
| **Proposed South WRF Extension** | 20.5 | 19.6 | 40.1 |
| **Proposed North WRF** | 0 | 20.3 | 20.3 |
| **Inpit Backfilling (Phase 1 Pit)** | 0 | 18.6 | 18.6 |
| | | | |
| **Total** | **22.1** | **60.4** | **82.5** |

**Tonnages were based on a swell factor of 1.25 and the bulk densities for the different material types*

## 6.4 Mine Production and Development

Based on the AGS Open Pit design presented the scheduled annual production output is presented in Table 6.9.

**Table 6-9: Planned Annual Mine Production Metrics - AGS Open Pit**

| Material Movement | Year 1 - 2024 | Year 2 - 2025 | Year 3 - 2026 | Year 4 - 2027 | Year 5 - 2028 | Year 6 - 2029 | Year 7 - 2030 | Year 8 - 2031 | Year 9 - 2032 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Tonnes Mined | 544,075 | 7,867,680 | 11,949,667 | 6,968,107 | 10,205,151 | 11,501,162 | 9,000,990 | 6,137,453 | 1,594,285 | **65,768,570** |
| Total Ore Tonnes Mined | 0 | 172,210 | 1,003,488 | 1,183,118 | 1,174,774 | 975,335 | 1,102,013 | 1,131,803 | 375,913 | **7,118,654** |
| Total Waste Tonnes Mined | 544,075 | 7,695,470 | 10,946,179 | 5,784,989 | 9,030,377 | 10,525,827 | 7,898,977 | 5,005,650 | 1,218,372 | **58,649,916** |
| Mined CaF2 Grade % | 0.00 | 17.30 | 18.70 | 19.50 | 19.40 | 19.40 | 20.60 | 21.40 | 18.90 | **19.74** |
| Mined CaCO3 Grade % | 0.00 | 0.70 | 2.30 | 3.90 | 3.10 | 1.70 | 2.20 | 3.20 | 5.30 | **2.86** |
| Mined CaF2 Tonnes | 0 | 29,792 | 187,652 | 230,708 | 227,906 | 189,215 | 227,015 | 242,206 | 71,048 | **1,405,542** |
| Strip Ratio | 0.0 | 44.7 | 10.9 | 4.9 | 7.7 | 10.8 | 7.2 | 4.4 | 3.2 | **8.2** |
| **Tonnes by Rock Type** | | | | | | | | | | |
| Metasediment Tonnes | 0 | 5,743,827 | 10,306,625 | 5,696,562 | 5,070,355 | 7,305,584 | 7,473,326 | 4,249,253 | 1,193,842 | **47,039,374** |
| Rhyolite Tonnes | 0 | 1,951,642 | 639,553 | 51,405 | 2,668,342 | 3,220,243 | 425,651 | 756,398 | 24,530 | **9,737,764** |
| Overburden Tonnes | 533,495 | 0 | 0 | 24,332 | 1,291,680 | 0 | 0 | 0 | 0 | **1,849,507** |
| Topsoil Tonnes | 10,580 | 0 | 0 | 12,690 | 0 | 0 | 0 | 0 | 0 | **23,270** |
| **Tonnes by Destination** | | | | | | | | | | |
| Total Tonnes to MILL | 0 | 172,210 | 1,003,488 | 1,183,118 | 1,174,774 | 975,335 | 1,102,013 | 1,131,803 | 375,913 | **7,118,654** |
| CaF2 Grade to MILL % | 0.00 | 17.30 | 18.70 | 19.50 | 19.40 | 19.40 | 20.60 | 21.40 | 18.90 | **19.74** |
| Total Tonnes to SOUTH WRF | 0 | 7,695,470 | 10,338,988 | 1,165,543 | 0 | 0 | 0 | 0 | 0 | **19,200,001** |
| Total Tonnes to NORTH WRF | 0 | 0 | 607,191 | 4,582,424 | 7,738,697 | 6,648,827 | 0 | 0 | 0 | **19,577,139** |
| Total Tonnes to OB DUMP | 533,495 | 0 | 0 | 24,332 | 1,291,680 | 0 | 0 | 0 | 0 | **1,849,507** |

| Material Movement | Year 1 - 2024 | Year 2 - 2025 | Year 3 - 2026 | Year 4 - 2027 | Year 5 - 2028 | Year 6 - 2029 | Year 7 - 2030 | Year 8 - 2031 | Year 9 - 2032 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Tonnes to TOPSOIL DUMP | 10,580 | 0 | 0 | 12,690 | 0 | 0 | 0 | 0 | 0 | **23,270** |
| Total Tonnes to IN PIT DUMP | 0 | 0 | 0 | 0 | 0 | 3,877,000 | 7,898,977 | 5,005,650 | 1,218,372 | **17,999,999** |
| **Mineral Reserves** | | | | | | | | | | |
| Total Tonnes Remaining | 0 | 6,946,444 | 5,942,956 | 4,759,838 | 3,585,063 | 2,609,729 | 1,507,716 | 375,913 | 0 | **0** |
| CaF2 Grade Remaining | 0.00 | 19.80 | 20.00 | 20.10 | 20.40 | 20.70 | 20.80 | 18.90 | 0.00 | **0.00** |
| | | | | | | | | | | |
| **Existing Inventory** | | | | | | | | | | |
| Total Ore Tonnes Stockpile | 102,380 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **102,380** |
| Ore Stockpile CaF2 Grade % | 6.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **6.50** |
| Ore Stockpile CaF2 Tonnes | 6,655 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **6,655** |
| | | | | | | | | | | |
| Total TMF Tonnes Stockpile | 150,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **150,000** |
| TMF Stockpile CaF2 Grade % | 16.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **16.00** |
| TMF Stockpile CaF2 Tonnes | 24,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **24,000** |
| **MILL Product** | | | | | | | | | | |
| **TMF Reprocessing** | | | | | | | | | | **0** |
| Total TMF Tonnes Processed | 70,000 | 80,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **150,000** |
| TMF CaF2 Grade % | 16.00 | 16.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **16.00** |
| TMF CaF2 Tonnes | 11,200 | 12,800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **24,000** |

| Material Movement | Year 1 - 2024 | Year 2 - 2025 | Year 3 - 2026 | Year 4 - 2027 | Year 5 - 2028 | Year 6 - 2029 | Year 7 - 2030 | Year 8 - 2031 | Year 9 - 2032 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| *TMF Reprocessing Recovery %* | *50.0* | *60.0* | *0.0* | *0.0* | *0.0* | *0.0* | *0.0* | *0.0* | *0.0* | ***55.3*** |
| *CaF2 Product Tonnes* | *5,600* | *7,680* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | ***13,280*** |
| | | | | | | | | | | |
| *Total Ore Tonnes Processed* | *0* | *274,590* | *1,003,488* | *1,100,000* | *1,100,000* | *1,100,000* | *1,100,000* | *1,100,000* | *442,954* | ***7,221,032*** |
| *Ore CaF2 Grade %* | *0.00* | *13.27* | *18.70* | *19.50* | *19.41* | *19.40* | *20.56* | *21.37* | *19.28* | ***19.56*** |
| *Ore CaF2 Tonnes* | *0* | *36,447* | *187,652* | *214,500* | *213,483* | *213,400* | *226,201* | *235,118* | *85,394* | ***1,412,197*** |
| *Fresh Ore Overall Recovery %* | *0.0* | *77.5* | *79.4* | *79.7* | *79.7* | *79.7* | *79.7* | *79.7* | *79.7* | ***79.6*** |
| *CaF2 Product Tonnes* | *0* | *28,253* | *148,988* | *170,939* | *170,129* | *170,063* | *180,264* | *187,370* | *68,052* | ***1,124,058*** |
| | | | | | | | | | | |
| *Tailings Tonnes* | *64,400* | *208,821* | *453,104* | *489,061* | *489,871* | *489,937* | *479,736* | *472,630* | *197,720* | ***3,345,281*** |
| *Tailings CaF2 Grade %* | *8.70* | *5.32* | *6.76* | *7.11* | *7.05* | *7.05* | *7.74* | *8.24* | *6.98* | ***7.21*** |
| *Tailings CaF2 Tonnes* | *5,600* | *11,118* | *30,636* | *34,761* | *34,554* | *34,538* | *37,137* | *38,948* | *13,798* | ***241,090*** |
| | | | | | | | | | | |
| ***DMS Rejects / Aggregate*** | | | | | | | | | | |
| *Interim DMS Rejects Aggregate* | *350,000* | *240,000* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | ***590,000*** |
| *DMS Rejects / Aggregate Tonnes* | | *109,836* | *401,395* | *440,000* | *440,000* | *440,000* | *440,000* | *440,000* | *177,182* | ***2,888,413*** |
| | | | | | | | | | | |
| ***Total DMS Reject / Aggregate*** | ***350,000*** | ***349,836*** | ***401,395*** | ***440,000*** | ***440,000*** | ***440,000*** | ***440,000*** | ***440,000*** | ***177,182*** | ***3,478,413*** |
| ***Total CaF2 Product Tonnes*** | ***5,600*** | ***35,933*** | ***148,988*** | ***170,939*** | ***170,129*** | ***170,063*** | ***180,264*** | ***187,370*** | ***68,052*** | ***1,137,338*** |

Grebes Nest Pit and Center pit are on track for dewatering in order to start development. They will form part of the final AGS Pit which is to be mined in two phases. Currently the first phase is designed to be the southern portion (mainly Grebes Nest Pit area), and the second phase is the Northern Portion (mainly Center Pit area) as shown in Figure 6.10 and Figure 6.11

An extension of the South WRF has been proposed to account for the waste to be mined in the latest AGS Pit design. Also, a new WRF will be required to the north of AGS Pit. An overall plan of current topography, planned WRFs and AGS Pit LOM design are depicted in cross sections and long sections and are shown below in Figure 6.5, Figure 6.6, Figure 6.7, Figure 6.8 and Figure 6.9.

The various figures show the annual progression of mining the AGS Open Pit and the development of the various dumps. These figures can be found in Appendix P.

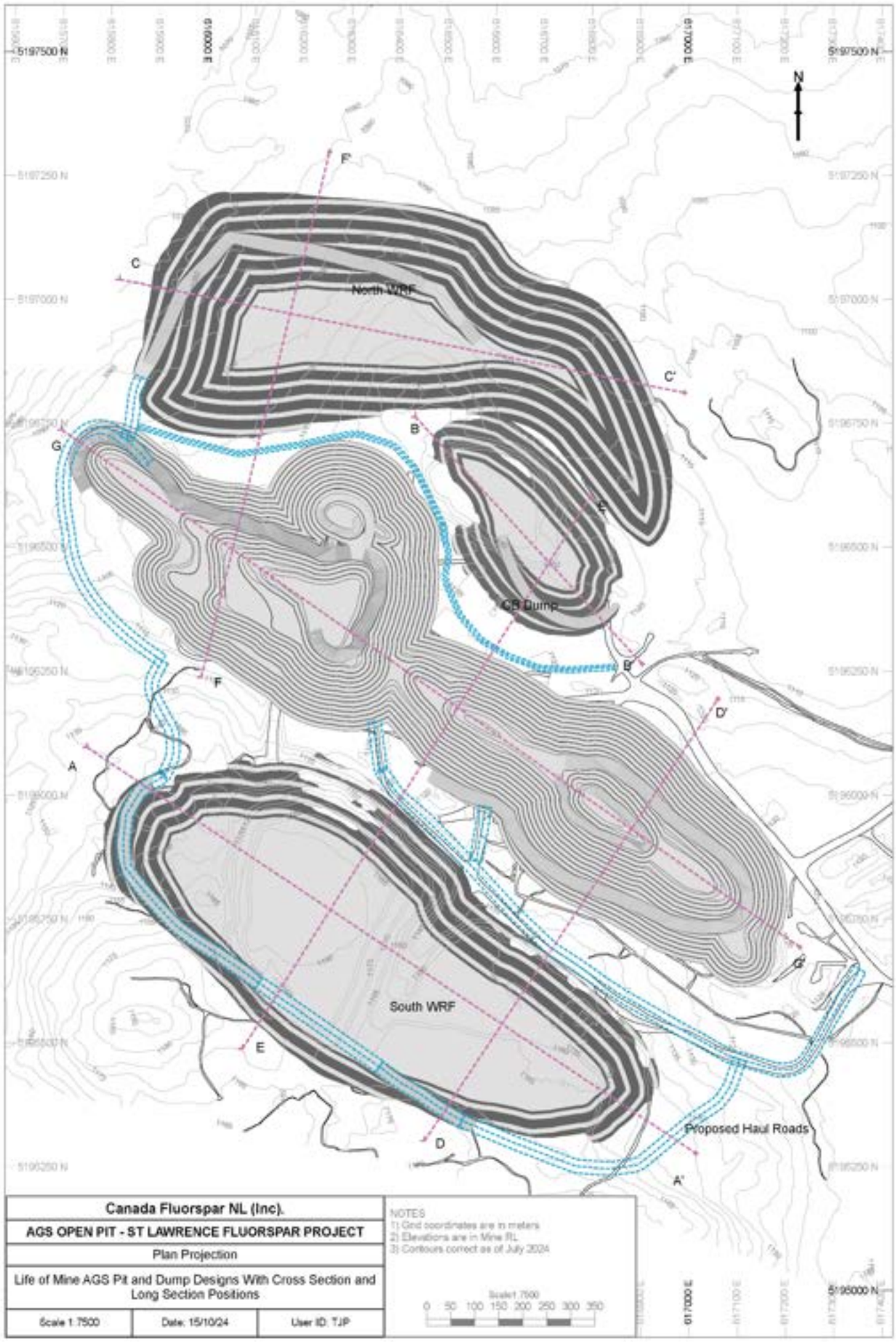



**Figure 6-5: AGS Pits and Dumps Section lines**

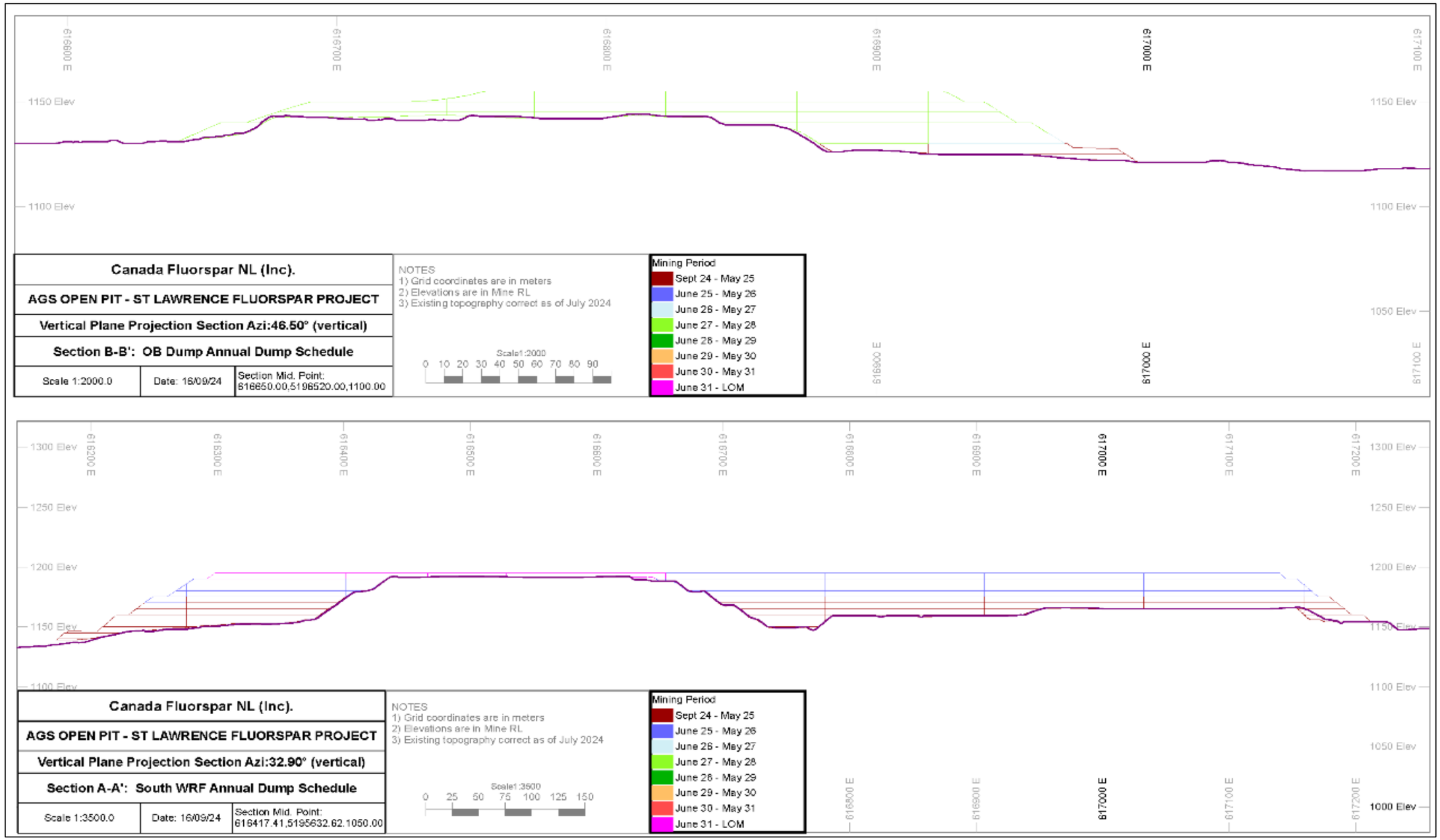



**Figure 6-6: Cross-sections AA' and BB'**

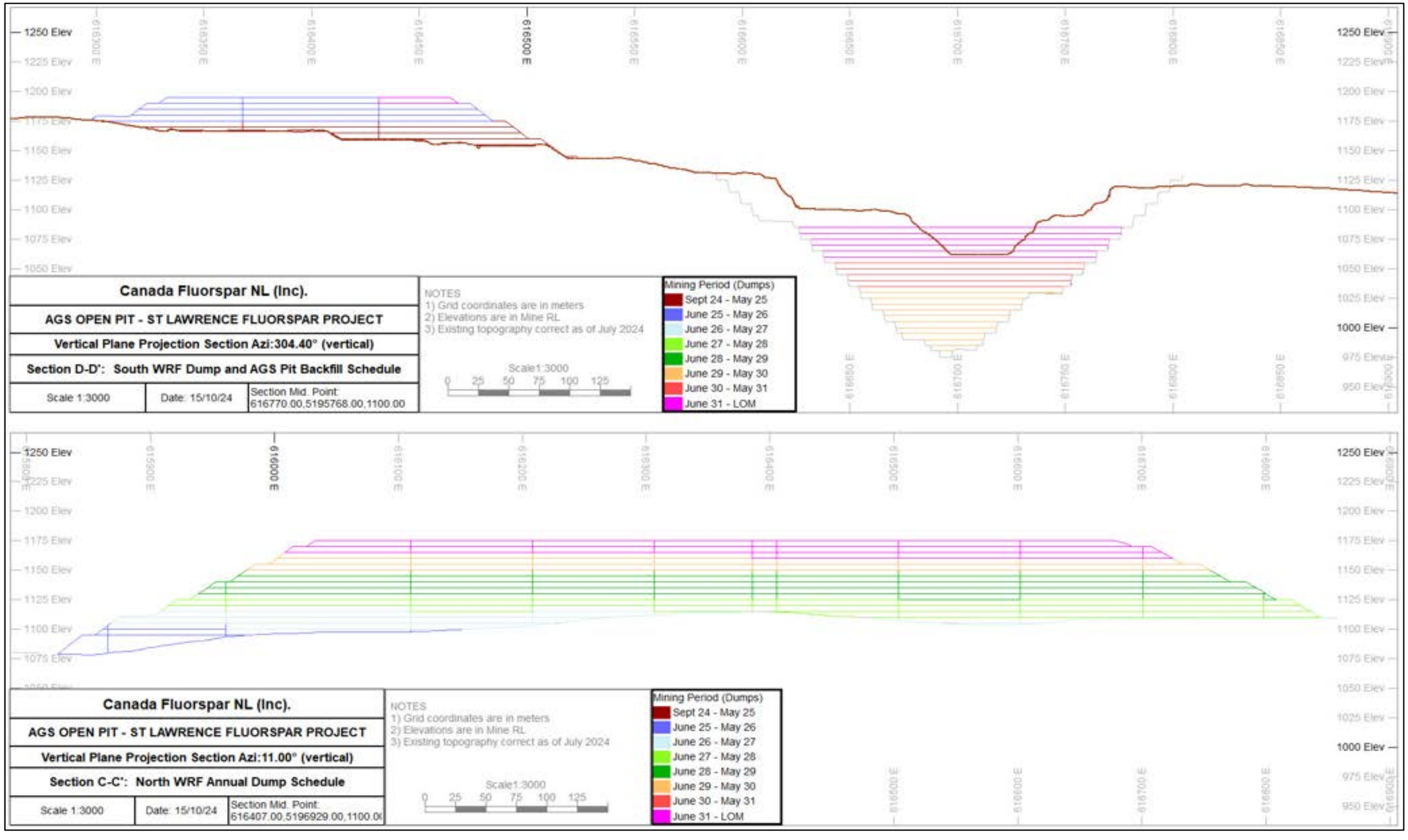



**Figure 6-7: Cross-sections CC' and DD'**

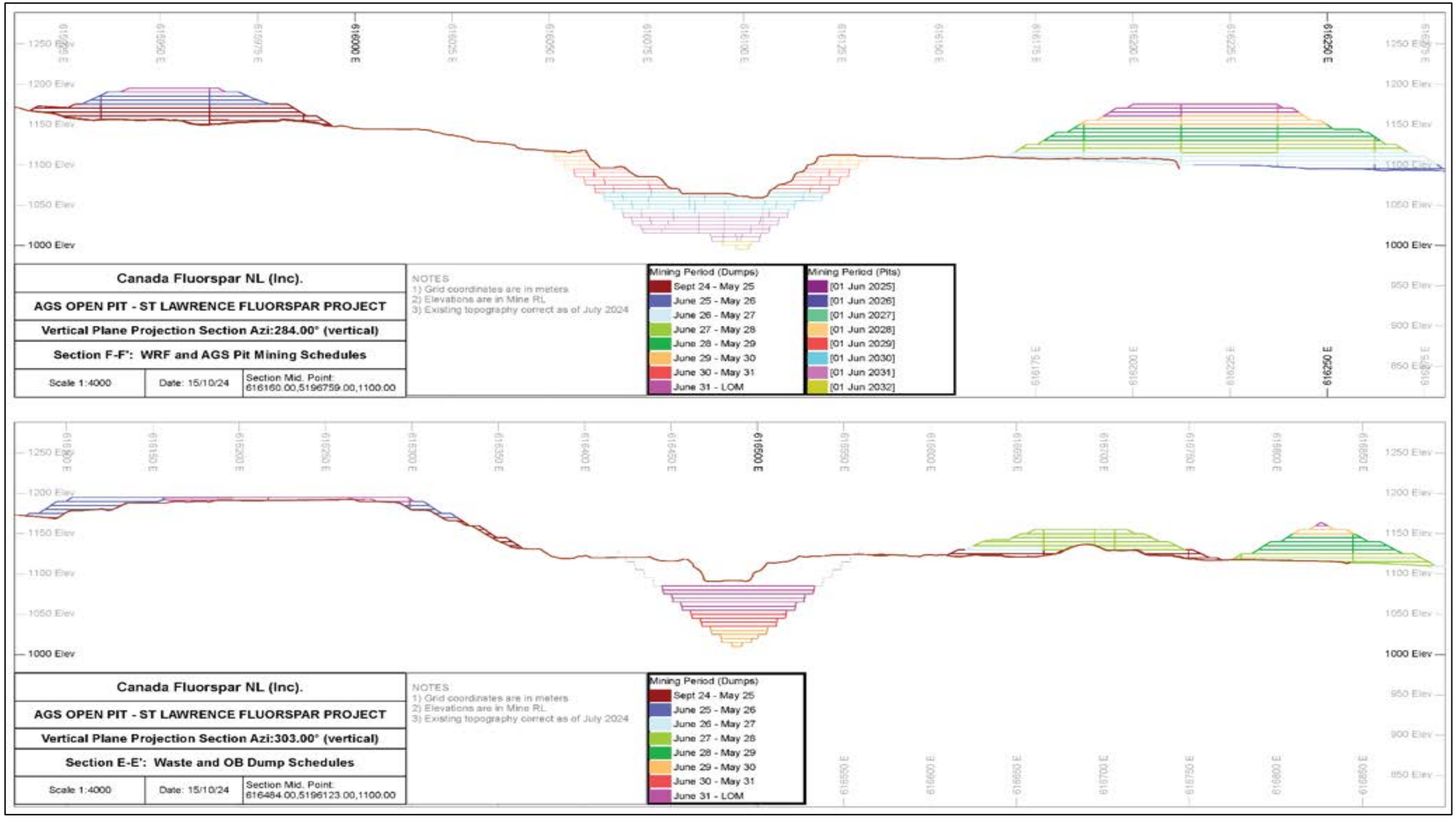



**Figure 6-8: Cross-sections EE' and FF'**

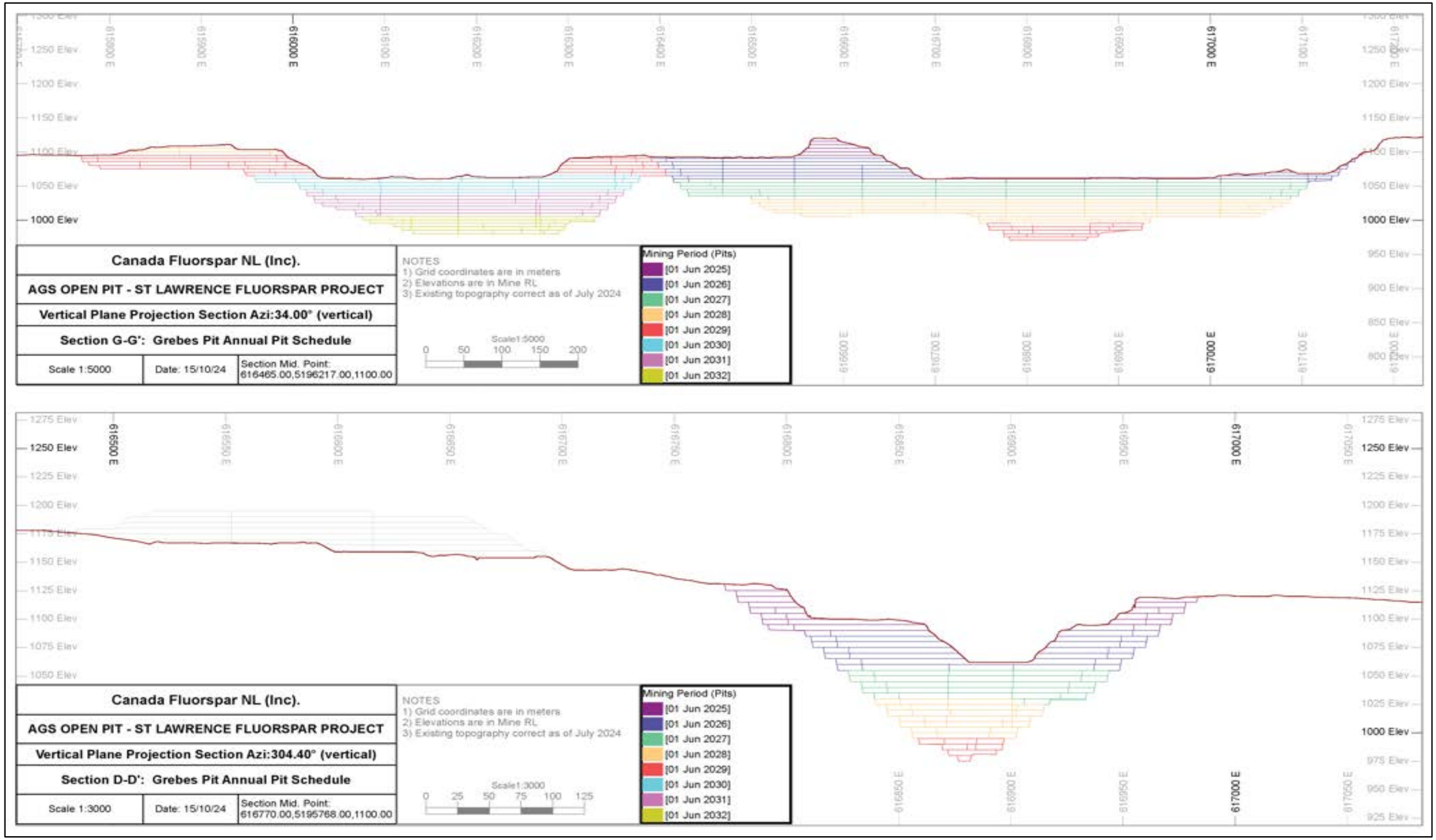



**Figure 6-9: Cross-sections DD' and GG'**

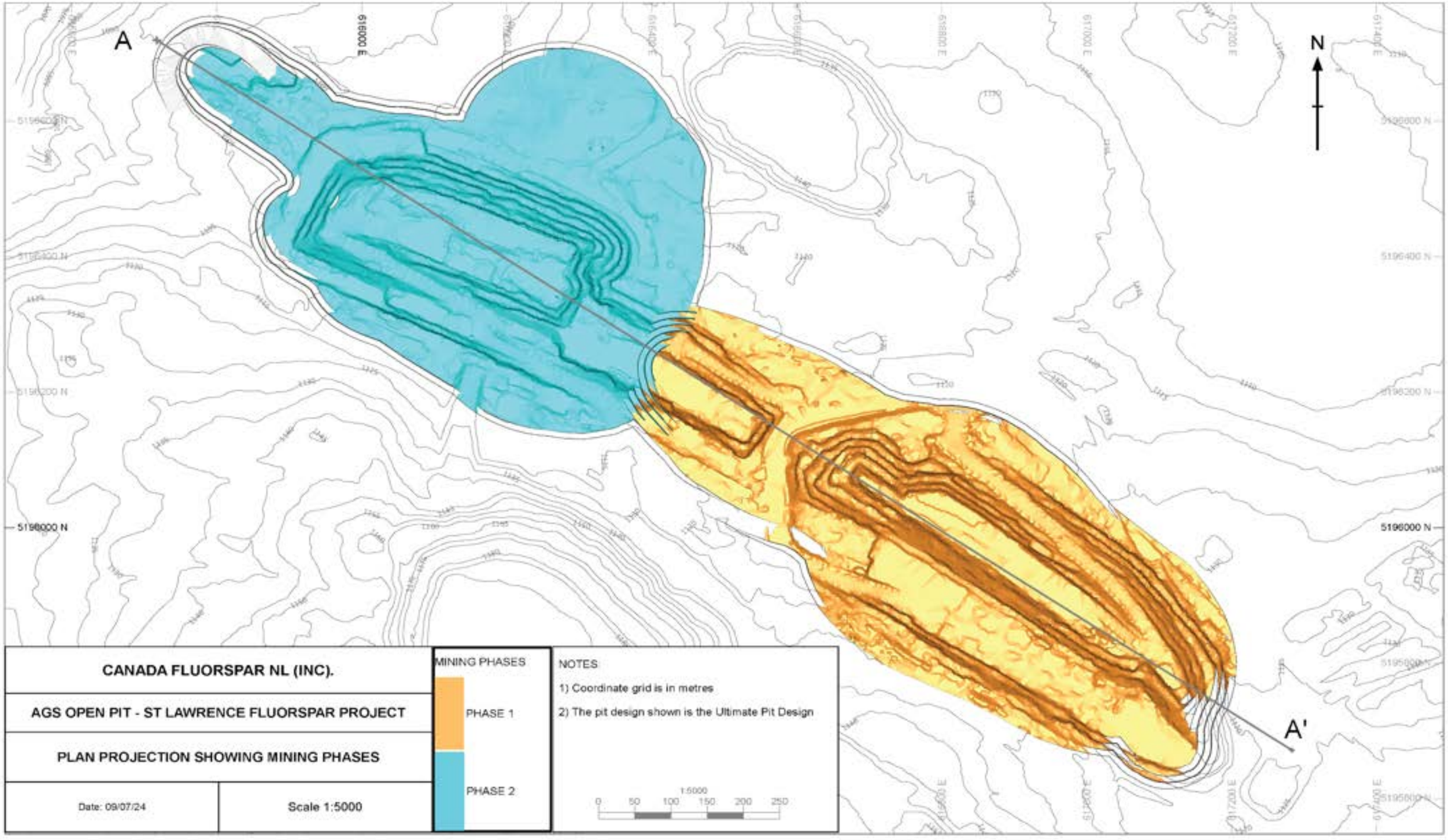



**Figure 6-10: Plan view of Mining Phases**

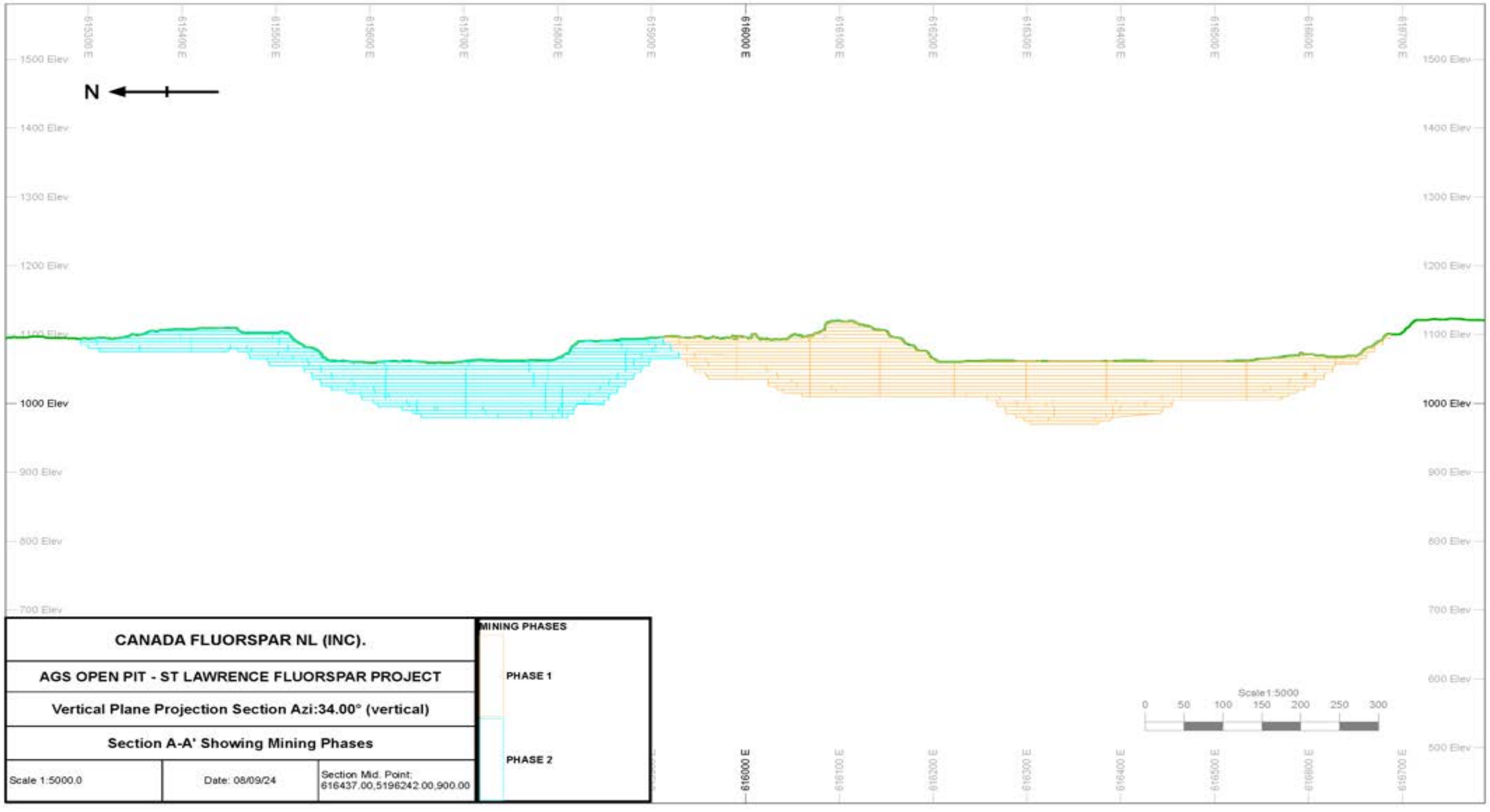



**Figure 6-11: Cross-sectional view (A-A') of Mining Phase**

### 6.4.1 Dilution and Recovery Factors

The addition of the Dense Media Separation (DMS) circuit at the process plant allows for the efficient separation of diluted material prior to the ore entering the process plant. This permits the mine to send material with a slightly higher level of dilution, knowing that contact dilution will be predominantly separated at that stage. The only limitation to the DMS is the throughput possible on an annual basis.

Open pit mining has the advantage of having working space in the separation of waste material from the ore. This coupled with the use of excavators, allows a higher degree of separation prior to ore being trucked to the process plant. The vein material is generally readily visible from the contact dilution expected during the mining operation. This together with the implementation of a systematic grade control (GC) program provides a higher level of confidence of in the spatial placement of the ore, hence minimizing ore loss and unplanned dilution.

Pit optimisation previously required a regularised Block Model however, with the advancement of software development sub celled models can now be assessed. The key factor in determining the minimum block size is the smallest mining unit (SMU), applicable for the operation. For the AGS Pit the SMU has been determined as 2.5 m. The 2023 sub celled resource model for AGS was therefore re-blocked to dimensions of 2.5 m in the Northing, 2.5 m in the Easting and 5 m in elevation. Even though benches are blasted in 10 m depths, they will be loaded and trucked on 5 m flitches.

Mining dilution encountered during the mining operation is defined as the addition of material below the estimated cut-off grade (COG) delivered to the processing plant due to over-mining at the ore/waste contacts and ore blocks grading below the COG inside mineralized zones that cannot be physically separated during the mining process. Mining dilution can therefore be broken into two categories: internal and external. Internal dilution is contained within the SMU block and accounted for in the block grade. External dilution is also accounted for by the SMU block since this ensures a realistic mining profile is considered on each flitch. The variability of the ore contact is currently not well understood due to the relatively broad-based drill spacing.

Once GC drilling is initiated and processed this will permit a better understanding of the level of flitch level variability. From this data the modifying factors can then be reviewed and upgrade.

Overall mining recovery has been estimated at 95% for open pit mining operations.

## 6.5 Mine Support Services/Infrastructure

The mine infrastructure falls under several categories:

1) Haul Road Network
2) Waste Storage Facilities/Waste Management Facilities
3) Dewatering Infrastructure
4) Shop Facilities
5) Laydowns

### 6.5.1 Ore and Waste Handling

In order to minimize construction and rehabilitation costs, topsoil and overburden soil stockpiles have been strategically located adjacent to the various infrastructure components as illustrated on Figure 6.2.

Mining commenced in Grebes Nest Pit with the draining of Grebes Nest Pond and mining of overburden and rock in the initial benches. Development/Waste rock from the initial mining was used to construct the series of roads needed for mine-haulage.

Initial development of the pit supported construction aggregate production for use in infrastructure development. Offsite quarries (permitted by others) were also utilized for initial construction works such as road maintenance/upgrades and the AGS Mill site.

Once development of Grebes Nest Pit began it became the primary source of construction aggregate for the remaining construction.

#### *6.5.1.1 Waste Rock Facilities*

The existing South WRF is comprised of two separate facilities, one which stores rhyolitic materials (southeast side) and the other metasediments and mixed waste rock (northwest side). CFI segregated waste rock in this manner to allow for future development of an aggregate facility and repurposing a portion of the mined waste rock for sale to local and regional aggregate users. Designs for extending the South WRF and the North WRF are under review by the environmental assessment division for approval. South WRF extension and North WRF is required for AGS development project waste rock management.

The existing South WRF is designed with 15 m benches in 5 m lifts and 10 m wide berms. The designed batter angle is the approximate angle of repose, (38°). The overall slope of the South WRF is approximately 27°. The top level of the existing South WRF is designed to be 1195 RL. This equates to a facility maximum height of 70 m. A total of approximately 27 million tonnes of waste rock and DMS material will be stored in this facility. Compared to the original 2016 design the footprint of the dump remains similar with a minor extension to the north-west. The dump height is raised in elevation by one bench to store additional waste rock generated from the new pit design.

As one of the potential future developments, CFI is actively seeking opportunities to sell waste rock as aggregate for eastern seaboard markets, the final waste storage capacity has the potential to be reduced significantly. The potential of the aggregate business stream includes actively pursuing source approvals and acceptance certifications into several US states, advanced discussions with potential buyers and/or partners, along with the analyzing engineering modifications of the Blue Beach Marine Facility shipping terminal to accommodate both fluorspar and aggregate ship loading and export.

The DMS rejects material is backhauled from the Mill and deposited with the waste rock within the South Waste WRF. The dump has been designed to ensure long-term physical stability as outlined in the stability assessment included in Appendix I.

#### *6.5.1.2 Overburden and Topsoil Stockpiles*

Where practical, CFI salvaged organic topsoil and stockpiled this material separately for later use in Project reclamation activities. Topsoil excavated from ditches and road widening was placed adjacent to roadways for efficient re-handling during reclamation activities.

#### *6.5.1.3 Overburden Material*

There is a single overburden (OB) Dump constructed to manage the overburden originating from the footprints of the open pit, AGS East TMF, and AGS Mill Site. The overburden is stockpiled for use later in the mine life for reclamation activities.

Overburden material from the stripping of the open pits was hauled to the OB Dump located to the north of the open pit as illustrated on Figure 6.2. The dump is at an elevation of 11155 masl for a maximum height of 35 m. The lifts for the overburden were developed with 10 m high benches using 5 m lifts, with 8 m berms. The slope of the batters is 27°, therefore the overall slope angle is approximately 17°. The OB dump is situated north of Center pit. From the 2016 design it has been redesigned to cater for the extra overburden to be mined from wider pit limits. As the new 2024 LOM design expands Center Pit to the North, the overburden dump footprint has been elongated toward the east to avoid sterilizing the potential mining area on the South. A total of 1.2 million $m^3$ of overburden is stored in the stockpile.

Overburden material stripped from the AGS Mill site was stockpiled to the south and to the east of the mill as illustrated on Figure 6.2. These stockpiles contain approximately 14,500 $m^3$ of overburden material. This stockpile has a maximum height of 5 m and a maximum slope gradient of 3H:1V (18°).

The overburden stockpiles were designed to ensure long-term physical stability. A stability analysis of the largest overburden stockpile located north of the open pit is included in Appendix I. The remaining stockpiles were constructed on similar foundations and are much shorter in height. It is anticipated that the majority of stockpiled overburden will be utilized during reclamation. As such, it is likely only the footprints of these facilities will need to be rehabilitated at closure. These stockpiles are maintained during operations to ensure their physical stability.

#### *6.5.1.4 Topsoil Stockpiles*

CFI operated two primary topsoil stockpiles, one to the northeast of the Grebes Nest Pit and a second north of the Pond Pit. These locations were selected to minimize haul distance, avoid sensitive areas, and minimize the potential for accidental disturbance. As of August 2021, topsoil removal was required around the open pits following the incorporation of new pit pushbacks present in the 2019 LOM plan.

Topsoil stockpiles are designed to have a maximum height of five metres and a maximum slope gradient of 3H:1V (18°). During construction and operation of the stockpiles, CFI installed rockfill containment berms and other erosion control measures on an as-needed basis to prevent downstream migration of materials.

Organic topsoil was salvaged from the infrastructure footprints to the greatest extent practical. The topsoil was stockpiled separately from the underlying overburden materials for later use in rehabilitation. As illustrated on Figure 2.1, several topsoil stockpiles sites were identified. The topsoil removal from the mine design is currently almost completed, except for a strip around the pit due to the 2019 revision of the LOM design.

The volume of topsoil that was stockpiled for reclamation purposes is approximately 356,000 $m^3$. It should be noted that additional topsoil is projected to be available during construction of areas that do not require stripping. During stripping and grubbing the volumes of topsoil gained from stripping and grubbing was compared to the volume required for closure, and if needed additional topsoil will be removed. It is anticipated that all the topsoil will be utilized during reclamation. As such, it is likely only the footprints of these facilities will need to be rehabilitated at closure. These stockpiles are maintained during operations to ensure their physical stability.

The current quantity of material stockpiled is 498,750 t (survey Nov 2020). There are currently two topsoil dumps areas, one on the Northeast of Grebes Nest Pit and the second one just North of Pond Pit. Topsoil excavated from ditches and/or road widening is placed adjacent to the roads for efficient access for rehabilitation upon closure. Those smaller topsoil quantities are not included in the larger stockpile total above.

A material balance is presented in the Mine Closure Plan. The material balance will be updated and verified using data obtained during future construction and stockpiling activities.

### 6.5.2 Production Ramps/Access

AGS Open Pit operations will have 10% grading Ramps as access and designed as covered in section 6.3.2.

### 6.5.3 Process Water Supply

Process water supply is discussed in section 7 and 10.

### 6.5.4 Potable Water

Potable water supply is discussed in section 10.

### 6.5.5 Water Management

Water at the Project is managed in accordance with the Water Management Plan. Detailed water management infrastructure is discussed in section 9.1. CFI notes the Water Management Plan will be revised throughout the life of the Project to account for changes in Project design and site-specific considerations. During the construction and operation phases, water management focuses on surface and groundwater flows into open pits, water removed from the underground mine, storm water run-off, and water required for mineral processing and mining, as well as satisfying CFI's environmental commitments. CFI carries out water management activities using the following components:

- Clean water diversion channels
- Erosion control measures
- Interceptor ditches to collect contact water from the WRF and process plant area
- Mine sumps and pumping systems
- Sediment control measures, including sediment basins

### 6.5.6 Electrical Distribution and Communication

Infrastructure in the Project area includes electricity, telephone, and Internet service. Electrical power for local operations is obtained from the Newfoundland Power grid. Infrastructure for mining equipment and personnel is also available at Marystown. The Town of St. Lawrence is connected to the main Newfoundland Power grid.

Electrical distribution is discussed further in section 10.

### 6.5.7 Fuel Storage Facility

The current fuel storage facility (diesel and gasoline) is located adjacent to the Maintenance Shop in the mine services area. Delivery trucks are connected via flexible hoses to the unloading pumps. Fuel is transferred to bulk fuel storage tanks within a containment bund. Distribution pumps transfer fuel to the mine truck re-fueling slab. The re-fueling station is fitted with containment slabs, kerbs, and bunds. Fire protection is provided by the Project's fire protection system.

As part of the expansion of the ROM pad area the existing fuel storage facility may be relocated to the outer boundary of the extended ROM area to ensure minimal interaction between refueling and an active ROM pad area.

### 6.5.8 Explosive Storage and Supply

Explosives magazine and Emulsion storage tanks are currently available onsite. Explosives providers to be sourced and explosive supply tendered out.

### 6.5.9 Communication

Infrastructure currently includes telephone and internet services. There is currently a plan to upgrade the local network to a private 5G network. This upgrade will be utilized to help and improve production activities.

The 5G network will support the use of high precision GPS that will guide the drill rig operator, dozer operator and excavator operator in maintaining the correct direction and elevation of the

respective functions being performed. Due to the real time monitoring function any excess variance versus design will trigger an alarm with Mine Control. Likewise, the required charging and timing of each blast hole will be uploaded to the shotfirer via the 5G network.

## 6.6 Ore Blending

It is planned that ore would be stockpiled near the Mill on the ROM stockpiles as shown in Figure 6.1. These stockpiles would be divided into four segregated piles, including a low-grade, medium-grade, high-grade, and refractory ore stockpile. Then blending would be carried out as required to maximise mill recovery.

## 6.7 Equipment

Table 6.10 lists the major mining equipment required for the open pit operations (AGS). Numerous pieces of smaller equipment are also utilized but are omitted for simplicity.

**Table 6-10: Major Mining Equipment for Open Pit Mining (AGS)**

| Equipment | Make / Model | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
|---|---|---|---|---|---|---|---|---|---|---|
| Loader | Cat. 992 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Excavator (120t) | Hitachi EX1200 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Haul Truck (100t) | Cat. 777 / Komatsu 785 | 6 | 10 | 12 | 12 | 12 | 12 | 12 | 8 | 5 |
| Grader | Caterpillar 16H/M | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Haul Truck (40t) | Cat. 740 / Komatsu HM400 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Water Truck | Komatsu HM400 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Track Dozer | Cat. D9 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Track Dozer | Cat. D8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Excavator (35t) | John Deere 350 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Haul Truck (40t) | Cat. 740 EJ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 966 Loader | Cat. 966 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Drill | Cat. 6200 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| Drill | Epiroc T45 Hammer | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| Pickup Truck with Blast-boxes | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Skid Steer Loader | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Fuel / Lube Truck | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| Mechanics Truck | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## 6.8 Condemnation Report

### 6.8.1 AGS Mine and Mill Site Condemnation

CFI has completed a large amount of condemnation and exploration diamond drilling, trenching, and surface mapping that has produced sufficient information regarding site condemnation. The existing condemnation drill database is also satisfactory to cover any site expansions and additional building construction that has occurred since 2016 (Appendix K).

### 6.8.2 AGS South Waste Rock Facility Expansion

A condemnation drilling program was completed from May 8 to May 20, 2024, for a series of five sterilization drillholes covering the proposed AGS South Waste Rock Facility expansion area. Drilling results indicate the area underlying the proposed expansion is barren of mineralization and is a viable location for waste rock storage from AGS open pits. A Condemnation Report and associated core logs, core photos, and reference maps are included in Appendix K. Further condemnation drilling will be completed as necessary prior to any further site expansions and infrastructure development.

# 7 Processing/Recovery Methods

## 7.1 Process Design Criteria

The existing mill and milling infrastructure will be utilised to process ore from the mine. The general AGS Mill site layout is illustrated on Figure 2.5 and the flow sheet and additional drawings of the AGS mill site are included in Appendix L. Figure 7.1 details the original design plan for the mill as of 2016, however there are a few notable alterations which require an updated floor plan. These alterations include:

- Laboratory is detached from plant (Figure 7.1 reference 2F).
- Addition of sulphide tank cells prior to flotation cells (Figure 7.1 reference 6F).
- DMS sinks transfer conveyor removed (Figure 7.1 reference 5D & 5E).
- Second drum filter installed in filtration area (Figure 7.1 reference 11F).

The mill will have a nominal feed rate of 1,100,000 tonnes per year (3,000 tonnes per day) and produce approximately 200,000 tonnes per year (550 tonnes per day), depending on head grade of acid-grade fluorspar concentrate per year. Target recovery for fluorspar on AGS ore is 79.6%, running at combined mill availability and utilisation of 93%.

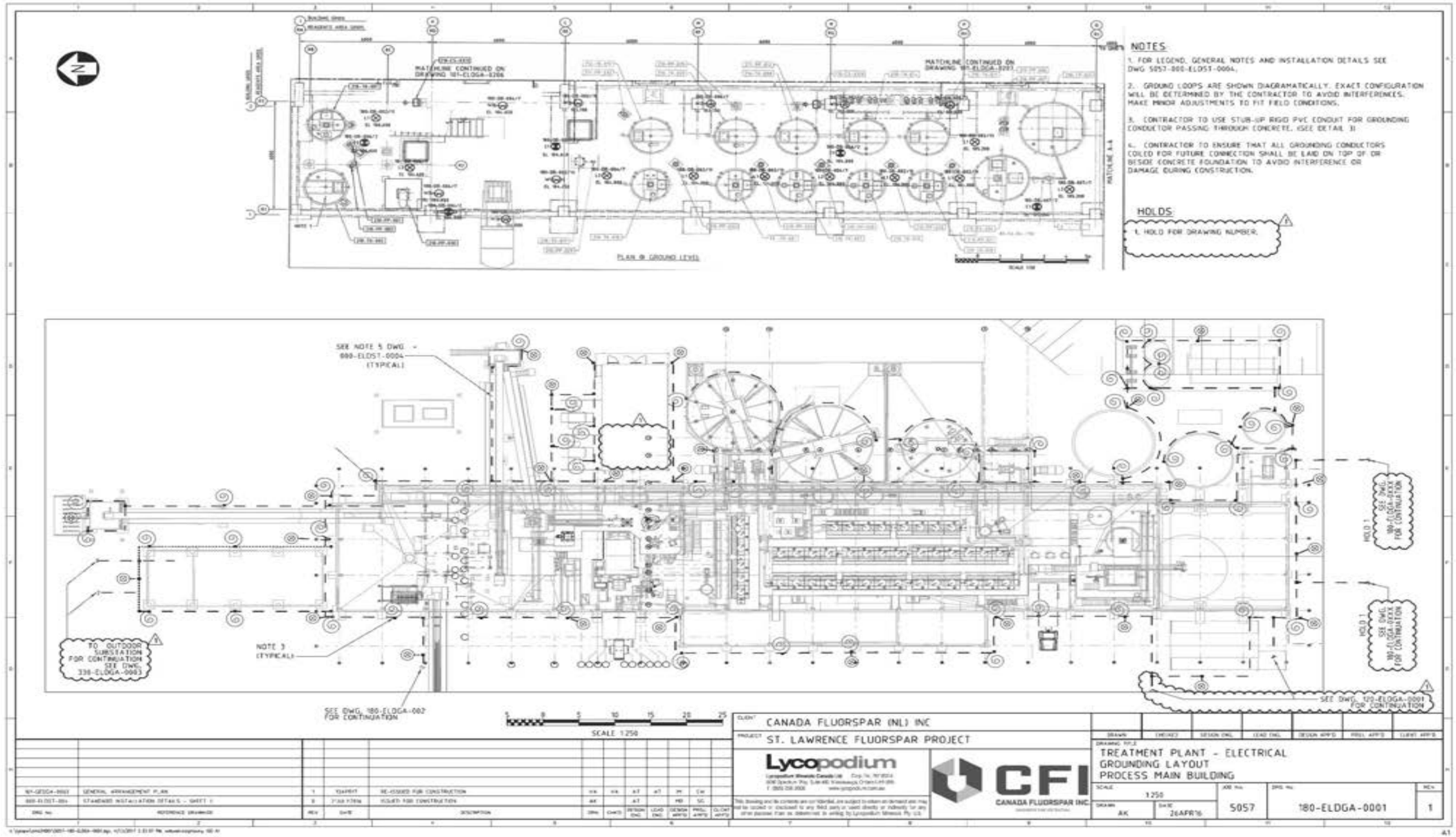



**Figure 7-1: Mill Floor Plan (in Appendix L.1)**

## 7.2 Process Description

The mill consists of the following sections:

- Crushing to nominal -13 mm Dense Medium Separation
- Grinding to 80% passing 100 µm
- Sulphide flotation
- Pulp Thickening and Conditioning
- $CaF_2$ Flotation
- Concentrate Thickening and Filtration
- Tailings
- Reagent preparation and handling systems

The mill is supported by ancillary infrastructure including:

- Assay/metallurgical Laboratory
- Reagent Storage
- Concentrate Storage
- Mill Offices/ Dry building

As built drawings of the auxiliary structures and certain changes to the Concentrator were not completed at the time of the changes and therefore CFI is in the process of updating detailed engineering as-builts and would be submitted to the IET once its developed.

A detailed description of the AGS Mill site infrastructure is provided in section 10. An equipment inventory list is provided in Appendix L.

### 7.2.1 Crushing

Run-of-Mine (ROM) ore is hauled from the open pit(s) and stockpiled at the ROM pad. The ore is reclaimed from the stockpile in a pre-determined blend, based on head grade and minerology, and fed directly to the ROM bin. The vibrating grizzly feeder (VGF) draws from the bin. Undersize material passes through the VGF while oversize ore is fed to the jaw crusher.

The VGF bypass and jaw crusher discharge are combined with the discharge from both the secondary and tertiary cone crushers and all to a double deck vibrating screen. Oversize from the top deck is fed to the secondary crusher while oversize from the lower deck is fed to the tertiary crusher. Undersize (-13 mm) product is conveyed to the fine ore stockpile.

### 7.2.2 Fine Ore Storage

Crushed ore is conveyed to the covered fine ore stockpile dome. Ore is withdrawn from the stockpile using two apron feeders, which discharge ore onto the DMS plant feed conveyor.

### 7.2.3 Dense Medium Separation (DMS)

The purpose of the DMS plant is to selectively recover mill feed material based on Specific Gravity (SG), to pre-concentrate the ROM ore prior to grinding and flotation. The plant creating an artificial slurry medium with a density between that of the desirable ore and the gangue.

In this case, the desirable mineral (calcium fluoride) has a higher SG (3.1) than the gangue (typically 2.62). Therefore, the DMS medium, a mixture of ferrosilicon and water, is set at an SG of 2.72 to separate the gangue from the ore while minimizing recovery losses. The medium density is controlled to within 0.02 of the target density by adjusting water. Separation occurs in the DMS cyclone, where lighter material (SG < 2.72) to exits as overflow and the heavier material (SG > 2.72) exits as underflow.

The crushed ore is conveyed to the DMS preparation screen where it is washed and screened. The oversize discharges directly into the DMS mixing box and the undersize is pumped to the ball mill cyclone feed pump box.

The DMS mixing box ensures intimate mixing of feed preparation screen oversize material and recycled FeSi slurry, where it is then pumped to the DMS cyclone. The densest fraction of material (the sinks) passes to the cyclone underflow and less dense material (the rejects/floats) discharges from the cyclone as overflow product.

Once they exit the cyclone, the sinks and rejects/floats slurries are passed over static drain panels onto horizontal deck vibrating screens. Slurry from the screens feed end gravitates to the

circulating medium (CM) tank while slurry from the screens discharge end is directed to the dilute medium (DM) circuit.

FeSi that drains from both drain / rinse screens is pumped through a demagnetizing coil, then drains to the mixing box back to the CM tank.

Dilute FeSi from the rinse portion of the two drain and rinse screens is collected in the DM tank from where it is pumped to a densifying cyclone, a magnetic separator, or a pipe separator for densification.

Drain and rinse screen oversize material from the rejects/floats and sinks screens consists of washed, density separated crushed rock. The DMS rejects material is conveyed into the rejects product pile for backhaul to the mine for screening as a fine aggregate product. The DMS sink product is fed to the ball mill circuit.

The size distribution of the plant feed stream from 2021 operations is described in Table 7.1.

**Table 7-1: Plant Feed PSD**

| Size Fraction | % Passing |
|---|---|
| mm | % |
| 13 | 100 |
| 8 | 79 |
| 4 | 48 |
| 2 | 30 |
| 1 | 19 |

### 7.2.4 Grinding

The DMS Sinks product is conveyed to the ball mill, together with re-circulated cyclone underflow slurry and process water. Ball mill discharge slurry exits the mill via a trommel screen where it is joined by the feed preparation screen underflow. Trommel screen undersize material is further diluted with process water and pumped to the ball mill classifying cyclones. Cyclone underflow gravitates back to the ball mill while the cyclone overflow is pumped to the desliming cyclones.

Deslime cyclone overflow slurry gravitates to the final tailings pump box while the underflow slurry gravitates to the sulphide flotation conditioning tank for further processing. The trommel screen oversize material is collected in a scats bunker and stockpiled on site.

### 7.2.5 Sulphide Flotation

The sulphide flotation circuit is fed with deslimed slurry from the grinding circuit. The sulphide flotation conditioning tank allows mixing with necessary reagents, then overflows into two sulphide tank rougher flotation cells followed by two banks of conventional scavenger cells, where the sulphide minerals and remaining slimes are floated and pumped to the final tailings pump box for disposal.

The sulphide scavenger flotation tailing slurry exits the final sulphide flotation cell into the pulp thickener feed pump box.

### 7.2.6 Pulp Thickening

The pulp thickener is used to bring sulphide flotation tails to the desired density before being pumped to the Fluorite flotation circuit. Flocculant, as required, is added to the thickener feed to promote settling of solids. Thickener overflow is recycled to the process as make up water for the grinding circuit. Underflow pumps pump the thickened slurry to the fluorite flotation circuit.

### 7.2.7 Fluorite Flotation

Pulp thickener underflow is pumped into the first of three conditioner tanks. The three conditioning stages allow specific reagent dosing. Conditioner #3 overflows into the rougher feed box. Fluorite rougher / scavenger flotation consists of two banks of four cells, and flotation occurs without further addition of reagents.

Concentrate from the fluorite rougher / scavenger flotation circuit is pumped to the first cleaner flotation feed with additional reagents. 1st cleaner concentrate is collected and pumped to the 2nd cleaner flotation stage. 1st cleaner tailings slurry gravitates to the final tailings pump box. All cleaner stages are configured for counter-current cleaning.

### 7.2.8 Concentrate Thickening and Filtration

Flotation concentrate from final cleaner stage is pumped to the concentrate thickener feed box where it is mixed with recycled filtrate water from the drum filter. The concentrate thickener underflow pump transfers slurry to the filter feed tank for temporary storage. Concentrate thickener overflow is transferred to the final tailings pump box.

The concentrate thickener underflow is pumped to the concentrate drum filter via the filter feed tank. This unit continuously dewaters the concentrate thickener underflow to approximately 8.5% moisture in the cake, which is discharged from the rotating drum and conveyed to the concentrate stockpile. The concentrate is transferred to transport trucks to be transported to the port.

### 7.2.9 Tailings Management Facility

The TMF allows collection and dewatering of various process slurries for disposal and storage. Water may be recovered and recycled within the process plant.

### 7.2.10 Tailings

Slurry and water from various areas of the process plant are collected in the tailings pump box. Coagulant and/or flocculant is added as required and tailings slurry is pumped to the TMF.

### 7.2.11 Reagents Area

Various reagents are added to the process, mainly within the flotation circuit. Table 7.4 provides a summary of the reagents that will be used in the process and the estimated consumption rates per tonne and per annum.

### 7.2.12 Fresh, Potable, and Fire Water Management Systems

Most of the Project's process water is recycled from the TMF Polishing Pond. Raw water for mineral processing, as well as potable, and gland water is drawn from the Tarefare Shaft (Tarefare Water Intake). Water for various processing usage is stored in storage tanks. From these storage tanks, water is pumped around the process plant for general use. A dedicated GSW pump

pressurizes the GSW ring main that is used to supply sealing water around the process plant. A potable water pump is used to transfer fresh water to a potable water treatment plant. Once treated, the potable water is stored in a dedicated tank and a potable water supply pump is used to pressurize a potable water ring main.

Water, both for industrial and office use, is drawn from nearby ponds and Tarefare Shaft. Potable water is available in large containers and bottles.

A firewater tank is located next to the process water tank where fire pumps withdraw water for the system. The system includes a primary diesel pump and a jockey pump. The header system provides firewater solely to the process plant.

### 7.2.13 Air Services

Two compressors supply a common manifold for instrument and plant air. The plant air system consists of a receiver vessel and distribution piping. The instrument air system additionally includes air drying and filtration equipment.

### 7.2.14 Concentrate Specification

Concentrate specification may be found in Table 7.2 below.

**Table 7-2: Concentrate Specification**

| PRODUCT SPECIFICATIONS | | | | |
|---|---|---|---|---|
| **Measured** | **Benchmark** | | **Target** | |
| $CaF_2$ | % | 97.5 | 97 | Min |
| $SiO_2$ | % | 0.8 | 1.2 | Max |
| $CaCO_3$ | % | 1.0 | 1.2 | Max |
| Alumina ($Al_2O_3$) | % | 0.1 | 0.15 | Max |
| Ferric Oxide ($Fe_2O_3$) | % | 0.15 | 0.2 | Max |
| $BaSO_4$ | % | 0.2 | 0.3 | Max |
| Total P as $P_2O_5$ | % | 0.01 | 0.025 | Max |
| As | ppm | 4 | 8 | Max |
| Soluble Chloride (ISE) | ppm | 20 | 50 | Max |
| Sulphur (Total) | % | 0.02 | 0.08 | Max |
| Hg | ppm | 0.5 | 1.5 | Max |
| TOC | % | 0.03 | 0.05 | Max |
| Moisture | % | <10 | <10 | Max |

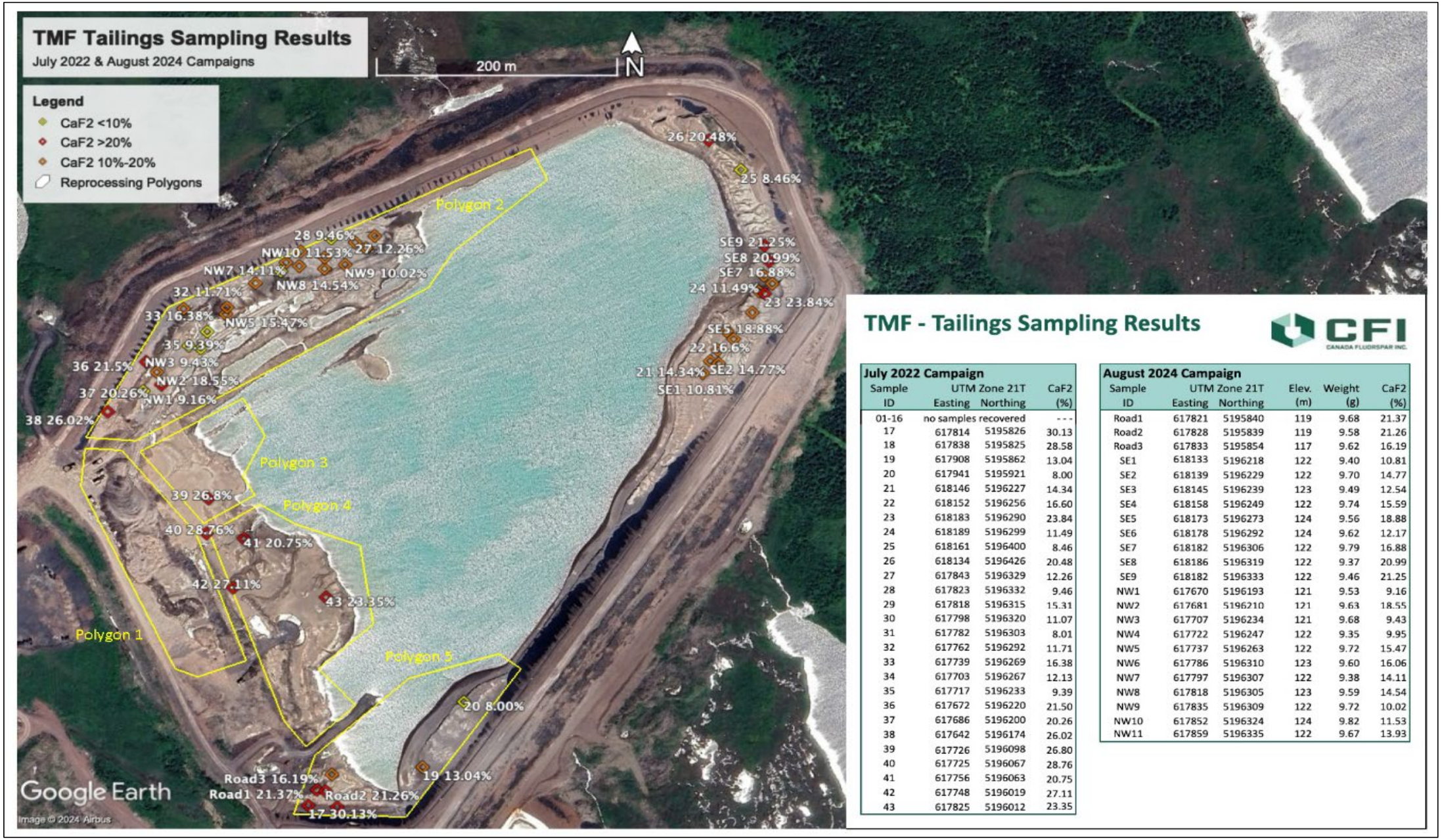
| | Mesh | Microns | % Passing |
|---|---|---|---|
| PSA | 100 | 150 | >91 |
| | 200 | 75 | >62 |
| | 325 | 45 | >42 |

### 7.2.15 Tailings Retreatment

As part of the preproduction and commissioning phase, tailings will be retreated through the process plant. This will enable commissioning of mill circuits (sans crushing and DMS) whilst training operators and recovering fluorspar from the TMF. The TMF will be dewatered, enabling the tailings to be retrieved using dry mining processes (long-reach excavator) and fed into the DMS Sinks Transfer Conveyor to report to the grinding circuit. Tailings will be recovered from the outside of the tailings pond in areas of historically high recovery loss (coarse fraction of tailings on the southwest side of the TMF) by separating the areas with a road built from DMS rejects,

and new tailings from the retreatment will be deposited at the northeast corner. The CFI Engineer of Record for the TMF will be involved in each step of this process, and any additional or amendments to existing permits will be obtained prior to project start.

Test work indicates a recovery of 60% producing acid-grade fluorspar will be achievable with retreated tailings. Process design information including feed tonnage for tailings retreatment are included in the table at the end of Section 7, combined with the fresh feed planned for the ramp up of production in 2025. Figure 7.2 shows the areas to be mined with the grade distribution based on the sample locations.




## TMF - Tailings Sampling Results

CFI CANADA FLUORSPAR INC.

**July 2022 Campaign**

| Sample ID | UTM Zone 21T Easting | Northing | CaF2 (%) |
|---|---|---|---|
| 01-16 | no samples recovered | | --- |
| 17 | 617814 | 5195826 | 30.13 |
| 18 | 617838 | 5195825 | 28.58 |
| 19 | 617908 | 5195862 | 13.04 |
| 20 | 617941 | 5195921 | 8.00 |
| 21 | 618146 | 5196227 | 14.34 |
| 22 | 618152 | 5196256 | 16.60 |
| 23 | 618183 | 5196290 | 23.84 |
| 24 | 618189 | 5196299 | 11.49 |
| 25 | 618161 | 5196400 | 8.46 |
| 26 | 618134 | 5196426 | 20.48 |
| 27 | 617843 | 5196329 | 12.26 |
| 28 | 617823 | 5196332 | 9.46 |
| 29 | 617818 | 5196315 | 15.31 |
| 30 | 617798 | 5196320 | 11.07 |
| 31 | 617782 | 5196303 | 8.01 |
| 32 | 617762 | 5196292 | 11.71 |
| 33 | 617739 | 5196269 | 16.38 |
| 34 | 617703 | 5196267 | 12.13 |
| 35 | 617717 | 5196233 | 9.39 |
| 36 | 617672 | 5196220 | 21.50 |
| 37 | 617686 | 5196200 | 20.26 |
| 38 | 617642 | 5196174 | 26.02 |
| 39 | 617726 | 5196098 | 26.80 |
| 40 | 617725 | 5196067 | 28.76 |
| 41 | 617756 | 5196063 | 20.75 |
| 42 | 617748 | 5196019 | 27.11 |
| 43 | 617825 | 5196012 | 23.35 |

**August 2024 Campaign**

| Sample ID | UTM Zone 21T Easting | Northing | Elev. (m) | Weight (g) | CaF2 (%) |
|---|---|---|---|---|---|
| Road1 | 617821 | 5195840 | 119 | 9.68 | 21.37 |
| Road2 | 617828 | 5195839 | 119 | 9.58 | 21.26 |
| Road3 | 617833 | 5195854 | 117 | 9.62 | 16.19 |
| SE1 | 618133 | 5196218 | 122 | 9.40 | 10.81 |
| SE2 | 618139 | 5196229 | 122 | 9.70 | 14.77 |
| SE3 | 618145 | 5196239 | 123 | 9.49 | 12.54 |
| SE4 | 618158 | 5196249 | 122 | 9.74 | 15.59 |
| SE5 | 618173 | 5196273 | 124 | 9.56 | 18.88 |
| SE6 | 618178 | 5196292 | 124 | 9.62 | 12.17 |
| SE7 | 618182 | 5196306 | 122 | 9.79 | 16.88 |
| SE8 | 618186 | 5196319 | 122 | 9.37 | 20.99 |
| SE9 | 618182 | 5196333 | 122 | 9.46 | 21.25 |
| NW1 | 617670 | 5196193 | 121 | 9.53 | 9.16 |
| NW2 | 617681 | 5196210 | 121 | 9.63 | 18.55 |
| NW3 | 617707 | 5196234 | 121 | 9.68 | 9.43 |
| NW4 | 617722 | 5196247 | 122 | 9.35 | 9.95 |
| NW5 | 617737 | 5196263 | 122 | 9.72 | 15.47 |
| NW6 | 617786 | 5196310 | 123 | 9.60 | 16.06 |
| NW7 | 617797 | 5196307 | 122 | 9.38 | 14.11 |
| NW8 | 617818 | 5196305 | 123 | 9.59 | 14.54 |
| NW9 | 617835 | 5196309 | 122 | 9.72 | 10.02 |
| NW10 | 617852 | 5196324 | 124 | 9.82 | 11.53 |
| NW11 | 617859 | 5196335 | 122 | 9.67 | 13.93 |

**Figure 7-2: Planned Tailings Area and Grade Distribution**

### 7.2.16 Water Treatment Plant

CFI has engaged a consultant and technology provider for the design and installation of a water treatment plant. This plant is envisioned as a ballasted flocculation plant (e.g. WesTech RapiSand) to treat TMF return water. The treated effluent will meet discharge regulatory requirements and will increase the amount and the quality of recycled water within the process and effectively decrease freshwater consumption. The plant will be installed and commissioned in 2025 during commissioning and ramp up of production. The design specifications and as-builts will be provided after the completion of detailed engineering. Initial plan drawing and section has been included in Appendix L-13. The overall water balance is provided in other sections.

During commissioning, the freshwater for the mill is supplied by the Tarefare shaft and the TMF return water is recycled as process water. Prior to discharge to the environment, the water to treated with flocculant and coagulant and its quality is monitored to ensure it meets the discharge requirements outlined in CFI's CofA.

## 7.3 Process Flow Diagram

The mill flow sheet is illustrated on Figure 7.3 as updated in 2024 based on current configuration of the circuit. Circuit optimisation is ongoing, and it is expected that there will be changes which require updates to the flowsheet and process design. Updated flow sheets will be submitted with future Development Plans as required. Future work includes winterisation, improvements to the deslime circuit, thickener capacity, water treatment plant, and additional storage and maintenance buildings, pending environmental assessment and regulatory approvals.

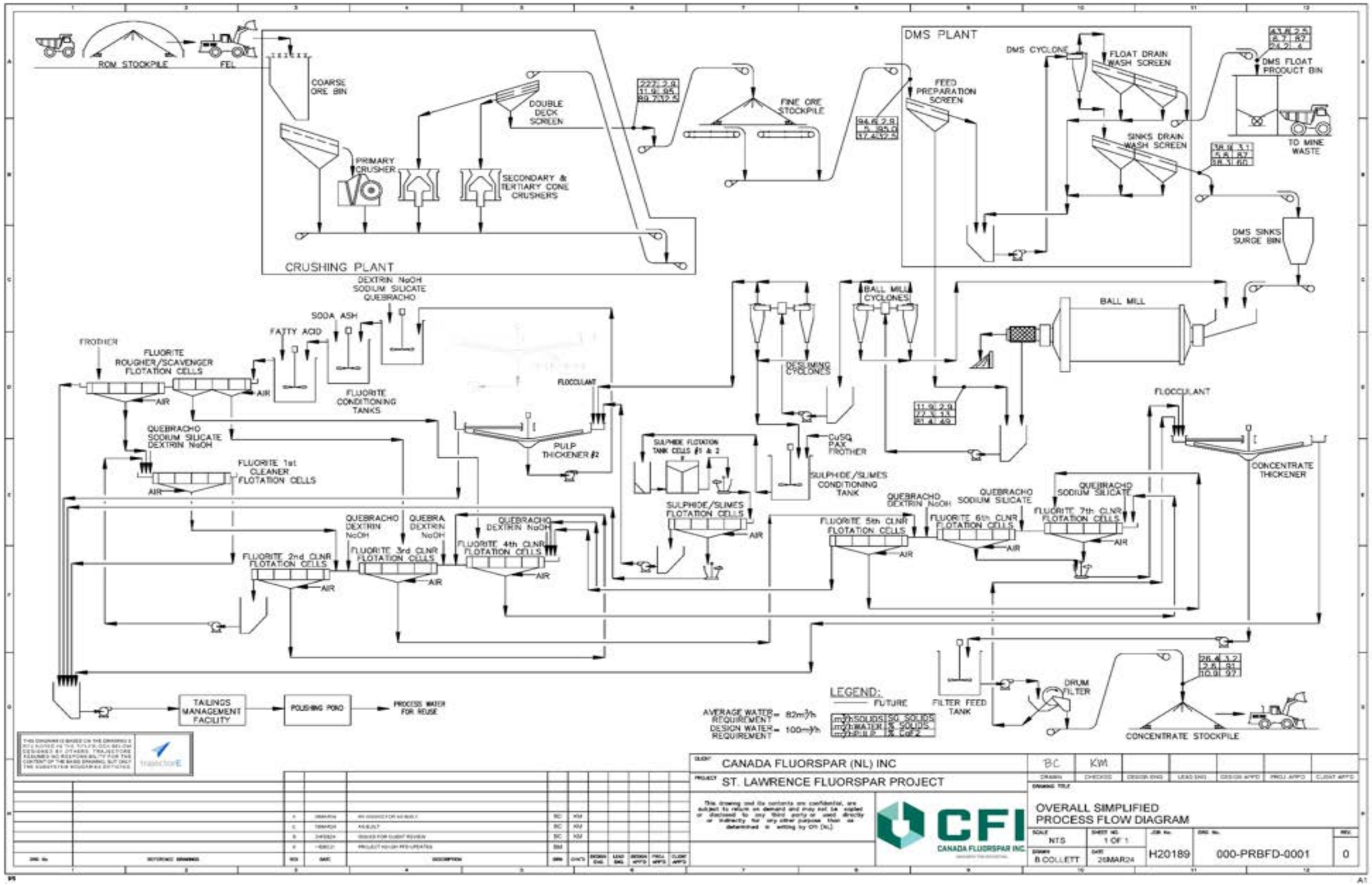



**Figure 7-3: Mill Flow Sheet**

Table 7.3 summarizes the metallurgical mass balance based on nominal production rates from open pit and underground ore respectively.

**Table 7-3: Nominal Metallurgical Mass Balance**

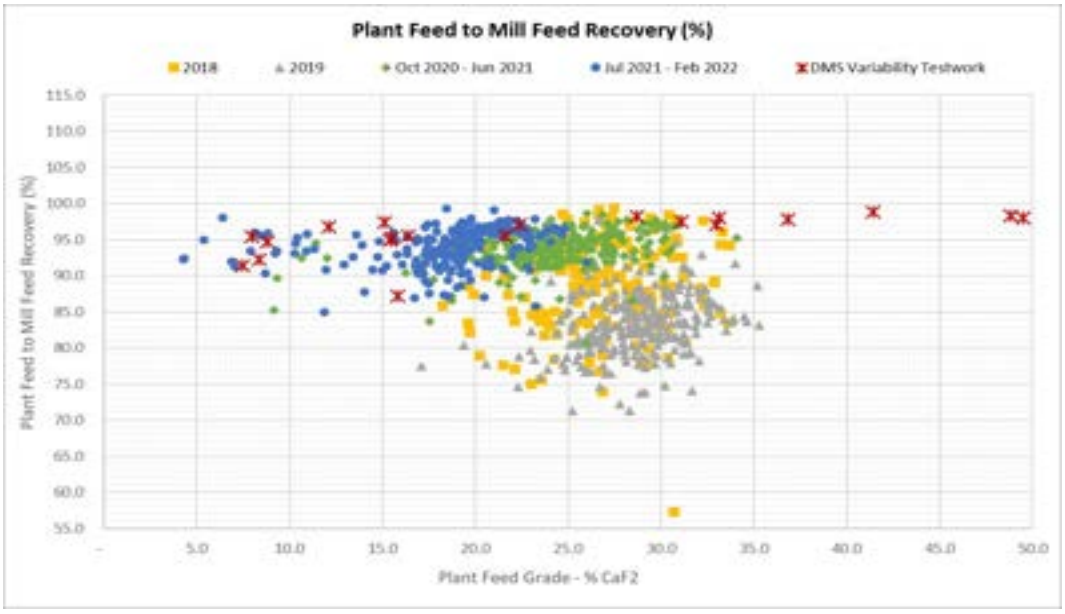
| Component | Open Pit Ore | |
|---|---|---|
| | Mass Flow t/y | % $CaF_2$ |
| ROM | 1,100,000 | 19.56% |
| Pre-screened Fines | 201,594 | 24.20% |
| DMS Rejects | 588,859 | 1.9% |
| DMS Sinks | 309,547 | 56.7% |
| Ball Mill Feed = DMS Sink + Fines | 511,141 | 43.2% |
| Final Tail | 298,373 | 11.1% |
| Final Concentrate | 175,659 | 97.5% |
| **DMS Recovery** | 94.8% | |
| **Flotation Recovery** | 83.6% | |
| **Overall Recovery** | 79.6% | |

A full set of 2023 as-built process flow diagrams are available in Appendix L. Site wide water management including Water Balance is discussed in Section 9.

## 7.4 Grade Description

Due to the DMS ahead of grinding, the plant is capable of accepting a wide range of head grades. A higher head grade will result in fewer DMS rejects produced, with a higher-grade flotation feed

generated. A lower head grade will have the opposite effect, with an increase in DMS rejects produced and a lower grade of flotation feed. The target average feed grade for near-term production is 22% $CaF_2$. Historic mill production shows a higher recovery loss at DMS with a lower head grade linked to liberation, where flotation recovery remains relatively constant at all feed grades. DMS and Flotation circuit recoveries compared to feed grades from original variability test work as well as actual plant data are shown in Figure 7.4 below. Original variability test work report can be found in Appendix O.



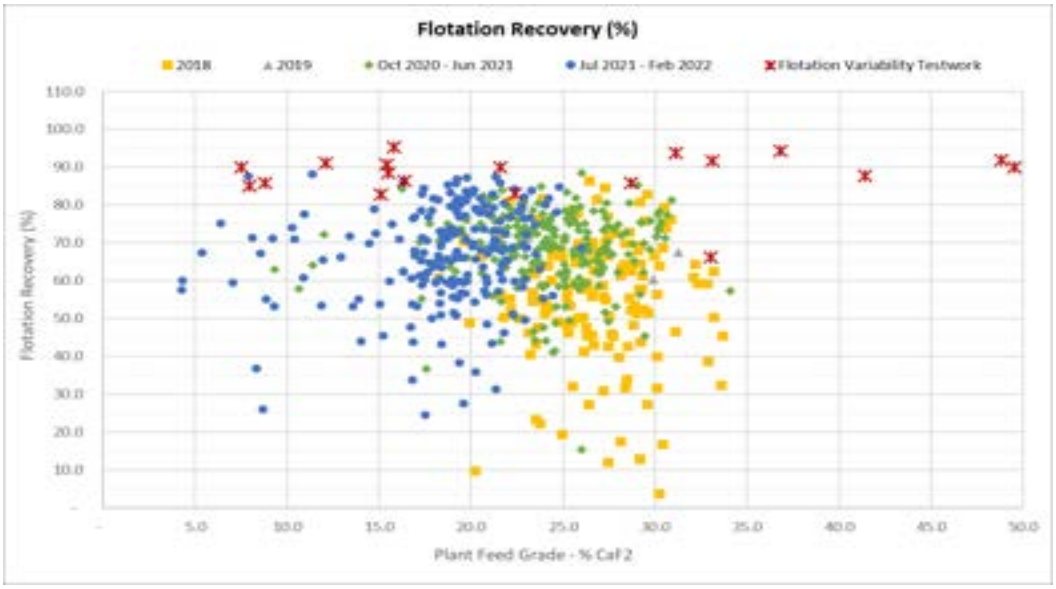




**Figure 7-4: Feed Grade versus Recovery for DMS and Flotation Circuits**

## 7.5 Reagents

**Table 7-4: Reagents and Consumption Rates Updated June 2021**

| Name | Use | Delivered Form to Process | Consumption (g/t) | Annual Consumption (t) |
|---|---|---|---|---|
| Soda Ash - powder | pH Control | Powder | 200 | 149 |
| Soda Ash - Solution | pH Control | Solution | 500 | 373 |
| Copper Sulphate | Sulphide Activator | Solution | 50 | 35 |
| Magnafloc 10 | Flocculant | Solution | 51 | 38 |
| Dextrin | Depressant | Solution | 210 | 157 |
| PAX | Collector | Solution | 100 | 74 |
| W31 | Frother | Liquid | 30 | 21 |
| FA-2 Fatty Acid | Collector | Solution | 300 | 224 |
| Quebracho | Depressant | Solution | 265 | 198 |
| Unicol PM 950 | Emulsifier | Solution | 15 | 11 |
| Sodium Silicate | Dispersant | Solution | 25 | 19 |
| NaOH | Dextrin solubility | Solution | 21 | 16 |
| Magnafloc 368 | Coagulant | Solution | 165 | 123 |
| FeSi | Dense Medium | Suspended Solution | 270 | 300 |

Reagent types and addition rates are currently under review pending test work and actual values from mill operation and will be updated in future revisions.

## 7.6 Mill Feed Rate

Table 7.5 shows the mill feed rate and the $CaF_2$ product with the overall plant recoveries.

**Table 7-5: Mill Feed Rate and Recoveries**

| | Year 1 - 2024 | Year 2 - 2025 | Year 3 - 2026 | Year 4 - 2027 | Year 5 - 2028 | Year 6 - 2029 | Year 7 - 2030 | Year 8 - 2031 | Year 9 - 2032 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Plant Capacity (tph) | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| Plant Availability (%) | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| | | | | | | | | | | |
| **TMF Reprocessing** | | | | | | | | | | **0** |
| Total TMF Tonnes Processed | 70,000 | 80,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **150,000** |
| TMF CaF2 Grade % | 16.00 | 16.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **16.00** |
| TMF CaF2 Tonnes | 11,200 | 12,800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **24,000** |
| TMF Reprocessing Recovery % | 50.0 | 60.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **55.3** |
| CaF2 Product Tonnes | 5,600 | 7,680 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **13,280** |
| | | | | | | | | | | |
| **Total Ore Tonnes Processed** | 0 | 274,590 | 1,003,488 | 1,100,000 | 1,100,000 | 1,100,000 | 1,100,000 | 1,100,000 | 442,954 | **7,221,032** |
| Ore CaF2 Grade % | 0.00 | 13.27 | 18.70 | 19.50 | 19.41 | 19.40 | 20.56 | 21.37 | 19.28 | **19.56** |
| Ore CaF2 Tonnes | 0 | 36,447 | 187,652 | 214,500 | 213,483 | 213,400 | 226,201 | 235,118 | 85,394 | **1,412,197** |
| Fresh Ore Overall Recovery % | 0.0 | 77.5 | 79.4 | 79.7 | 79.7 | 79.7 | 79.7 | 79.7 | 79.7 | **79.6** |
| CaF2 Product Tonnes | 0 | 28,253 | 148,988 | 170,939 | 170,129 | 170,063 | 180,264 | 187,370 | 68,052 | **1,124,058** |
| | | | | | | | | | | |
| Tailings Tonnes | 64,400 | 208,821 | 453,104 | 489,061 | 489,871 | 489,937 | 479,736 | 472,630 | 197,720 | **3,345,281** |
| Tailings CaF2 Grade % | 8.70 | 5.32 | 6.76 | 7.11 | 7.05 | 7.05 | 7.74 | 8.24 | 6.98 | **7.21** |
| Tailings CaF2 Tonnes | 5,600 | 11,118 | 30,636 | 34,761 | 34,554 | 34,538 | 37,137 | 38,948 | 13,798 | **241,090** |
| | | | | | | | | | | |

| | Year 1 - 2024 | Year 2 - 2025 | Year 3 - 2026 | Year 4 - 2027 | Year 5 - 2028 | Year 6 - 2029 | Year 7 - 2030 | Year 8 - 2031 | Year 9 - 2032 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **DMS Rejects / Aggregate** | | | | | | | | | | |
| Interim DMS Rejects Aggregate | 350,000 | 240,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **590,000** |
| DMS Rejects / Aggregate Tonnes | | 109,836 | 401,395 | 440,000 | 440,000 | 440,000 | 440,000 | 440,000 | 177,182 | **2,888,413** |
| | | | | | | | | | | |
| **Total DMS Reject / Aggregate** | **350,000** | **349,836** | **401,395** | **440,000** | **440,000** | **440,000** | **440,000** | **440,000** | **177,182** | **3,478,413** |
| **Total CaF2 Product Tonnes** | **5,600** | **35,933** | **148,988** | **170,939** | **170,129** | **170,063** | **180,264** | **187,370** | **68,052** | **1,137,338** |

## 7.7 Tailings Disposal

DMS rejects, as a tailings stream, will be sold as aggregate where possible, used for road construction onsite, and otherwise deposited with the waste rock in the South WRF.

Flotation tailings will be deposited in the AGS East TMF, around the perimeter so as to build a beach of tailings along the embankment. Tailings deposition will follow the TMF Operations, Maintenance, and Surveillance Manual as developed by the Engineer of Record.

Once the AGS East TMF reaches design capacity, there is potential to further increase the capacity of the AGS East TMF as part of a third raise. CFI will complete the necessary technical studies and environmental assessments to support either of the proposed solutions.

## 7.8 Concentrate Hauling

Filtered concentrate will be temporarily stored at the processing plant prior to loading in covered haul trucks for transport to the BBMT where it will be transferred to a breakbulk vessel. Concentrate will be shipped in 7,000 to 15,000 tonne batches from the BBMT with the option to ship containerized fluorspar product from third-party export terminals in St John's or Argentia to international markets. Concentrate shipped from BBMT will be loaded onto the ships via a mobile ship loading conveyor. DMS reject aggregate will be shipped via BBMT exclusively. The aggregate product will be sold in parcels of 45,000 tonnes and will be transported to BBMT using haul trucks where it will be stockpiled before being loaded on breakbulk vessels using the mobile ship loading conveyors

Future concentrate loading operations from the BBMT will have on-site storage capacity and the capability of accepting larger panamax-sized vessels. These larger vessels have higher storage capacity and better access to global markets.

# 8 Tailings Management Facility (TMF)

## 8.1 Description of the TMF

The AGS East TMF (Figure 8.1) has been designed and was constructed to the industry standard Canadian Dam Association (CDA) Dam Safety Guidelines (CDA, 2013) with consideration of the revised criteria presented in CDA (2014). The CDA provides recommendations for selecting appropriate design criteria for dams based on a classification system. The design criteria include the Inflow Design Flood (IDF), Environmental Design Storm (EDS), Earthquake Design Ground Motion (EDGM), and required freeboard. In the case of the AGS East TMF, the classification for the impoundments has been conservatively selected as VERY HIGH based on the potential environmental consequences of an embankment failure. Further details on the dam hazard classification are included within the detailed TMF Design Report (KP, 2016e; Appendix M). The AGS East TMF design criteria also takes into account project-specific values and industry standard practices. The key design criteria for the AGS East TMF are summarized in Table 8.1.

Alex McIntyre, P.Eng. of Knight Piésold Ltd. is the Engineer of Record for the Polishing Pond and Tailings Storage Facility Dams. The dams are designed to meet the Factors of Safety (FoS) Outlined in the CDA Guidelines as summarized in Table 8.2.

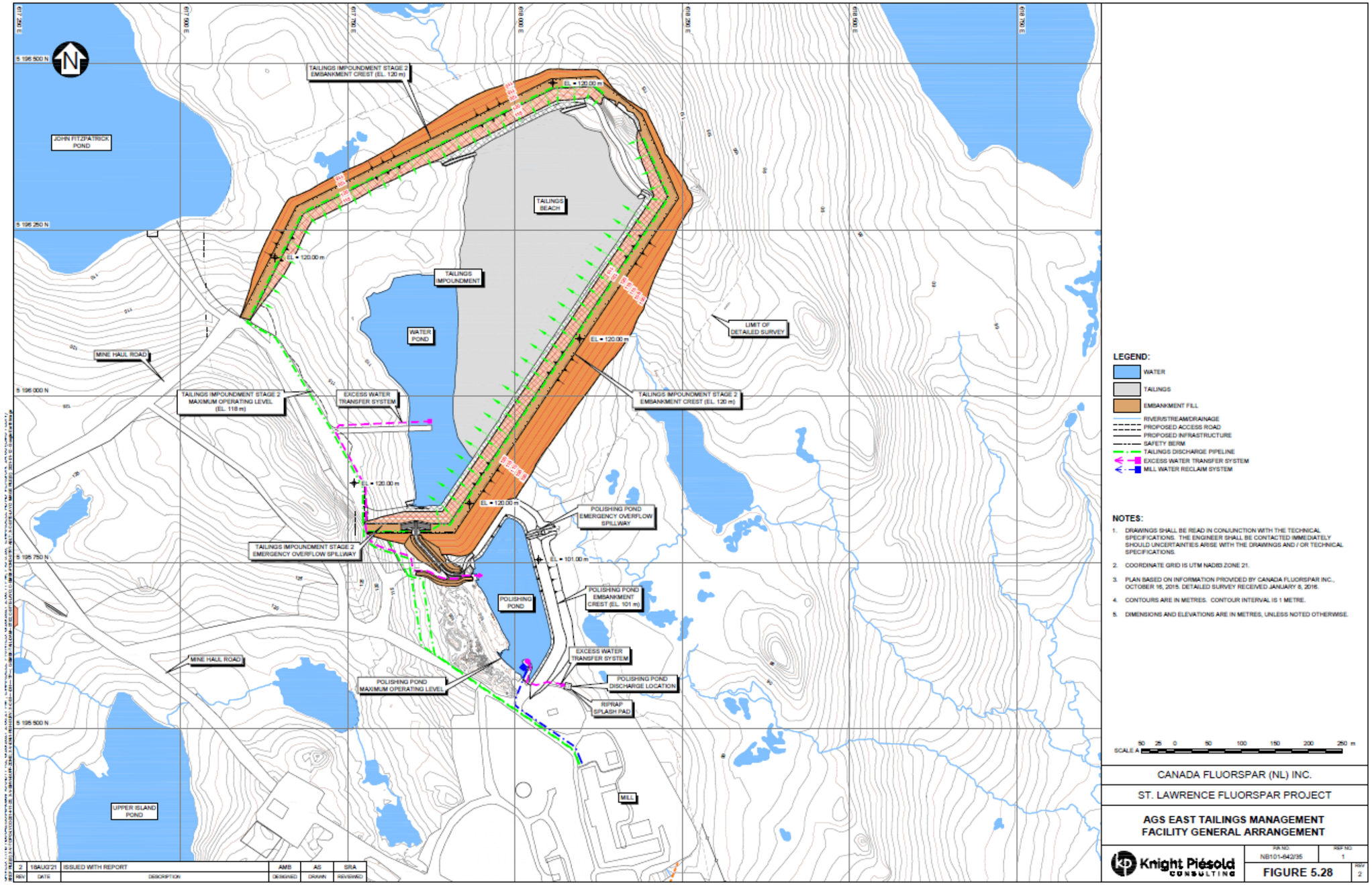



**Figure 8-1: AGS East Tailings Management Facility General Arrangement**

**Table 8-1: Key Design Criteria for AGS East TMF**

| Item | Criteria | Source |
|---|---|---|
| Function | Permanent and secure storage of tailings | KP |
| | Temporary containment of process water and management of runoff water | KP |
| | Minimal impact to surrounding environment | KP |
| | Minimal risk to surrounding environment | KP |
| Dam Hazard Classification | Very High | KP |
| Operations | Operating Days per year: 365 | CFI |
| | Nominal Tailings Solids Rate: up to 226,000 dry tonnes per year | CFI |
| | Operating Life: Tailings Solids Production: 2,975,086 tonnes | Original |
| | Operating Life: to 2027; capacity is available until 2029 | KP |
| Tailings Characteristics | Specific Gravity: 2.85 | SGS |
| | Settled Density: 1.45 tonnes/$m^3$ | KP |
| | Non-ARD | Golder, 2016, Golder 2019 |
| | Tailings Impoundment Ultimate: 2,100,000 $m^3$ (10 years of tailings solids plus 100,000 $m^3$ operating pond) | KP |
| | Polishing Pond: 39,000 $m^3$ | KP |
| Inflow Design Flood (IDF) | IDF selected based on Dam Hazard Classification of the Tailings Impoundment | KP |
| | 2/3rd between the 1 in 1,000 year and the Probable Maximum Flood | CDA, 2014 |
| Environmental Design Storm (EDS) | 1 in 200-year 24 hr rainfall event | KP |
| Spillway | Convey the IDF | KP |
| | Inlet Width:<br>- Tailings Impoundment: 4 m wide<br>- Polishing Pond: 5 m wide | KP<br>KP |
| | Configuration: Trapezoidal Broad Crested Weir | KP |

| Item | Criteria | Source |
|---|---|---|
| Freeboard Requirements | Total Freeboard:<br>- Tailings Impoundment: 2.3 m<br>- Polishing Pond: 2.0 m | KP<br>KP |
| | Wet Freeboard:<br>- Tailings Impoundment: 0.4 m<br>- Polishing Pond: 0.6 m | KP<br>KP |
| | Dry Freeboard:<br>- Tailings Impoundment: 1.6 m<br>- Polishing Pond: 0.9 m | KP<br>KP |
| | Containment Freeboard:<br>- Tailings Impoundment: 36,400 $m^3$<br>- Polishing Pond: 8,400 $m^3$ | KP |
| Stability Requirements | End of Construction FoS 1.5 Upstream and Downstream | CDA, 2013 |
| | Long-Term Steady State FoS: 1.5 Downstream | CDA, 2013 |
| | Full or Partial Rapid Drawdown: Not Applicable to geomembrane lined waste rock dam | KP |
| | Pseudo-Static FoS: 1.0 Upstream and Downstream | CDA, 2013 |
| | Post-Earthquake FoS: 1.2 Upstream and Downstream | CDA, 2013 |
| Seismic Design Criteria | Earthquake Design Ground Motion (EDGM): 1 in 10,000-year Event | CDA, 2014 |
| Foundation | Embankments to be founded on competent sand and gravel till | KP |
| Seepage Control | 80 mil HDPE geomembrane liner on embankment upstream face | KP |
| Monitoring | Real time monitoring will take place downstream of the TMF | CFI |
| Excess Water Discharge | A floating barge and pipeline will be used to transfer water from the Tailings Impoundment to the Polishing Pond | KP |
| | An additional pump and pipeline will be used to transfer water from the Polishing Pond to the Discharge location (MSEP) | KP |
| Closure Goals | No long-term liability (i.e. Landform) | KP |
| | Tailings must be consolidated | KP |
| | Return to pre-development watershed conditions | KP |
| | Minimize visual impact | KP |
| | Minimize work required at closure | KP |

**Table 8-2: Tailings Management Facility – Design FoS**

| Loading Conditions | Minimum FoS | Slope |
|---|---|---|
| End of Construction (before reservoir filling) | 1.5 | Upstream and Downstream |
| Long-term (steady state seepage, normal reservoir level) | 1.5 | Downstream |
| Pseudo-static | 1.0 | Upstream and Downstream |
| Post-earthquake | 1.2 | Upstream and Downstream |

*FoS – Factor of Safety*

### 8.1.1 Tailings Impoundment

The Tailings Impoundment is comprised of a side hill impoundment located within Salt Cove Watershed to the east of John Fitzpatrick Pond. The Impoundment is located approximately 500 m north of the Mill.

A geomembrane-lined rockfill embankment was constructed along the perimeter of the Tailings Impoundment. The geomembrane was tied into the dense sand and gravel till foundation soils. The Tailings Impoundment embankment was raised using downstream construction to a current crest elevation of 120 m with a maximum height of approximately 26 m. The key embankment geometry is as follows:

- Crest Width - 15 m
- Upstream Slope - 2H:1V
- Downstream Slope - 2H:1V

A tailings discharge pipeline was installed along the perimeter of the Tailings Impoundment. An excess water discharge system consisting of a pump and pipeline is in place to transfer water from the Tailings Impoundment to the Polishing Pond. An emergency overflow spillway was incorporated into the south end of the Tailings Impoundment embankment. This spillway will manage extreme storm events and direct them into the Polishing Pond.

### 8.1.2 Polishing Pond

The Polishing Pond comprises a side hill impoundment located directly south of the Tailings Impoundment, within Salt Cove Watershed. Similar to the Tailings Impoundment, the Polishing Pond embankment is constructed as a lined rockfill dam. The geomembrane was tied into the dense sand and gravel till foundation soils in order to minimize seepage from the facility.

The Polishing Pond embankment was constructed to a final crest elevation of 101 m with a maximum height of approximately 8 m. The key embankment geometry is as follows:

- Crest Width - 15 m
- Upstream Slope - 2H:1V
- Downstream Slope - 2H:1V

A pump and pipeline were installed in the Polishing Pond to allow water transfer to the Mill and to the Mill Site Event Pond (MSEP) for discharge as required. An emergency overflow spillway was incorporated into the south end of the Polishing Pond embankment to manage the excess water from the local catchment areas and the Tailings Impoundment spillway during extreme storm events. The spillway will direct excess flow safely to the environment

## 8.2 TMF As-Built Drawings

Detailed design of the TMF was completed by Knight Piésold Ltd. (KP, 2016e). The Design report was previously submitted under a separate cover and is included in Appendix M.

CFI commits to submitting as built drawings to the IET once complete. Additional as-built drawings are pending final as-built geomembrane certificates for Stage 2 expected in Q2 of 2024 and will be submitted once completed.

## 8.3 TMF Emergency Response Plan

CFI has submitted an Emergency Preparedness and Response Plan (EPRP) and an Operations, Maintenance and Surveillance Manual (OMS) to the Department of Environment and Climate Change, Water Resources Division. Updates to both documents are planned and once complete, will be re-submitted.

## 8.4 Tailings Characterization and Treatment

The specific gravity of the tailings solids is estimated to be 2.85, based on laboratory testing (Appendix M). Preliminary settling tests conducted by SGS initially estimated the deposited dry density of the tailings at 1.1 tonnes/$m^3$; however, this test was not representative of the actual process design. In 2024, CFI, in collaboration with Knight Piesold, conducted additional settling tests, which revealed variability in the settled density.

However, in all cases, the results exceeded the 1.1 tonnes/$m^3$ determined in 2016. Lab results received in September 2024 indicated a settled density of 1.45 dt/m3 as an update to the original design which used a conservative value of 1.1 dt/m3. This revised settled density of 1.45 dt/$m^3$ was incorporated by Knight Piesold into deposition planning. The tailings gradation is illustrated on Figure 8.2.

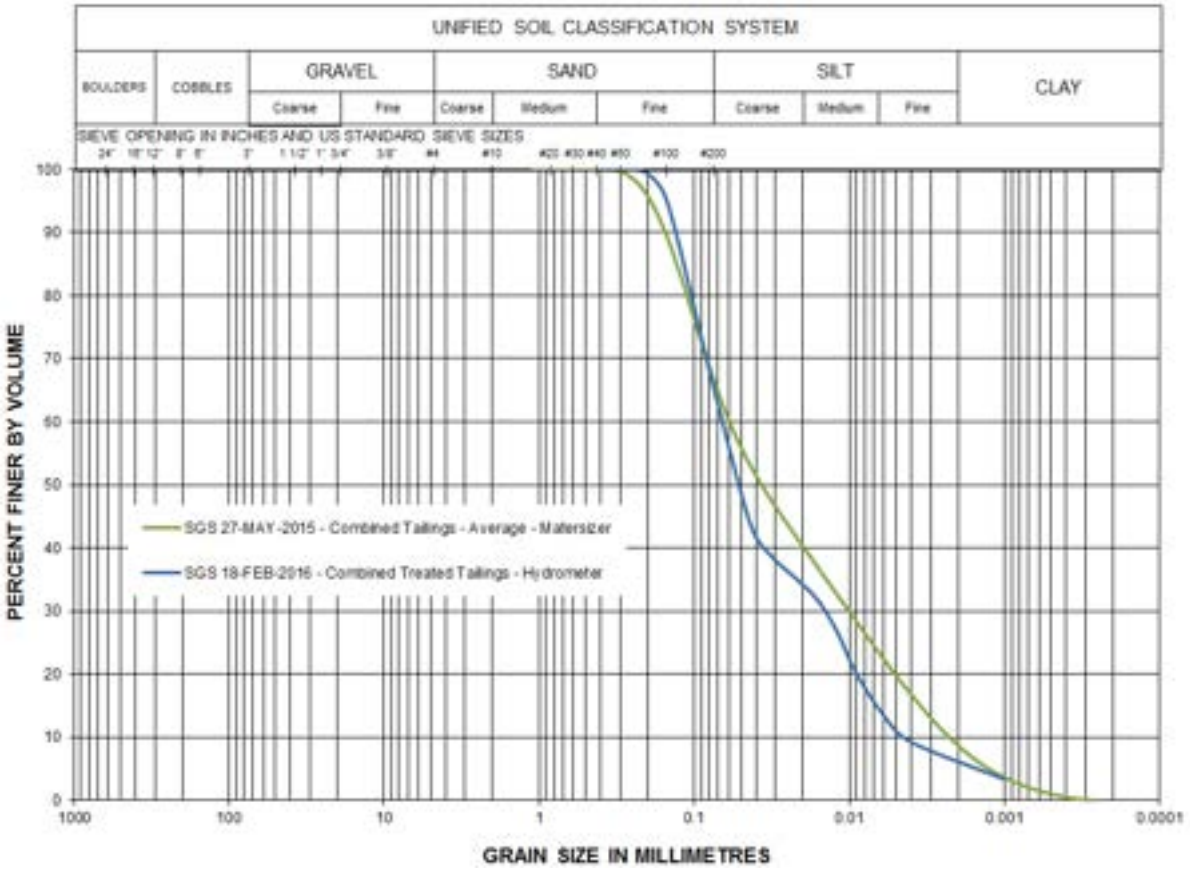



**Figure 8-2: Tailings Gradation**

The St. Lawrence Fluorspar tailings to be deposited into the AGS East TMF are considered to be non-acid generating (Golder, 2019; Appendix E). Test work to date indicates the tailings geochemistry will not result in any adverse environmental impacts, and no chemical treatment requirements are expected to be needed at this time.

### 8.4.1 Storage

The Tailings Impoundment was constructed to store up to 2,975,086 tonnes) at a settled density of 1.45 tonnes/$m^3$. The Tailings Impoundment will also have capacity available to store a normal operating pond volume of 100,000 $m^3$.

A filling schedule from 2021 is illustrated below on Figure 8.3 and summarized in Table 8.3. Filling of the AGS TMF is monitored by CFI and reviewed by the Engineer of Record, or similarly qualified Engineer, regularly to ensure the design densities are achieved. For tailings storage beyond the

10-year capacity, CFI will review alternative locations such as Shoal Cove Pond as well as the potential for raising or expanding the AGS East TMF. A detailed design of the preferred option will be prepared along with an updated development plan prior to construction of additional tailings storage locations.

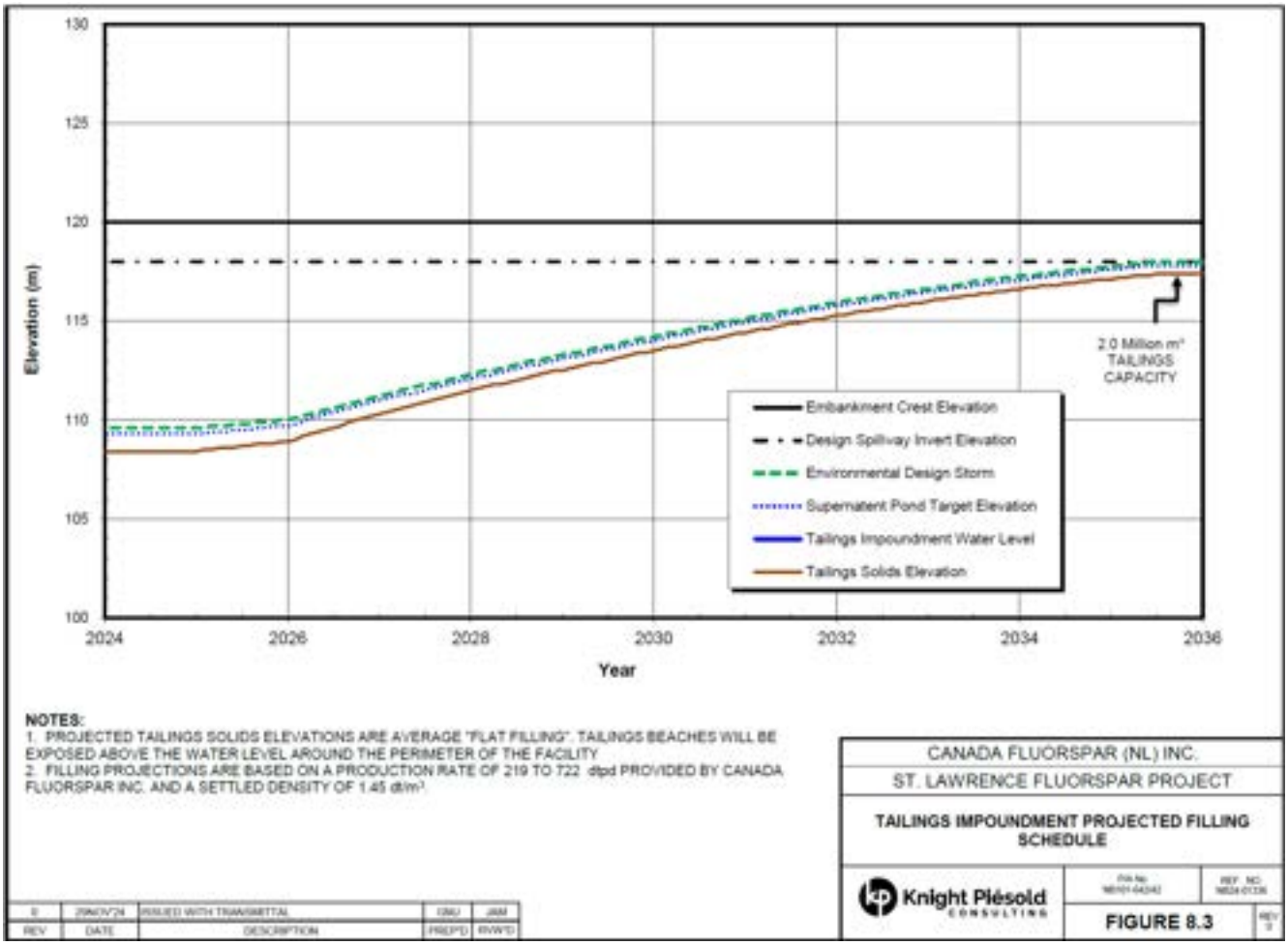



**Figure 8-3: Cumulative Tailings Impoundment Schedule**

**Table 8-3: Tailings Impoundment Filling Summary**

| Year | Daily production Rate[1][2] (dtpd) | Annual Tailings Production[2] (dtpa) | Cumulative Tonnes (tonnes) | Cumulative Volume ($m^3$) | Tailings Impoundment Crest (m) | Remaining Tailings Capacity to Design Filling Level ($m^3$) |
|---|---|---|---|---|---|---|
| 2017 | N/A | 771 | 771 | 532 | 110 | |
| 2018 | 182 | 66,280 | 67,051 | 46,242 | 110 | |
| 2019 | 428 | 156,093 | 223,144 | 153,892 | 110 | |
| 2020 | 453 | 165,724 | 388,868 | 268,185 | 110 | |
| 2021 | 566 | 206,450 | 595,318 | 410,564 | 120 | |
| 2022 | 94 | 34,408 | 629,726 | 434,294 | 120 | |
| 2023 | 0 | 0 | 629,726 | 434,294 | 120 | |
| 2024 | 0 | 0 | 629,726 | 434,294 | 120 | 1,565,706 |
| 2025 | 219 | 80,054 | 709,780 | 489,503 | 120 | 1,510,497 |
| 2026 | 696 | 253,901 | 963,681 | 664,607 | 120 | 1,335,393 |
| 2027 | 542 | 263,597 | 1,227,278 | 846,398 | 120 | 1,153,602 |
| 2028 | 722 | 264,305 | 1,491,582 | 1,028,678 | 120 | 971,322 |
| 2029 | 721 | 262,995 | 1,754,577 | 1,210,053 | 120 | 789,947 |
| 2030 | 719 | 262,407 | 2,016,984 | 1,391,024 | 120 | 608,976 |
| 2031 | 676 | 246,860 | 2,263,844 | 1,561,272 | 120 | 438,728 |
| 2032 | 588 | 214,770 | 2,478,614 | 1,709,389 | 120 | 290,611 |
| 2033 | 522 | 190,415 | 2,669,029 | 1,840,709 | 120 | 159,291 |
| 2034 | 447 | 163,243 | 2,832,272 | 1,953,291 | 120 | 46,709 |
| 2035 | 391 | 142,814 | 2,975,086 | 2,051,784 | 120 | 0[4] |

**NOTES:**

1. **DAILY PRODUCTION BASED ON ANNUAL PRODUCTION PROVIDED BY CFI JUNE 2024.**
2. **TAILINGS REPROCESSING IN 2024 ASSUMED TO PROVIDE NET 0 CHANGE IN STORAGE.**
3. **FILLING SCHEDULE ASSUMES TONNES PER ANNUM AT 1.45 DRY TONNES/m3.**
4. **TAILINGS PRODUCTION FOLLOWING 2035 TO BE DEPOSITED IN ALTERNATE FACILITY TO BE DETERMINED.**

The projected tailings surface at the end of operations is illustrated on Figure 8.4. Detailed figures showing projected annual tailings filling can be found in Appendix M (TMF – Projected Filling – End of Year 01, TMF – Projected Filling – End of Year 02, TMF – Projected Filling – End of Year 03,

TMF – Projected Filling – End of Year 04, TMF – Projected Filling – End of Year 05, TMF – Projected Filling – Ultimate).

The Polishing Pond provides storage for approximately 25,000 $m^3$ of water up to El. 99 m (2 m below the crest). This pond is used to provide final clarification and monitoring of the water prior to discharge to the environment.

Approximately 925,000 $m^3$ of mine rock has been used to construct the embankments for the Tailings Impoundment and Polishing Pond.

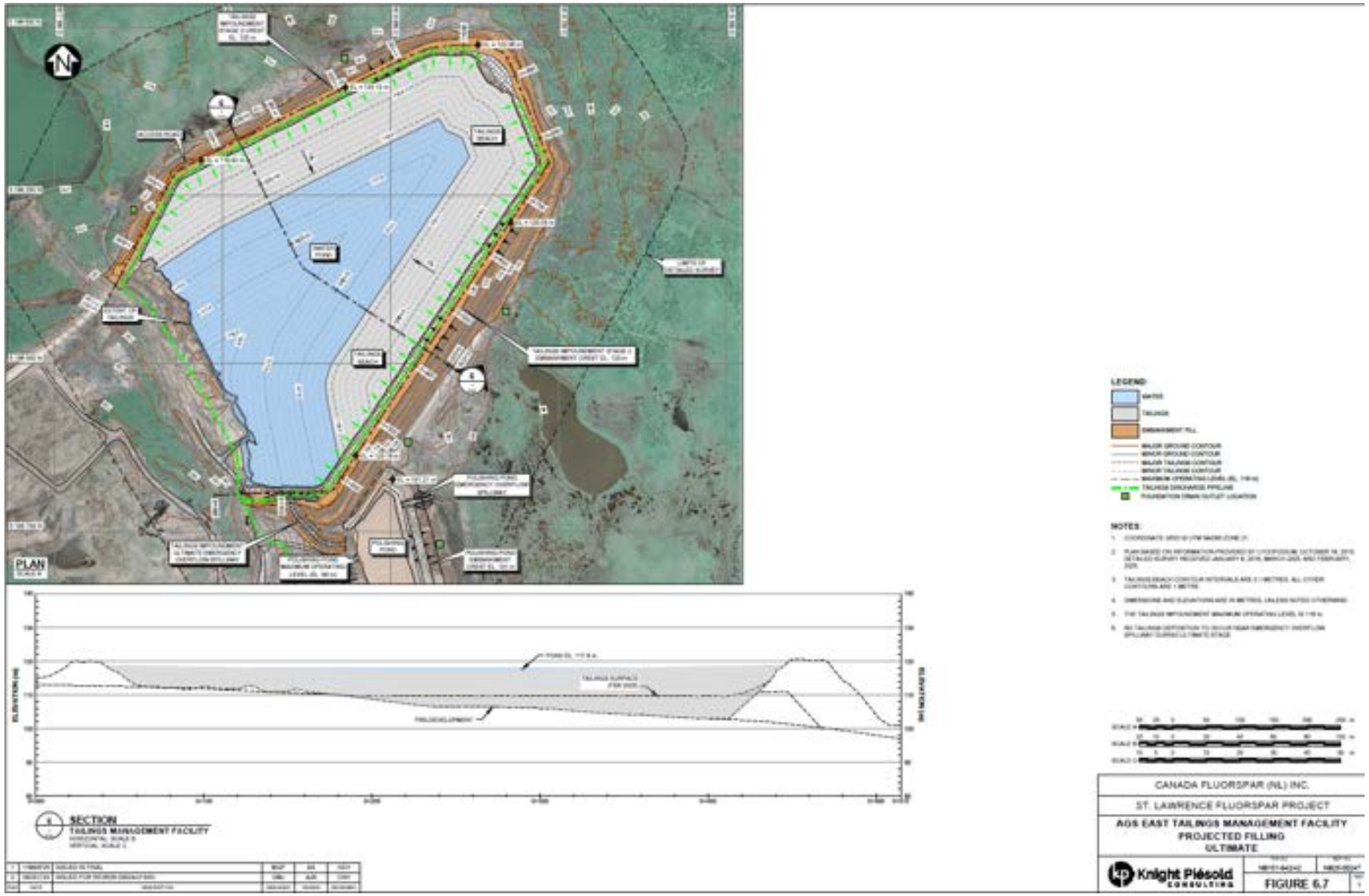



**Figure 8-4: TMF Projected Filling – End of Filling (In Appendix M)**

### 8.4.2 Operations and Monitoring

A generalized summary of the tailings and water management strategy for the AGS East TMF is provided below:

- Tailings slurry is delivered to the Tailings Impoundment via an HDPE pipeline that is installed along the embankment crest on the north, east, and south sides of the impoundment.
- Tailings are deposited sub-aerially from spigots located around the perimeter of the Tailings Impoundment. To the maximum extent possible, a dry tailings beach is maintained around the perimeter of the facility to aid in the consolidation of the tailings.
- An operating pond is maintained in the Tailings Impoundment to allow for clarification of the process water prior to its transfer to the Polishing Pond.
- A pump and pipeline system is used to control water levels in the Tailings Impoundment by transferring excess water to the Polishing Pond.
- Excess water from the Polishing Pond and Tailings Impoundment is directed to the MSEP for final flocculation, clarification and discharge to the environment.
- Water within the Polishing Pond is tested and treated, if required, prior to discharge. A pump and pipeline system is used to transfer water from the Polishing Pond to either the mill or directly to the Salt Cove Watershed (upstream of the real time monitoring location installed downstream from the Tailings Impoundment.).
- Seepage from the Tailings Impoundment and Polishing Pond is collected by toe and foundation drains installed beneath the embankments. Currently water from these drains is recirculated back into the Tailings Impoundment and Polishing Pond to minimize the release of TSS to the environment. With the formation of the tailings beach, it is expected that TSS within the seepage water will decrease to acceptable levels, allowing discharge immediately downstream of the embankments.
- Water quality will continue to be monitored at a location downstream of the drain outlets to ensure compliance with water quality objectives as outlined in the

Environmental Effects Monitoring Plan (CFI, 2017) and the project's CoA. Seepage pump-back systems will continue to be operated if unexpected problems arise with the water quality downstream of the embankments.

### 8.4.3 Effluent Discharge and Treatment

Discharges of mine effluents into water bodies are controlled by Newfoundland and Labrador Regulation 23/09 under the Water Resources Act (O.C. 2009-091). Schedule A of this regulation, referred to as the Environmental Control Water and Sewage Regulations (Government of Newfoundland and Labrador, 2003) lists the various parameters and associated limits that must be met when discharging to the environment. These discharge limits are also outlined in CFI's Certificate of Approval (CoA; No. AA22-085691).

Effluent from the TMF is treated for TSS and discharged to the environment via the outlet of the MSEP in accordance with the aforementioned regulations and approvals, after solids (TSS) have been allowed to settle out. The Polishing Pond and MSEP are designed to settle out suspended sediments to the greatest extent practical without the use of flocculants; however, settling aids (e.g., flocculants) are utilized as necessary to meet CoA effluent discharge limits. Water will continue to be managed in accordance with the WMP and monitored as per the EEMP.

## 8.5 TMF Closure

### 8.5.1 Tailings Management Facility

The closure objectives for the TMF are as follows:

- Ensure long-term physically stability to protect public safety and reduce erosion and downstream sedimentation
- Ensure long-term chemical stability of the tailings
- Create a final landform that is compatible with the surrounding landscape and consistent with the agreed upon sustainable post-closure land use

- Acid generation and metal leaching for the tailings is not expected. On-going studies and monitoring of the NP/AP values and metal leaching potential of the tailings will verify the current interpretation

The TMF closure strategy (Figure 8.5) comprises the following elements:

- The surface of the tailings will be sloped towards the southeast in the direction of the closure spillway
- The slope will be a minimum of 0.5%
- The TMF embankment will be breached at closure to allow for surface water to freely drain from the facility. This breach / closure spillway will be designed to be stable in the long-term
- Drainage across the Tailings Impoundment area will be maintained using channels that will be lined and armored with rip-rap. The surface drainage will be directed to the breached area (closure spillway) of the TMF. The channels will promote drainage and reduce erosion of the covered tailings
- Re-vegetation of the covered TMF will be accomplished using native species

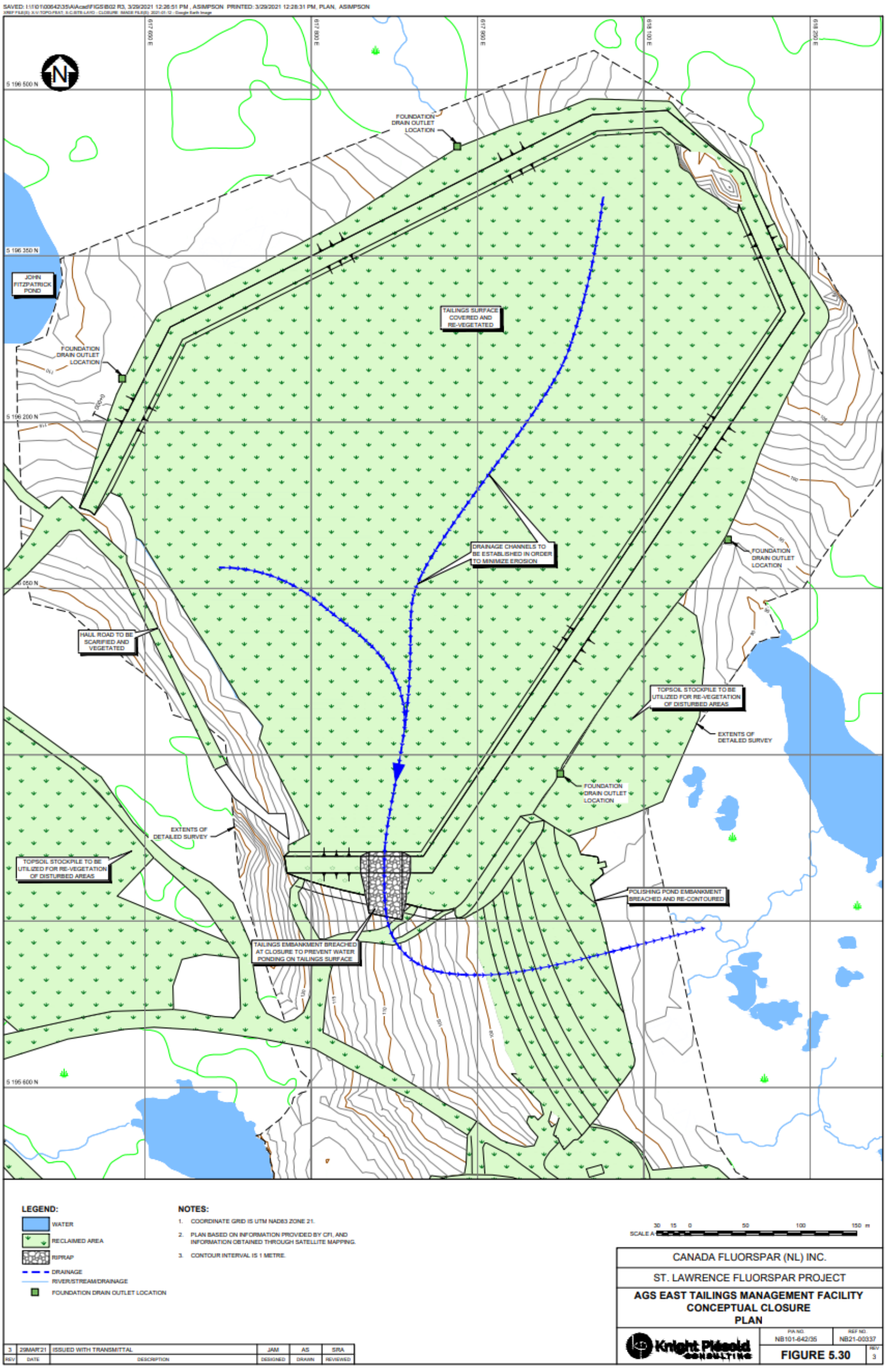



**Figure 8-5: AGS East Tailings Management Facility Conceptual Closure Plan**

### 8.5.2 Polishing Pond

The polishing pond will be rehabilitated following the closure of the TMF. Upon closure the Polishing Pond will be dewatered. Testing will be completed to ensure the water is suitable for discharge to the natural environment. The underlying sediments will be characterized to ensure they are chemically stable and meet land use objectives.

Operational monitoring of sediment quality will inform subsequent closure plans. Sediments exceeding the established sediment quality objectives will be excavated and disposed of within a licenced off-site facility.

The geomembrane liner will be removed and disposed of in a permitted landfill. The polishing pond embankments and spillway will be regraded to match the surrounding topography and to reinstate the natural drainage patterns. The area will then be revegetated.

# 9 Water and Waste Management

The potential environmental issues and mitigation measures associated with the construction, operation, and closure of the project have and will be addressed within the EPP (CFI, 2016b). In addition to the EPP, the following plans have been developed to mitigate potential environmental impacts related to the construction, operation, and closure of the Project:

- Mine Development Plan (MDP; KP, 2016; KP, 2021)
- Mine Rehabilitation and Closure Plan (MRCP; KP, 2016a; KP, 2021)
- Construction/Operation Phase Environmental Effects Monitoring Plan (EEMP; CFI, 2020)
- Construction/Operation Phase Environmental Protection Plan (EPP; CFI, 2020)
- Waste Management Plan (CFI, 2019)
- Water Management Plan (KP, 2016e)
- Avifauna Management Plan (AMEC, 2016a)
- Contingency/Spill Response Plan (CFI, 2019)

Each of these plans are living documents that will be reviewed, at a minimum, annually and updated as required. The plans will also be updated prior to initiating closure phase activities.

## 9.1 Water Management Infrastructure

CFI will continue to monitor and report all water uses, withdrawals and/or removals from any water source for any related purpose.

Knight Piésold Ltd. (KP) completed a site wide water management plan and water balance for the Project. The site wide water management strategy for the Project is focused on achieving the following objectives:

- Ensure all discharge from the project complies with the site water quality objectives (Schedule A and the Certificate of Approval) (Government of Newfoundland and Labrador, 2003 and 2016),
- Provide sufficient water to support milling operations,
- Minimize impacts on the surrounding watersheds,
- Provide flexibility and allow for future adaptation to actual conditions.

In general, all non-contact water (runoff from clean overburden, undisturbed areas, revegetated areas) is diverted away from the Project work areas to the maximum practical extent (Figure 9.4). Potentially impacted water (from the tailings and process, Open pit workings, waste rock facility, Mill Site, and ore stockpiles) is collected, monitored, and released to the environment once it is demonstrated the water meets the water quality objectives (Certificate of Approval, DOEC, 2016).

The primary concern related to the mine site water management at this project is sediment loading. Schedule A requires that discharge be limited to 30 mg/L TSS. As a result, water management at the St. Lawrence Fluorspar Project includes the use of flocculant and geo bags to reduce TSS released to the environment. All contact runoff from significantly disturbed project areas is routed through ponds or basins that allow for flocculant and geo bag treatment prior to discharge to the environment.

These basins and ponds include the Tailings Impoundment, the Polishing Pond, the Mill Site Event Pond, and Sediment Basin SB-05. The TMF (including the Tailings Impoundment and the Polishing Pond) is described in detail in Appendix M, and the Mill Site Event Pond is described in detail in Appendix N.

The water balance for each of the areas are illustrated on Figures 9.1, 9.2 and 9.3 as updated in 2021. The full water balance along with plant mass balance is currently under review.

Future water treatment plant is discussed in Section 7.

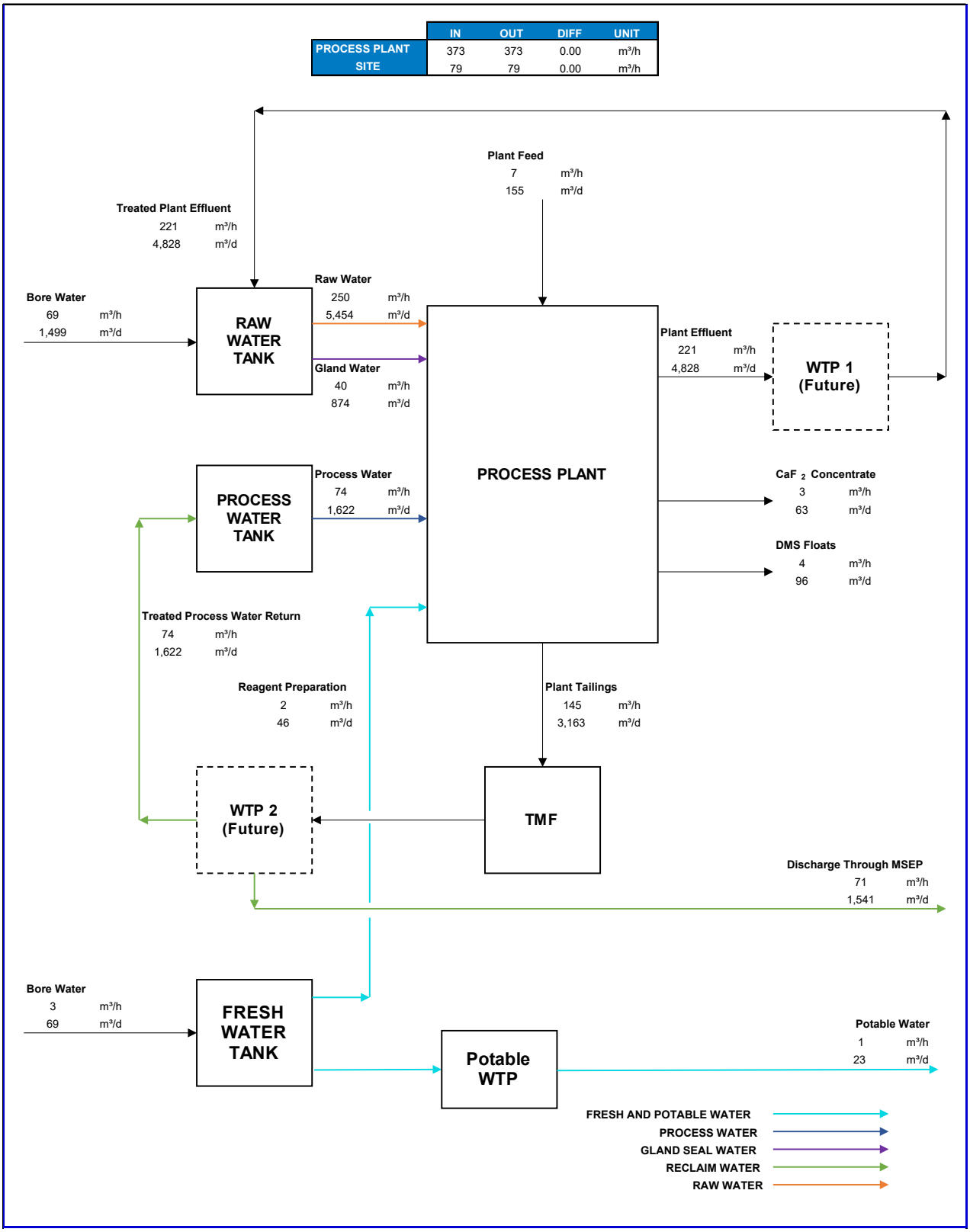



**Figure 9-1: Mill Water Balance**

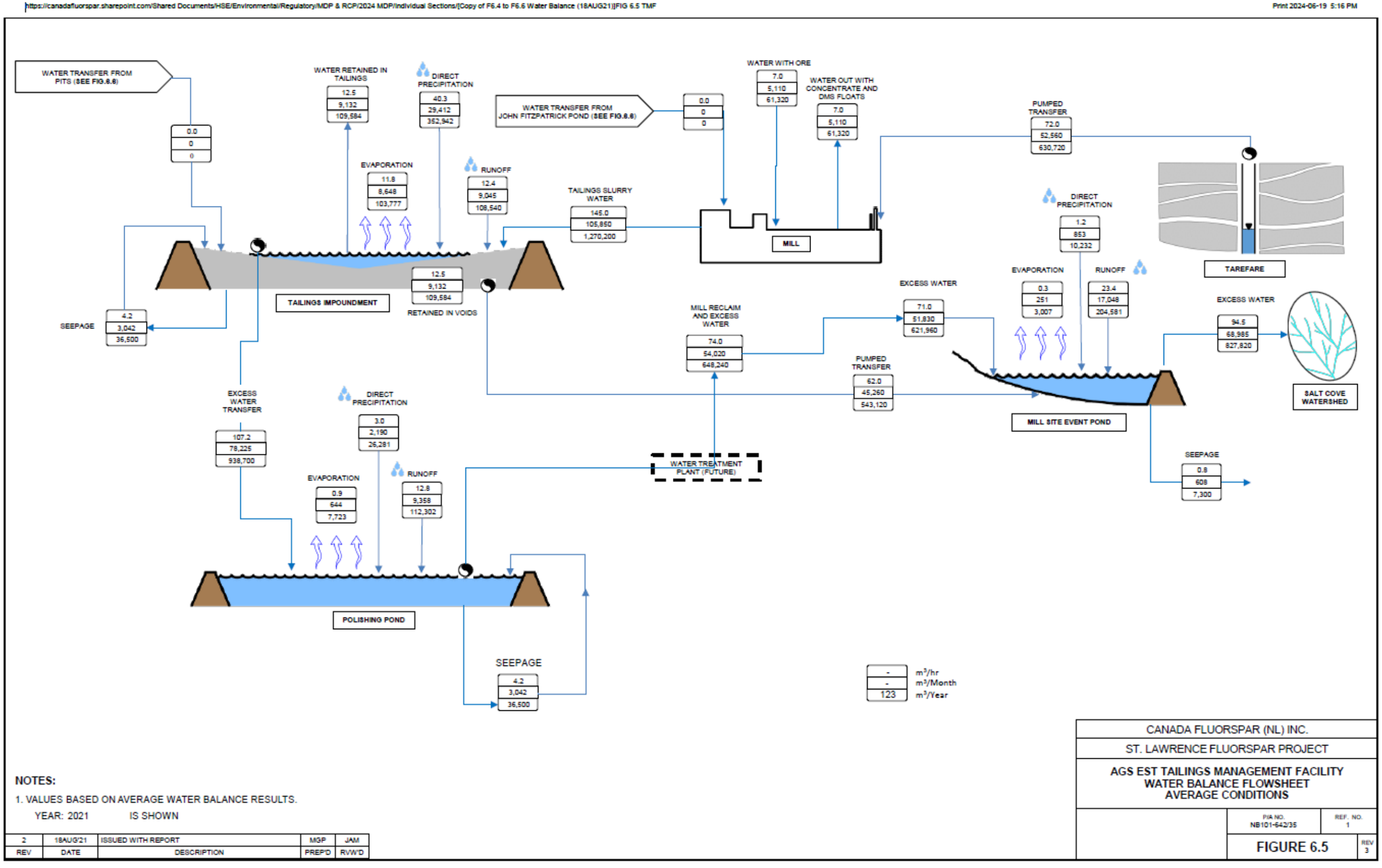



**Figure 9-2: Water Balance Flowsheet – Average Conditions**

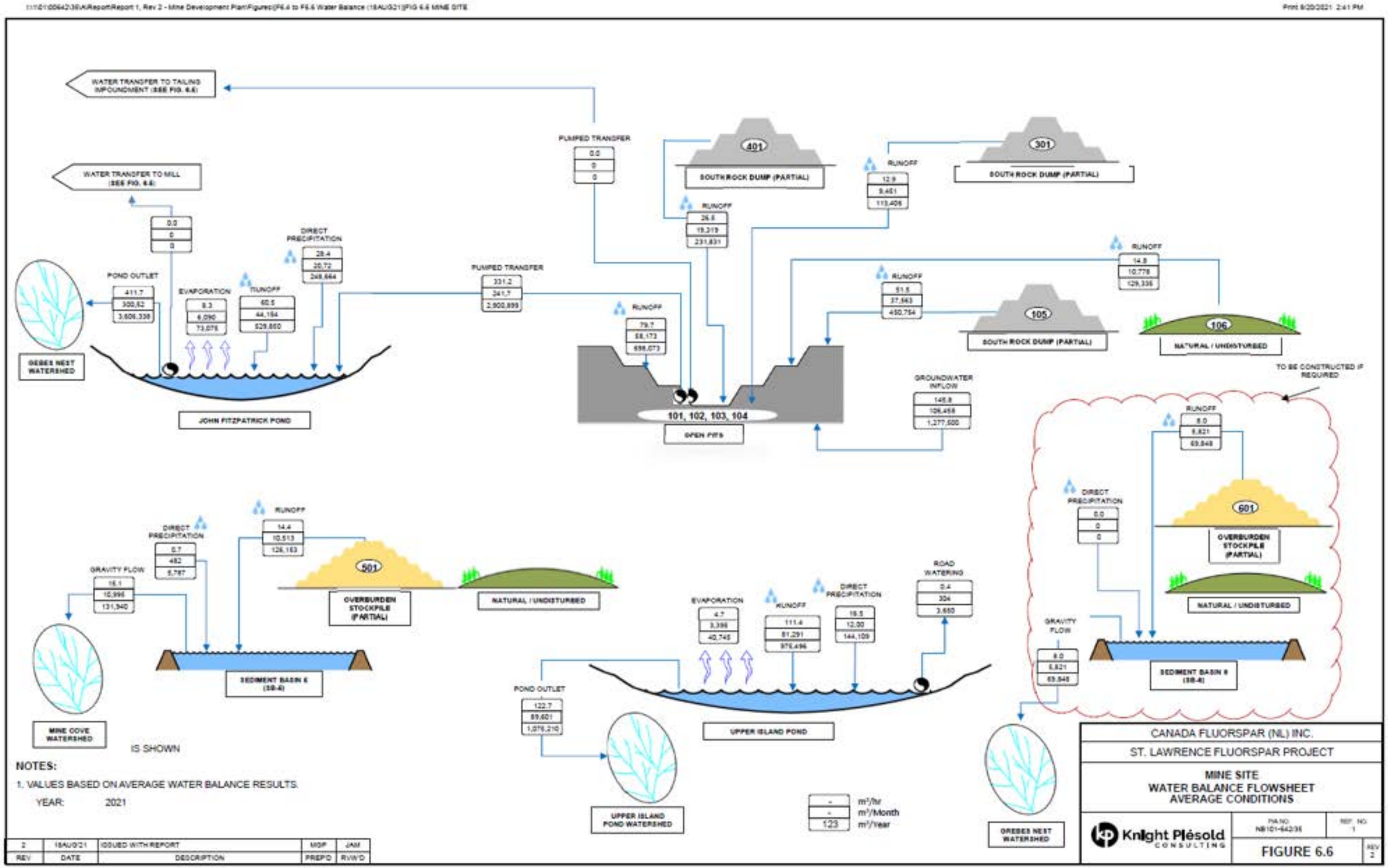



**Figure 9-3: Mine Site Water Balance Flowsheet - Average Conditions**

## 9.2 Surface Plan

The surface plan is shown on the site wide water management plan illustrated on Figure 9.4.

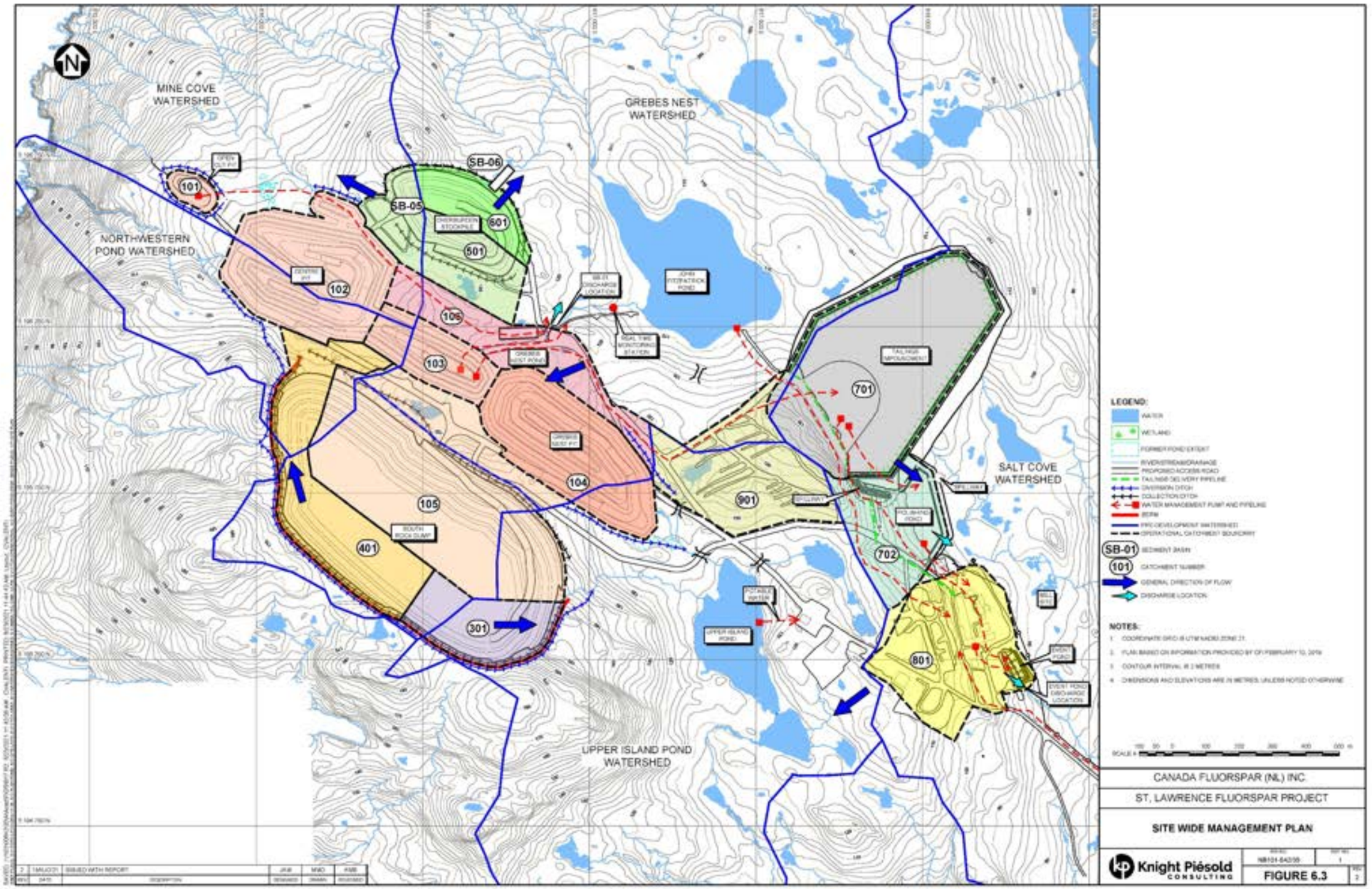



**Figure 9-4: Site Wide Water Management Plan**

## 9.3 Waste Management

CFI is committed to taking all necessary steps to ensure the collection, storage, transportation, and disposal of all wastes generated by the Project will be conducted in a safe, efficient, and environmentally compliant manner. The waste management plan establishes consistent and efficient roles and responsibilities to be undertaken by various site personnel and site contractors.

The fundamental basis of the plan is the practical and positive management of wastes by implementation of a sound waste minimization program. The ideals of the three Rs (reduction, recovery/reuse and recycling of wastes) are fundamental parts of the Waste Management Plan. The main objectives of the plan are the creation of a framework for the proper handling and disposal of wastes, minimization of potentially adverse impacts on the environment, and to comply with the regulatory requirements for waste management.

The objectives of the Waste Management Plan are:

- Identify potential waste generation sources
- Classify generated waste
- Providing guidelines for proper:
- Segregation and temporary storage of the waste
- Collection and transport for final disposal
- Tracking and reporting
- Minimize waste through a commitment to “Reduce, Reuse and Recycle”
- Prevent and reduce adverse impacts on the environment, including wildlife and fish habitat
- Protect the health and safety of site personnel

Wastes generated during the operation and closure of the Project is/will be temporarily placed in suitable refuse containers located within a designated waste management area. Wastes generated at the project site will be collected, segregated, labeled, and temporarily stored until

transported for reuse, recycling, or disposal. A licensed waste contractor will be selected for liquid waste disposal services, hazardous waste removal, and non-hazardous waste removal. Waste is picked up by a licenced contractor and disposed of at a proper facility that is permitted to receive the waste type. Figure 9.5 shows the spatial location of temporary waste storage areas.

The Waste Management Plan addresses management of solid and liquid wastes, hazardous and non-hazardous wastes generated by the workers. Materials are considered waste when it can no longer be used for its original intended purpose. Waste generated during execution of the work site will be categorized as follows:

- Office/lunchroom waste
- Metals
- C&D waste
- Waste lumber
- Conveyor belts and tires
- Vehicles, equipment and machinery
- Sewage and human waste
- Hazardous and special waste

Waste may be temporarily stored in laydown areas, located in convenient areas in proximity to the area/activities from which the waste is being produced. These laydown areas will have transportable containers such as roll off bins for storage of the various waste streams. Waste streams will be segregated and labelled for the waste type. The laydown areas will have sufficient space for safe transport.

Hazardous waste will be stored in designated areas or storage facilities that are appropriately designed for the materials stored. The hazardous waste storage area (HWSA) will have secondary containment and be collected in appropriate leak proof containers until they are removed from site on an as needed basis by a licensed facility for disposal.

Laydown areas will be located throughout the site for placement of waste, until such a time that it can be transported to the appropriate facility for final disposal. All waste streams shall be properly segregated in their designated labelled bins.

Waste Transfer Areas are centralized facilities where waste is unloaded from several collection vehicles into appropriate containers. There is an established waste management area on the East side of the Mill where segregation bins are labelled with signage for proper waste segregation and disposal of waste such as general domestic waste, hazardous waste, metal, and waste lumber.

Waste management inspections are conducted on a regular basis to ensure compliance with the waste management plan.

It is intended that all waste will be removed from the facility and properly disposed of in a safe and environmentally acceptable format and in accordance with the requirements of applicable regulatory agencies and authorities.

The generated waste stored at the work site shall at regular intervals be transported to locations for final treatment and disposal by a dedicated waste transport collector, who will hold all required licenses, including but not limited to licensing for collection, handling, transport, treatment, and final disposal.

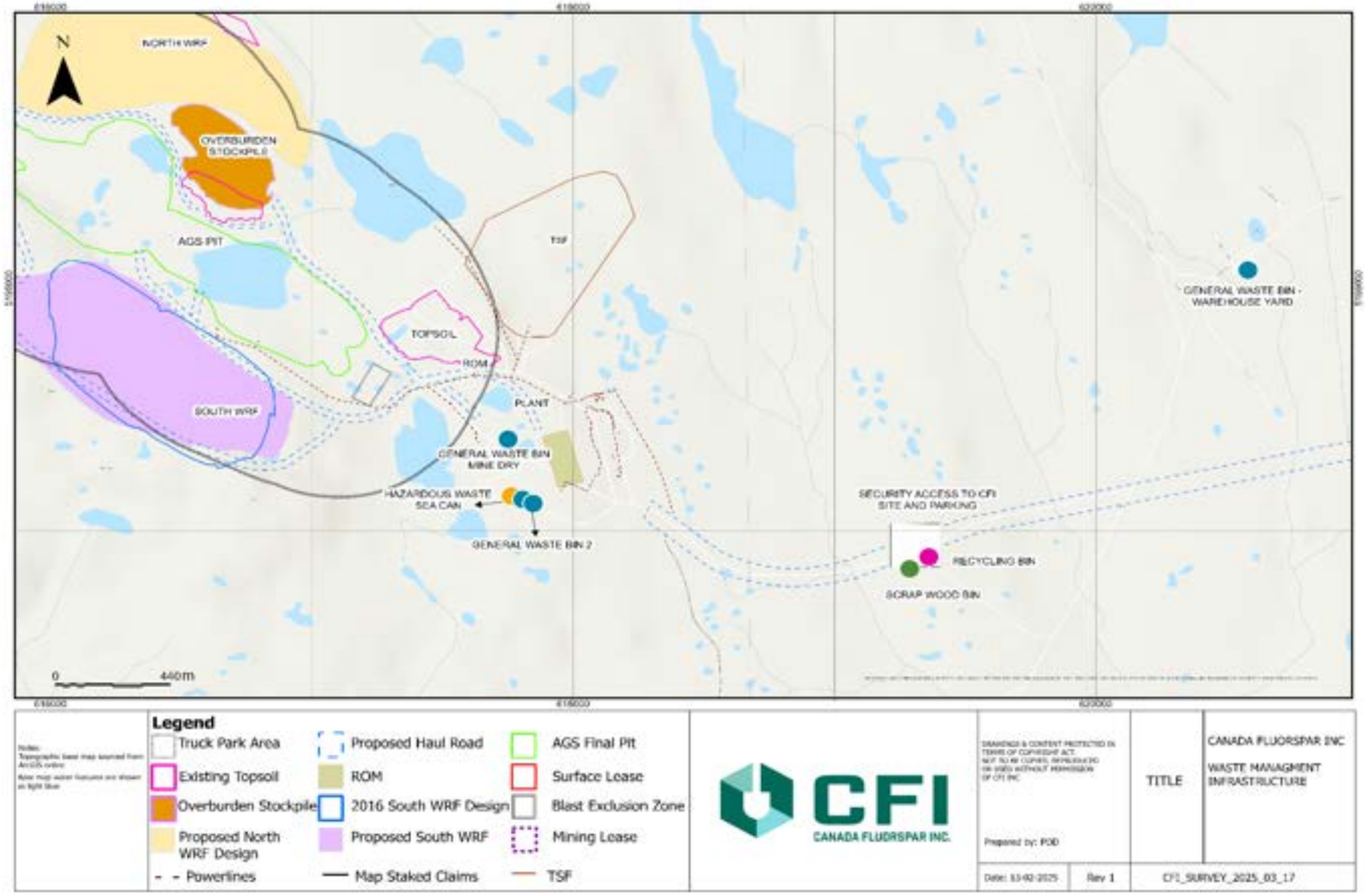



**Figure 9-5: Location of Waste Storage Areas on Site**

# 10 Site Infrastructure

The following section provides a detailed description of the Project infrastructure not discussed in detail above (e.g., TMF, open pits, waste rock facilities, overburden and topsoil stockpiles). Overall site general arrangements are displayed on Figures 2.3 to 2.6.

## 10.1 Building Descriptions

The following buildings are located at the AGS Mill site as shown on Figure 10.1 and in Appendix L. To the maximum extent practical CFI utilizes portable structures. The use of this style of structure minimizes the scope of works required for foundations, as well as the effort required for closure.

### 10.1.1 Workshop/Warehouse Buildings

The plant workshop with some warehouse capability is included as a bay at the North end of the Mill building. A welding bay is located on the perimeter of the workshop. Temporary parts and tools storage has been added as sea containers at the mill, as well as a reagents storage building to the east of the thickeners.

The main operation warehouse is at the former Blue Beach Dry building, which has been renovated to accommodate warehousing activities.

### 10.1.2 Main Administration Building

The administration building is located south of the main mill building area. This building complex contains offices, meeting/training room, reception area, lunchroom, change room, and washroom facilities. This is a modular building founded on wooden cribbing above precast concrete footings. Allowance for future expansion has been made for the addition of a modular office building.

### 10.1.3 Mill Dry Building

The mill dry administration building is located northeast of the mill building area. This building contains offices, meeting/training room, lunchroom, change room, and washroom facilities. This is a modular building founded on wooden cribbing above precast concrete footings.

### 10.1.4 Mine Dry and Mine Administration Building

The mine dry and administration building is located west of the Maintenance shop. This modular building complex contains offices, meeting room, reception area, lunchroom, and dry/washroom facilities for men and women.

### 10.1.5 Security Buildings

The security buildings consist of a staffed gatehouse and a modular unit located 1.2 km east of the Administration Building. The modular unit houses an office and a search area.

### 10.1.6 Laboratories

An assay laboratory has been constructed at the AGS mill site immediately north of the Mill building. The lab includes the metallurgical and analytical laboratories, as well as a preparation laboratory.

### 10.1.7 Maintenance shop

A steel building was constructed to the east side of the Mine Dry. It houses heavy vehicle maintenance bays, mobile equipment bay, drill rebuild bay, and repair bays.

### 10.1.8 Concentrate and Reagent Storage

Concentrate and Reagent storage buildings are located on the southeast site of the mill building.

### 10.1.9 Crushed Ore Enclosure

A steel frame dome ore enclosure approximately 36 m in diameter and 14 m tall is constructed at the outlet end of the main crusher conveyor.

**Figure 10-1:Site Infrastructure Layout**

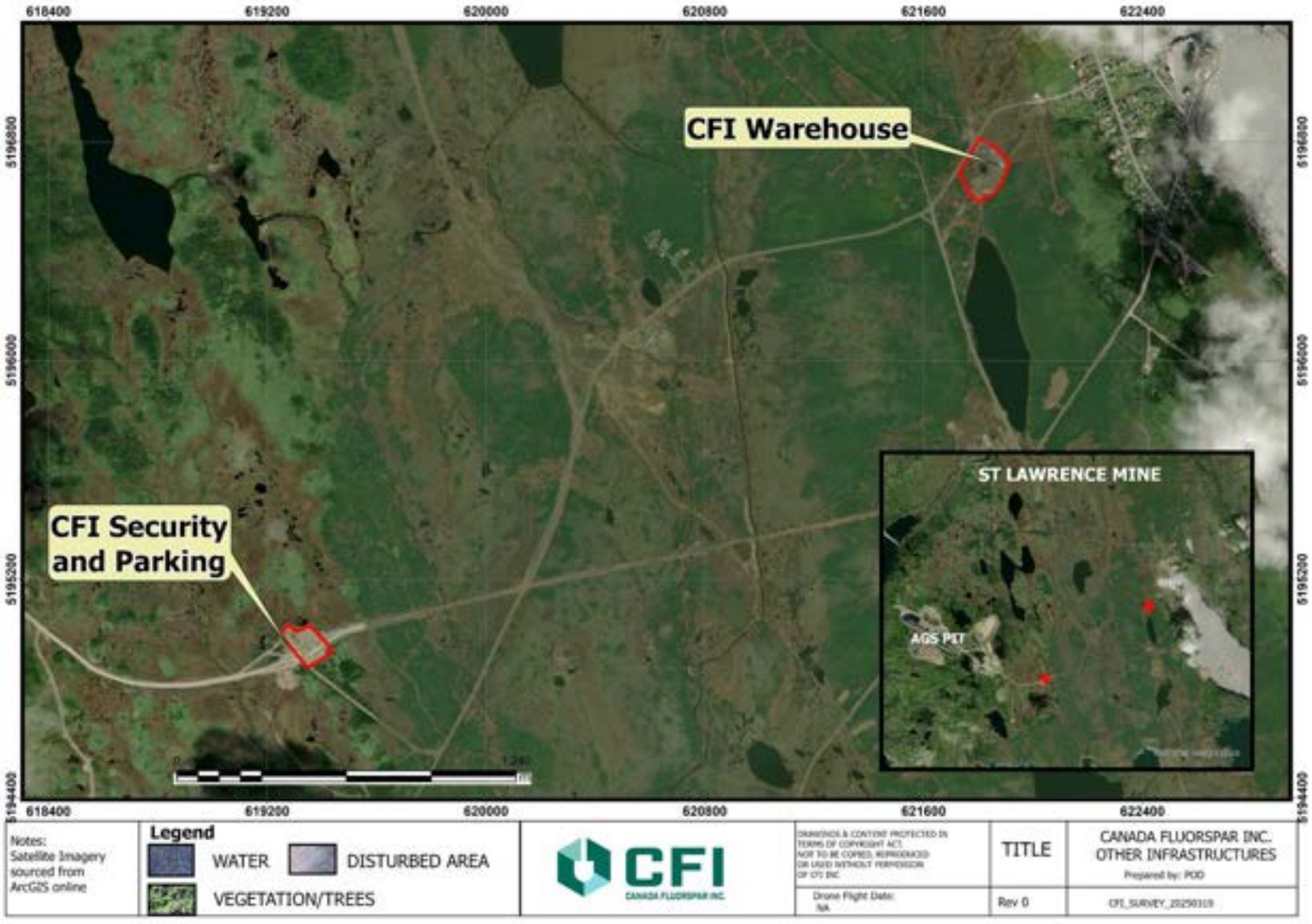



**Figure 10-2: Security and Warehouse infrastructure**

## 10.2 Utilities

The following is a summary of the utilities that are developed:

- **Raw Water Intake/Raw Water Supply:** The majority of process water will be recycled from the AGS East TMF Polishing Pond. Raw water for mineral processing, as well as potable, and gland water is drawn from the Tarefare Shaft (Tarefare Water Intake) or John Fitzpatrick Pond using a Pentair submissible turbine pump with an 8 inch pipeline. Water, both for industrial and office use, is drawn from nearby ponds and Tarefare Shaft.
- **Fuel Storage Facility**: The fuel storage facility (diesel and gasoline) is located adjacent to the maintenance shop in the mine services area. Delivery trucks are connected via flexible hoses to the unloading pumps. The fuel is transferred to bulk fuel storage tanks within a containment bund. The distribution pumps transfer the fuel to the mine truck refuelling slab. The refuelling station is fitted with containment slabs, kerbs, and bunds. Fire protection is provided by the site's fire protection system.
- **Fire Water**: A firewater tank is located next to the process water tank where the fire pumps will withdraw water for the system. There are two pumps, namely: primary diesel pump and jockey pump. The header system provides firewater solely to the mill. The concentrate storage area of the mill is a dry system, whereby upon triggering the system will flood with water via diesel driven pump. The remainder of the mill is supplied by a wet system continuously charged via Jockey Pump. When a drop in pressure is notices, the Diesel Driven pump provides high pressure / flow water to hose cabinets and outside hose connections.
- **Sewage and Septic**: Sewage and non-process wastewater from the mill and ancillary buildings is collected and transferred to a sewage treatment plant located adjacent to the administration building. An additional septic field was constructed to manage sewage from the Mine Dry / Mine office as well as the Maintenance shop.
- **Power Supply**: Plant incoming 12.5 kV is stepped down to 4.16 kV at the plant outdoor substation via plant main 12.5 / 4.16 kV transformer.

The Newfoundland Power Authority (NPA) provided CFI with a 12.5 kV power supply to the process plant. Power is obtained from the existing grid via NPA's substation located north of the Town of St Lawrence. The incoming 12.5 kV supply is stepped down to 4.16 kV at the process plant substation via the process plant's main 12.5 kV / 4.16 kV transformer.

The 4.16 kV supply is distributed by the process plant's 4.16 kV switchgear and is stepped down to 600 V supply via 4.16 kV / 600 V distribution transformers. A prefabricated electrical room adjacent to the process plant area houses two low voltage motor control centers (MCCs). The crushing plant has its own 4.16 kV / 600 V transformer, prefabricated electrical room, and MCC. Power supply to the TMF pumps, raw water transfer pump, mine dewatering pumps, and settling ponds is supplied via 4.16 kV overhead lines and pole-mounted transformers. Indoor and outdoor distribution boards are allowed for process plant lighting, small power distribution, and uninterrupted power supply (UPS) power distribution.

Emergency power is provided on the site by means of a standby diesel generator to a limited key number of items. Critical process loads, one-third of the lighting, and a portion of the heating are on emergency power. Emergency power is generated at 600 VAC and is directly connected to the MCCs via an emergency power distribution board. Transfer from normal power to emergency power is manual with the loss of normal power at the MCC's incoming supply.

The process plant's main 12.5 kV / 4.16 kV, 6.5 MVA transformer is an oil natural air natural (ONAN), free-breathing type of transformer with on-line tap changer. The 4.16 kV / 600 V, 2 MVA distribution transformers are an ONAN, sealed type with de-energized tap changer. Fencing was constructed around the process plant transformers.

The low voltage MCCs are arc resistant, front access, with back-to-back arrangement and housed in the prefabricated electrical rooms. The MCCs have Type 2 protection coordination. Starters and incoming circuit breakers in MCCs are of withdrawable design, complete with protection. All motor starters are equipped with intelligent protection relays with Ethernet / IP communication. The low voltage MCCs supply power to low voltage motors, low voltage variable speed drives, and low voltage distribution boards.

### 10.2.1 Water Management Infrastructure

As discussed in Section 9, water is managed in accordance with the WMP. The WMP will be revised, as required, throughout the mine life to account for changes in the Project design and site-specific considerations. During the construction and operation phases, the water management focuses on surface and groundwater flows into the open pits, water removed from the underground mine, storm water runoff, and water required for mineral processing and mining, as well as satisfying CFI's environmental commitments. Water management during operations is undertaken utilizing the following:

- Clean water diversion channels
- Erosion control measures
- Interceptor ditches to collect contact water from the South WRF and Mill site
- Mine sumps and pumping systems
- Sediment control measures including sediment basins, which was designed to settle suspended solids without the use of flocculants, to the greatest extent practical.

### 10.2.2 Main Access Road / Town Bypass Road

Access to the site from St. Lawrence is provided by an existing narrow paved road (Director Drive approximately 3.5 km long) followed by a hard-packed gravel road (Figure 1.2). The site access has been upgraded with a 5.6 km gravel Town Bypass Road which connects the project to Highway 220, as well as by upgrading existing roads. Maintenance of the road will be required throughout the mine life

### 10.2.3 Powerline

Newfoundland Power has provided CFI with a 12.5 kV power supply to the AGS Mill following the general alignment illustrated on Figure 1.2. The power is obtained from the existing grid via Newfoundland Power Authority's substation located to the north of the Town of St Lawrence.

### 10.2.4 Ship loading Equipment

The loading of bulk carriers between 15000-45,000 WMT at BBMT is executed using a McCloskey SDX Telescopic Stacker 150 mobile ship loader conveyor, as shown on Figure 10.3. Loading is completed directly from the haul trucks onto the ship loader, thus eliminating the need for stockpiles.

CFI is in the process of evaluating the feasibility of installing a fixed ship loading conveyor and material handling equipment to support aggregate operations as part of the BBMT expansion/upgrade project.

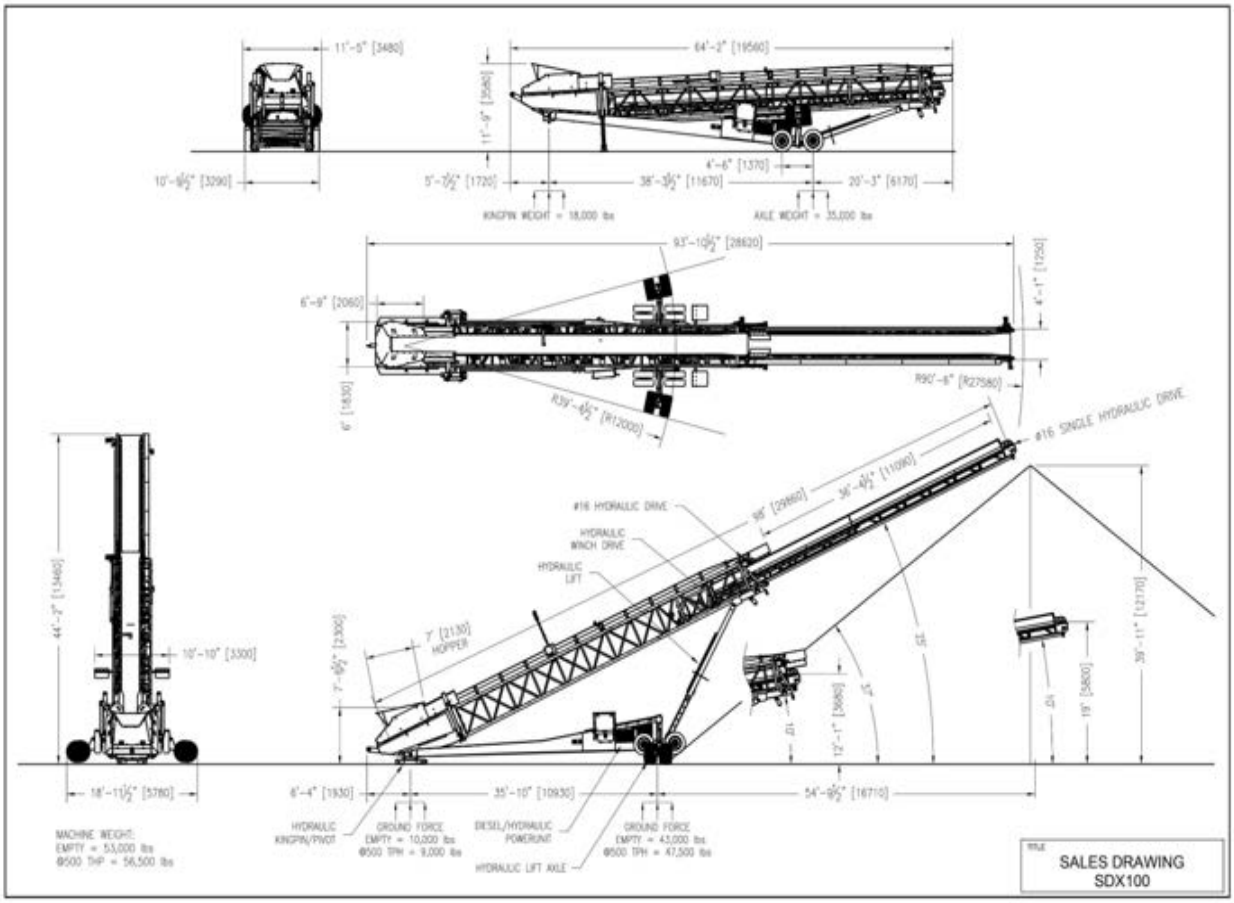



**Figure 10-3: McCloskey SDX Telescopic Stacker 150 Mobile Ship Loader**

***Blue Beach Marine Terminal***

The BBMT located east of the project includes the current infrastructure as shown on Figure 10.4. CFI is currently engineering upgrades and expansion to the BBMT, which is expected to be operational by the end of 2025.

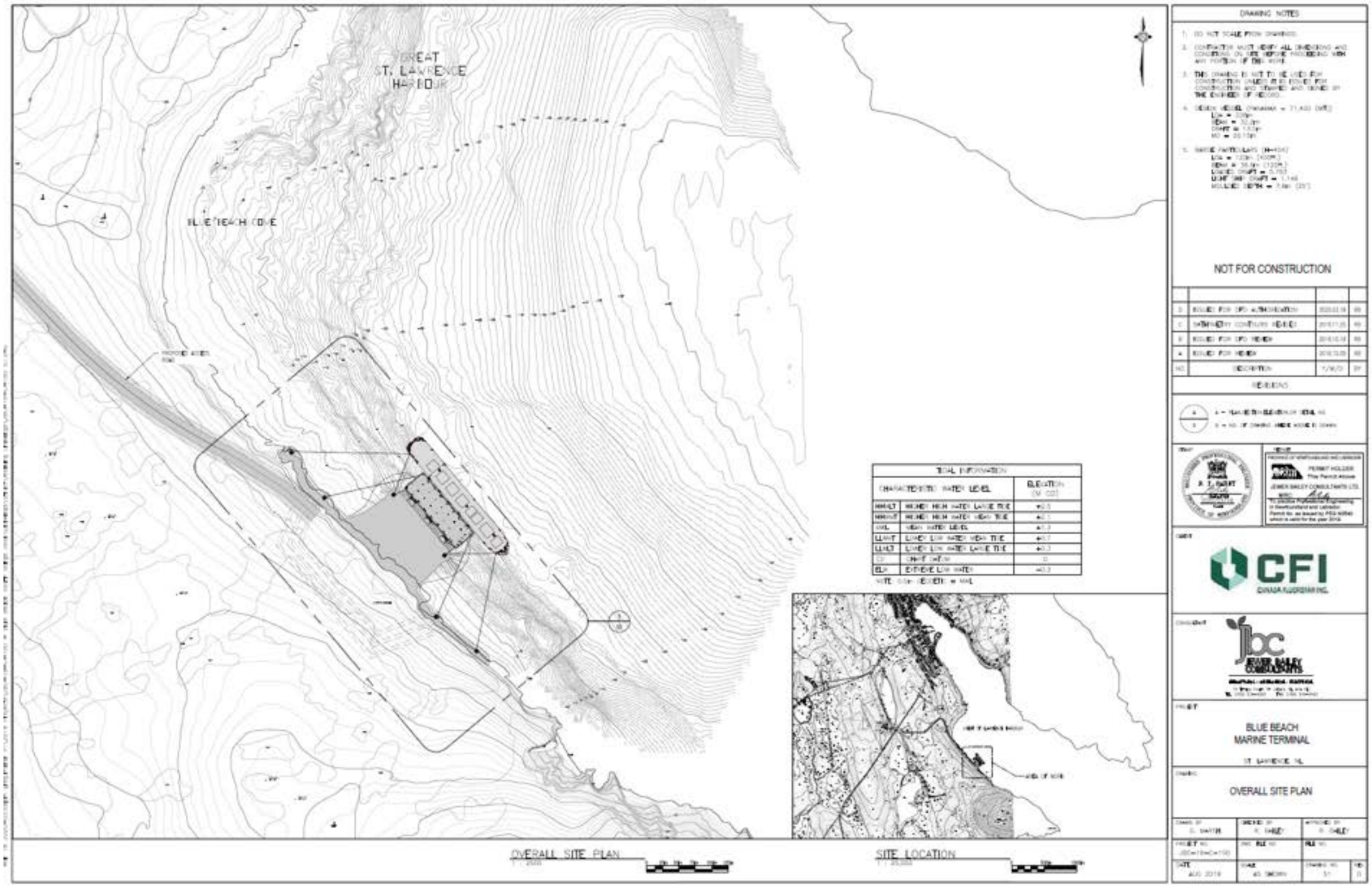



**Figure 10-4: Blue Beach Marine Terminal**

## 10.3 Building Information

A list of buildings and information such as size, type, and dimensions for site infrastructure is included in Table 10.1.

**Table 10-1: List of Buildings**

| Building | Building Type | Description of Building Use | Building Dimensions/Size | | | Floor Slab Dimensions | | | Design Contractor | Drawing/Package Number | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length (FT-Inches) | Width (FT-Inches) | Height (FT-Inches) | Length (FT-Inches) | Width (FT-Inches) | Thickness (FT-Inches) | | | |
| Admin Building | Pre-Fab Site Trailer | Main offices for G&A staff including board room, lunch room and washroom facilities | 84' 0" | 60' 0" | 9' 0" | N/A | N/A | N/A | Williams Scotsman | 11-17246-52 | |
| Mill Dry Building | Pre-Fab Site Trailer | Main offices for maintenance, engineering & mill staff including locker rooms, board room, lunch room, and washroom facilities | 60' 0" | 60' 0" | 9' 0" | N/A | N/A | N/A | Modspace | 2018-11 | |
| | | | | | | | | | EAL | 6866 | |
| Maintenance Shop & Wash Bay | Pre-fab Steel Structure | Used as a mobile equipment maintenance shop and wash area | 100 ' 0" | 120' 0" | 34' 0" | 100 ' 0" | 120' 0" | 1 ' 0" | CIMA+ | C50-00044 | |
| | | | | | | | | | Olympia Steel Buildings | 20974 | |
| Warehouse | Pre-fab Steel Structure | This building is used as a warehouse facility included offices, lunch room, and washroom facilities. | 100' 0" | 40' 0" | | 100' 0" | 40' 0" | 1 ' 0" | Do not have drawings | | Slab thickness is assumed |
| Mine Dry Building | Pre-Fab Site Trailer | Offices that will be utilized by the Mining Contractor including board room, lunch room and washroom facilities | 84' 0" | 60' 0" | 9' 0" | N/A | N/A | N/A | ModSpace | 2018-11 | |
| Security Shack | Standard wooden building | This building is at the main entrance of the site and is securities station. | 10' 0" | 8' 0" | 9' 0" | N/A | N/A | N/A | Do not have drawings | | |
| Site Parking Lot Entrance Building | Modified Construction Trailer | This building is next to the parking lot and used as an entry point for staff. | 55' 0" | 8' 0" | 9' 0" | N/A | N/A | N/A | Do not have drawings | | |
| Reagents Building | Pre-Engineered | Building used for reagents storage and will not be occupied. | 96' 0" | 70' 0" | 26' 0" | 96' 0" | 70' 0" | 1' 0" | EAL<br>Maderra Engineering | 6987<br>CFI008-ST-LY-002-01 REV F0 | |
| Con Storage Building | Steel-Fabric Structure | This building is used as a concentrate storage dome and will not be occupied. | 204' 0" | 60' 0" | 35' 4" | 204' 6" | 60' 0" | 1' 0" | MegaDome | 378584 | |
| Con Storage #2 Building | Steel-Fabric Structure | This building was originally permitted to be used as a concentrate storage dome but it has not been completed. | 112' 0" | 98' 6" | 46' 6" | N/A | N/A | N/A | MegaDome | GD-ARCHE-208328 | This building does not have a concrete slab. It was constructed with a concrete knee wall but no floor slab. |
| Clarkes Pond Office Trailer | Pre-Fab Site Trailer | Used as an office for the staff at Clarkes Pond. | 60' 0" | 12' 0" | 9' 0" | N/A | N/A | N/A | Do not have drawings | | |
| Cold Storage Building | Steel Structure | Used for storing core. | 40' 0" | 40' 0" | 20' 0" | 40' 0" | 40' 0" | 1' 0" | Do not have drawings | | Slab thickness is assumed |
| Core Logging Building | Steel Structure | Used for logging and cutting core. | 52' 0" | 27' 0" | 11' 0" | 52' 0" | 27' 0" | 0' 6" | FinTech Engineering Inc. / EAL | 6508 | |
| Rock Lab | | This building was used as the lab for the Minworth Mill | 34' 0" | 34' 0" | 20' 0" | 34' 0" | 34' 0" | 0' 6" | Do not have drawings | | Slab thickness is assumed |
| Minworth Mill | Steel Structure | Old De-Commissioned Mill | 160' 0" | 74' 0" | | 160' 0" | 74' 0" | | Do not have drawings | | |
| Mill Building | Steel structure | Processing Plant | 446' 0" | 64' 0" | 48' 0" | 446' 0" | 64' 0" | | Glen Barnes Architecture Inc.<br>CBCL Limited | 173031 | Do not have the structural/foundation drawings |
| Lab | Modified sea containers | Assay and Metallurgy lab building | 52' 0" | 28' 0" | 9' 0" | 52' 0" | 28' 0" | Slab on Grade (assuming 6") | CFI | ASSAY LAB As Built | Slab thickness is assumed |
| Crushed Ore Dome | Aluminum Geodesic Dome | This building is used as a crushed ore storage dome. | 120' 0 1/16" | N/A | 30' 6 1/2" | N/A | N/A | N/A | Tank Connection | 9852D1PRASM | This is a cylindrical tank<br>There is not floor slab and we do not have the foundation drawings |
| Crusher E-House | Modified Sea Container | This container is used as an electrical house for the crusher area. | 40' 2" | 8' 2" | 9' 7 1/4" | N/A | N/A | N/A | WEIR MINERALS | DOC0050514-41 | |
| Mill E-House | | | 68' 0" | 30' 0" | 9' 7 1/4" | N/A | N/A | N/A | Do not have drawings | | |

# 11 Mine Rehabilitation and Closure

## 11.1 Closure Plan Objectives

All major site infrastructure was constructed in a manner that considers the key closure objectives. The general objectives of the Rehabilitation and Closure Plan for the Project are:

- To restore affected landscapes to a physically and chemically stable and safe environment, in order to protect public health and safety.
- To reduce or eliminate potential adverse environmental effects associated with each phase of the Project.
- To decommission and rehabilitate the project site to a land use similar to its original use.
- To return the property to the Crown after monitoring demonstrates the specific closure objectives have been met and when no liability remains.
- To meet community expectations relating to mine rehabilitation and closure, as well as their expectations on public access to the site area. CFI engaged with community stakeholders throughout the environmental assessment process completed in 2016 and will continue to engage with community stakeholders moving forward. As a company we are committed to constructing, operating and closing the project in compliance with all applicable municipal legislation.

In order to minimize construction and rehabilitation costs topsoil and overburden soil stockpiles have been strategically located adjacent to the various infrastructure components as illustrated on Figure 6.1. Organic topsoil was salvaged from the infrastructure footprints to the greatest extent practical. The topsoil was stockpiled separately from the underlying overburden materials for later use in rehabilitation. Topsoil is stockpiled in rows to ease access for re-utilization for progressive rehabilitation of the dumps and LOM rehabilitation of the remaining infrastructure development areas. It is anticipated that all of the topsoil will be utilized during reclamation. As such, it is likely only the footprints of these facilities will need to be rehabilitated at closure. These stockpiles are maintained during operations to ensure their physical stability.

The overburden stockpiles were designed to ensure long-term physical stability. A stability analysis of the largest overburden stockpile located north of the open pit is included in Appendix I. The remaining stockpiles were constructed on similar foundations and were much shorter. It is anticipated that the majority of stockpiled overburden will be utilized during reclamation. As such, it is likely only the footprints of these facilities will need to be rehabilitated at closure. These stockpiles are maintained during operations to ensure their physical stability.

Details on planned closure methods for the TMF and Polishing Pond are discussed in Section 8. The scope of the closure plan for the other mining areas and facilities are outlined in the following sections.

### 11.1.1 AGS Open Pit

The closure objectives for the open pits are to ensure the closed-out pits are physically stable in order to protect human health and safety, as well as to ensure water discharging from the open pits meet water quality objectives and is managed in channels that will remain stable post-closure (i.e., designed and constructed to meet the water management design criteria for closure.

Boulder fencing will be installed around the highwall to prevent inadvertent post-closure access to the pit by recreational vehicles. The boulder fencing will be accompanied by appropriate signage to warn land users of the potential mine hazard.

### 11.1.2 AGS Waster Rock Dumps

The closure objectives for the South and north waste rock dump are in place to ensure that the waste dump is designed, constructed, and rehabilitated in such a way that the long-term physical stability of the slopes is maintained. The closure objectives will also ensure that the dump maintains its long-term chemical stability such that runoff and seepage quality meet the ECWSR guidelines.

There are currently no constituents of concern in the waste rock based on the Golder 2019 geochemical results and as presented in the Mine Development Plan (CFI, 2016a) As such, no specific recommendations with respect to waste rock management were provided by Golder (2019). The location of the waste dump is situated to avoid any major surface waterbodies or any

future mining expansion areas. It is also located in an area that allows for the optimization of haul distances to the dump during the life of mine (LOM).

### 11.1.3 AGS Overburden and Topsoil Dumps

The closure objective for the overburden and topsoil stockpiles is to ensure long-term physical stability to minimize erosion. Overburden and topsoil materials stripped from the Project during construction will be stockpiled at various locations around the Mine and Mill sites.

The overburden and topsoil stockpiles will be utilized for closure, with the remaining topsoil and overburden being left in a stable configuration during material excavation. As such, only the footprints of these facilities will need to be rehabilitated at closure. These stockpiles will be maintained during operations to ensure their physical stability.

Runoff water may be impacted by the sediments loosened by soil handling activities. As such, settling ponds, interception ditches, and filter fabrics will be used to avoid an influx of sediment into the surrounding watersheds. Erosion control will be achieved by the use of riprap, filter fabrics, drainage channels, and mulches installed in erosion-prone areas and removed once the areas have been stabilized.

### 11.1.4 AGS Buildings and Infrastructure

The closure objectives for decommissioning the buildings and industrial infrastructure are to:

- Maximize salvage and re-use of infrastructure and equipment
- Maximize on-site disposal of non-salvageable infrastructure and equipment
- Identify and remove hazardous materials for disposal at an approved off-site facility
- Identify and remove any physical hazards or other potential threats to public health and safety

Identify and remediate any surface and subsurface contamination that may have resulted from project operations

### 11.1.5 Blue Beach Marine Terminal

The port access road will be reclaimed by the removal and disposal of bridges, bridge abutments and culverts followed by scarifying and re-contouring the roadbed and revegetation activities such as hydro-seeding and/or replanting. A similar ownership handover arrangement regarding the Blue Beach Port Access Road has been discussed with IET and the Township of St. Lawrence and may be pursued in the future.

Rehabilitation of the port site will include the rehabilitation of the timber cribs, the onshore laydown area, demobilization of the loading barge and removal of steel mooring posts and concrete mooring bollards to grade and contouring. The rest of the infrastructure (includes the port laydown area, barge, timber cribs and bollards) at the Blue Bench Marine Terminal rehabilitation will be carried out to meet the overall closure goal and general closure plan objectives.

### 11.1.6 Water Management Facilities

The main objectives for the closure of the water management facilities are to ensure drainage patterns are returned, to the greatest extent practical, to natural predevelopment conditions, and that drainage on site and adjacent to the site is stable in the long term.

#### *11.1.6.1 Sediment Basins*

Sediment basins will be rehabilitated once the up-gradient areas have been stabilized. Several sediment ponds will be progressively rehabilitated during operations. Sediments within the basins will be characterized to ensure they are chemically stable and meet land use objectives. Operational monitoring of sediment quality will inform subsequent closure plans. Sediments exceeding the established sediment quality objectives (i.e., Canadian Environmental Quality Guidelines for Soil) will be excavated and disposed of within a licenced off-site facility. The area will be regraded to match the surrounding topography and to reinstate the natural drainage patterns. The area will then be revegetated.

#### *11.1.6.2 Diversions and Ditches*

A network of water diversion and collection ditches has been established during operations to divert clean surface water runoff and convey sediment laden water respectively. The network will be upgraded during operations based on observations made during monitoring. Diversions and ditches will be designed to safely convey the design flood.

## 11.2 Progressive Rehabilitation

Throughout operations, progressive rehabilitation will be carried out to the greatest extent practical. Progressive rehabilitation will be implemented during the operation phase with the following objectives:

- Minimize physical safety concerns
- Reduce environmental impacts, such as erosion and sedimentation (and the corresponding water management requirements)
- Reduce environmental liabilities and the corresponding amount of financial assurance required
- Provide insight for future rehabilitation activities

Based on the current Mine Development Plan there are many opportunities for progressive rehabilitation throughout the planned mine life. The following opportunities for progressive rehabilitation have been identified:

- Decommissioning and rehabilitation of construction related buildings and infrastructure, as well as areas disturbed during construction (i.e., removal of temporary buildings, rehabilitation of laydown areas, stabilization of roadways and overburden/topsoil stockpiles)
- Progressive revegetation of the Tailings Impoundment embankments
- Progressive rehabilitation of the South Dump side slopes
- Progressive rehabilitation of the open pits (e.g., construct boulder fence, construct water management structures (spillway and channel), and install signage around sections of the open pits)

- Progressive rehabilitation of inoperative water management infrastructure (e.g., sediment basin located downstream of a reclaimed waste dump)
- Complete closure research programs and technical studies

These opportunities for progressive rehabilitation are discussed in greater detail in the following sections.

### 11.2.1 Shoal Cove Pond Historic Tailings Remediation

CFI completed partial rehabilitation of Shoal Cove Pond adjacent to the former Minworth Tailings Dam, as discussed in Amec Foster Wheeler (AMEC, 2016b; Appendix A). Shoal Cove Pond contains historic tailings which were produced by previous mining operations (i.e., not CFI); however, they were not remediated prior to 2016 to the extent that potential environmental effects would be completely mitigated. As such, CFI has carried out some remediation to alleviate concerns for the environment (with the exception of a breakwater). It should be noted that responsibility and/or liability for the former tailings is not being assumed or considered and no further remediation is planned for the Shoal Cove Pond area

As discussed above, CFI has conducted some rehabilitation work to the historic tailings that were deposited in Shoal Cove Pond and the adjacent Minworth Tailings Dam. This rehabilitation work was done to improve the level of rehabilitation that was conducted in the past to mitigate any remaining environmental effects. This work involved the following:

- Construction of two fish barriers (one at the inlet and one at the outlet of Shoal Cove Pond)
- Removing all existing fish (brook trout and American Eel)
- Hydroseeding/revegetating portions of the Minworth tailings dam
- Settling basin remediation

The construction of the fish barriers as well as the hydroseeding/revegetation and settling basin remediation was approved by IET and DFO. Fish barrier construction is completed. Progressive rehabilitation activities will continue to be reported as part of the annual operational reporting requirements.

### 11.2.2 Open pits

The open pits will be progressively reclaimed as they are exhausted during the LOM. Progressive rehabilitation opportunities associated with the open pits include:

- Installation of boulder fencing
- Installation of signage
- Backfilling of portions of the open pits with waste rock
- Construction of closure phase water management infrastructure (e.g., closure spillways and channels)
- Flooding of the pits will occur (if they do not need to be dewatered to support the potential for future pit expansion or underground development)

### 11.2.3 Waste Dumps

Material from grubbing and stripping will be placed on completed permanent benches and revegetated during operations. During the initial phase of progressive reclamation, small-scale revegetation trials will be conducted to assess the success of the species chosen for revegetation. If these species cannot thrive during these initial phases of rehabilitation, modifications to the revegetation plan will be made prior to final mine closure. Some benefits to progressive reclamation are:

- Decreased grubbing a stripping that was required at the start-up of the Project
- Minimized re-handling of overburden and topsoil (i.e., direct placement)
- Minimized potential for erosion
- Control dust during operations
- Decreased area required to revegetate at closure

### 11.2.4 Tailings Impoundment Embankments

The downstream face of the tailings embankments will be rehabilitated once the end of mine life is confirmed and no future embankment raises are envisaged. The embankments will be covered with locally stripped and stockpiled overburden and topsoil, and vegetated. The vegetation species will be selected based on their ability to colonize a slope of 2H:1V and to avoid instruction

of invasive species. Vegetation will be limited to short grasses, such that visual assessments and Dam Safety Inspections can be carried out as per CDA guidelines.

# 12 Cost and Economics

## 12.1 Anticipated Employment

Employment during the restart and commissioning / ramp-up phases will rely on local and Canadian contractors, and permanent employment will increase through 2024 and 2025. It is anticipated that CFI employees and contractors will total 207 by the end of 2024 and 292 by the end of 2025 which will include 80-90 permanent employees of the mining contractor. The number of employees (CFI and the mining contractor) as well as temporary contractors engaged in logistics will average between 290 and 300 during the operations phase.

## 12.2 Occupations by NOC code and designation

A List of occupations according to the NOC 2016 is provided in Table 12-1.

## 12.3 Employment numbers by phase

The labor histogram / employee numbers for the commissioning and ramp-up phase as well as the operations phase is provided in Table 12-1.

**Table 12-1: Anticipated Employment**

| | | Commissioning and Ramp-up | | Operations | | |
|---|---|---|---|---|---|---|
| Role | NOC Code | 2024 | 2025 | 2026 | 2027 | 2028 |
| Chief Executive Officer (CEO) | 00015 | 1 | 1 | 1 | 1 | 1 |
| Chief Financial Officer (CFO) | 00015 | 1 | 1 | 1 | 1 | 1 |
| Mine Manager | 80010 | 1 | 1 | 1 | 1 | 1 |
| HR Manager | 10011 | 1 | 1 | 1 | 1 | 1 |
| HR Specialist | 11200 | | 1 | 1 | 1 | 1 |
| Port Supervisor | 13201 | 1 | 1 | 1 | 1 | 1 |
| Planner | 70010 | 1 | 2 | 2 | 2 | 2 |
| Project Controls Specialist | 70010 | 1 | 1 | 1 | 1 | 1 |
| Mine Operations Manager | 80010 | 1 | 1 | 1 | 1 | 1 |

| | | Commissioning and Ramp-up | | Operations | | |
|---|---|---|---|---|---|---|
| Role | NOC Code | 2024 | 2025 | 2026 | 2027 | 2028 |
| Plant Operations Manager | 70012 | 1 | 1 | 1 | 1 | 1 |
| Maintenance Manager | 70012 | 1 | 1 | 1 | 1 | 1 |
| Technical Services Manager | 21102 | 1 | 1 | 1 | 1 | 1 |
| Production Geologist | 21102 | 2 | 2 | 2 | 2 | 2 |
| Exploration Geologist | 21102 | 2 | 2 | 2 | 2 | 2 |
| Mine Planner | 21330 | 1 | 1 | 1 | 1 | 1 |
| Surveyor | 21203 | 1 | 1 | 1 | 1 | 1 |
| Geology Technician | 22101 | 2 | 4 | 4 | 4 | 4 |
| Core Technician | 22101 | 2 | 4 | 4 | 4 | 4 |
| Survey Technician | 22213 | 2 | 2 | 2 | 2 | 2 |
| Instrumentation Technician | 22312 | 2 | 3 | 3 | 3 | 3 |
| Operations Trainer | 41210 | 1 | 1 | 1 | 1 | 1 |
| Security | 64410 | 6 | 8 | 8 | 8 | 8 |
| Cleaners | 65312 | 1 | 2 | 2 | 2 | 2 |
| Site Supervisor | 82020 | 2 | 4 | 4 | 4 | 4 |
| Electrician | 72201 | 3 | 4 | 4 | 4 | 4 |
| Mobile Maintenance - Plant | 72401 | 3 | 4 | 4 | 4 | 4 |
| Mobile Maintenance - Mining | 72401 | 8 | 16 | 16 | 16 | 16 |
| Maintenance Supervisor | 70012 | 2 | 2 | 2 | 2 | 2 |
| Millwright | 72400 | 2 | 6 | 6 | 6 | 6 |
| Welder | 72106 | 1 | 3 | 3 | 3 | 3 |
| Plant Operators | 94100 | 22 | 26 | 26 | 26 | 26 |
| Control Room Operators | 93100 | 4 | 8 | 8 | 8 | 8 |
| Heavy Equipment Operator - Plant | 73400 | 8 | 18 | 18 | 18 | 18 |
| Heavy Equipment Operator - Mining | 73400 | 62 | 66 | 66 | 66 | 66 |
| Port Operator | 75210 | 4 | 12 | 12 | 12 | 12 |
| Labourer - Plant | 95100 | 8 | 12 | 12 | 12 | 12 |
| Labourer - Mining | 85110 | 12 | 16 | 16 | 16 | 16 |
| Operations Supervisor | 70012 | 4 | 8 | 8 | 8 | 8 |
| Lab. Supervisor | 22101 | 1 | 1 | 1 | 1 | 1 |
| Controller | 10010 | 1 | 1 | 1 | 1 | 1 |
| Supply Chain Manager | 10012 | 1 | 1 | 1 | 1 | 1 |
| Community Relations | 11201 | | 1 | 1 | 1 | 1 |

| | | Commissioning and Ramp-up | | Operations | | |
|---|---|---|---|---|---|---|
| **Role** | **NOC Code** | **2024** | **2025** | **2026** | **2027** | **2028** |
| Warehouse Supervisor | 12013 | 1 | 1 | 1 | 1 | 1 |
| Logistics Coordinator | 13201 | 1 | 1 | 1 | 1 | 1 |
| Purchaser | 12102 | | 1 | 1 | 1 | 1 |
| Administrator | 13100 | | 1 | 1 | 1 | 1 |
| Accounts Payable Clerk | 14200 | 1 | 1 | 1 | 1 | 1 |
| Accounts Receivable Clerk | 14200 | | 1 | 1 | 1 | 1 |
| Payroll Clerk | 14200 | | 1 | 1 | 1 | 1 |
| Warehouse Specialist | 14401 | 2 | 3 | 3 | 3 | 3 |
| Environment Coordinator | 21120 | 1 | 1 | 1 | 1 | 1 |
| Information Technology (IT) Tech | 21222 | 1 | 1 | 1 | 1 | 1 |
| Metallurgist | 21322 | 1 | 1 | 1 | 1 | 1 |
| Mine Engineer | 21330 | 1 | 2 | 2 | 2 | 2 |
| Engineer | 21301 | 1 | 1 | 1 | 1 | 1 |
| Lab. Tech | 22101 | 6 | 12 | 12 | 12 | 12 |
| Met. Tech | 22101 | 2 | 2 | 2 | 2 | 2 |
| HSE Manager | 22232 | 1 | 1 | 1 | 1 | 1 |
| Safety Coordinator | 22232 | 1 | 1 | 1 | 1 | 1 |
| Safety Technician | 22232 | 2 | 3 | 3 | 3 | 3 |
| Environment Technician | 22300 | 2 | 3 | 3 | 3 | 3 |
| Business Development | 41402 | 1 | 1 | 1 | 1 | 1 |
| Engineering Projects Manager | 20010 | 1 | 1 | 1 | 1 | 1 |
| **Total** | | **207** | **292** | **292** | **292** | **292** |

## 12.4 Principal Costs and Assumptions for the Project

Principal operating costs and assumptions related to the AGS open pit project are provided in Table 12-2 below. It should be noted that CFI has not included escalations or commodity price variations in the economic assessment included in the MDP. Similarly, the analysis presented below are on a pre-tax, undiscounted basis.

**Table 12-2: Principal Costs and Assumptions**

| Criteria | Unit | Val |
|---|---|---|
| Days per year | days | 365 |
| Hours per day | h | 24 |
| Hours per year | h | 8,760 |
| Availability (steady state) | % | 93.00% |
| Available hours per year | h | 8,147 |
| Mill Throughput | tph | 135 |
| Aggregate Throughput | tpa | 1,100,000 |
| Recovery (average) | % | 79.60% |
| | | |
| | | |
| **Operating Costs:** | **Unit** | **Val** |
| Open Pit Contract Rate, Mined | $/t | 4.28 |
| Mill Operating Cost, Processed | $/t | 16.25 |
| Logistics, Concentrate | $/t | 6.00 |
| Logistics, DMS Rejects | $/t | 4.00 |
| G&A | $/y | 5,957,858 |
| | | |
| **CaF2 Price:** | **Unit** | **Val** |
| CaF2 Price in USD: | USD | 500.00 |
| Exchange Rate: | CAD/USD | 1.35 |
| CaF2 Price CAD: | CAD | 673.90 |
| | | |
| **Financial** | | |
| Fiscal year end month | month | 5 |
| | | |
| **Royalty:** | | |
| Royalty % of Gross Revenue - Until 2M tonnes produced | % | 4.75% |
| Royalty % of Gross Revenue - After 2M tonnes | % | 2.30% |

## 12.5 Capital and Operating Costs

Table 12.3 summarizes the Project capital and operating costs. Closure costs are secured by letters of credit and will be discussed in more detail in the reclamation and closure plan.

### 12.5.1 Capital Expenditure Details

#### *12.5.1.1 Mining*

When mining in a month is at a higher strip ratio than the average life of mine strip ratio, this activity is considered capital as it is an investment in the future of the mine by exposing the ore body. These expenses are capitalized and then expensed as the ore is mined. Also included in capital for 2024 are mobilization costs for the mining contractor and “early works” activities such as building mine roads and other infrastructure. The mining cost also includes on-going grade control and infill drilling to convert the inferred to proven reserves.

#### *12.5.1.2 Process Plant*

Process plant capital is all activities (CFI staff, consultants, materials) needed to bring the mill from the state of disrepair that existed on the purchase date to a long-term sustainable asset. This includes rebuilding both the ore and concentrate domes, as well as significant work inside the mill.

#### *12.5.1.3 Water Treatment Plant*

This is to fund the construction of a water treatment plan to ensure the metallurgical facility has clean water available to ensure the highest recovery possible. This is part of a contribution agreement with the Government of Newfoundland and Labrador who is funding part of the project.

#### *12.5.1.4 Aggregate*

This is to finance the construction of an aggregate crushing and screening facility. This facility will take waste rock from the mine and use it to produce aggregate for export.

#### *12.5.1.5 Blue Beach*

This refers to the completion of a dock and loading facility to allow CFI to load ships at the mine site. This logistics ability will provide a significant competitive advantage against other suppliers of aggregate and $CaF_2$.

#### *12.5.1.6 Asset Disposal*

Between 2023 and 2024, CFI undertook the disposal of a range of fixed assets primarily due to depreciation, obsolescence, and physical deterioration. The assets disposed of included WA600 Komatsu loaders, a 390 Komatsu excavator, an HM400 Komatsu articulated truck, a Metso mobile crusher, a 605 rigid frame Komatsu truck, among other similar heavy equipment. These assets were originally acquired by the former ownership of CFI and no longer met operational or economic viability standards.

#### *12.5.1.7 Closure*

This refers to expenditure to rehabilitate pits and other areas once mining has been completed at a respective area.

## 12.6 Cash Flow

The projected project pre-tax undiscounted cash flow including OPEX and CAPEX are detailed in Table 12.3 and include relevant production data and revenue assumptions The spreadsheet is located in Appendix P2.

**Table 12-3: Production Project Pre-tax undiscounted Cash Flow ($ CAD)**

| Canada Fluorspar (NL) Inc. | | Year | Yr 0 | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Yr 6 | Yr 7 | Yr 8 | Yr 9 | Yr 10 | Yr 11 | Yr 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| St. Lawrence Fluorspar Project | | Calendar | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
| **Operating Statistics** | | | | | | | | | | | | | | | |
| **Mining** | | | | | | | | | | | | | | | |
| Number of operating days | | 4,571 | 188 | 366 | 365 | 365 | 365 | 366 | 365 | 365 | 365 | 366 | 365 | 365 | 365 |
| Ore Tonnes Mined | | 7,118,654 | - | - | 172,210 | 1,003,488 | 1,183,118 | 1,174,774 | 975,335 | 1,102,013 | 1,131,803 | 375,913 | - | - | - |
| Ore Grade % | | 19.74% | - | - | 17.30 | 18.70 | 19.50 | 19.40 | 19.40 | 20.60 | 21.40 | 18.90 | - | - | - |
| Waste Tonnes Mined | | 56,777,138 | - | - | 7,695,469 | 10,946,178 | 5,747,967 | 7,738,697 | 10,525,827 | 7,898,977 | 5,005,651 | 1,218,372 | - | - | - |
| Overburden Tonnes | | 1,849,507 | - | 538,495 | - | - | 24,332 | 1,291,680 | - | - | - | - | - | - | - |
| Topsoil Tonnes | | 23,270 | - | 10,580 | - | - | 12,690 | - | - | - | - | - | - | - | - |
| Total material mined | | 65,768,569 | - | 544,075 | 7,867,679 | 11,949,666 | 6,968,107 | 10,205,151 | 11,501,162 | 9,000,990 | 6,137,454 | 1,594,285 | - | - | - |
| Strip ratio - Open Pit | | 8.2 | - | - | 44.7 | 10.9 | 4.9 | 7.7 | 10.8 | 7.2 | 4.4 | 3.2 | - | - | - |
| **Mill** | | | | | | | | | | | | | | | |
| **Fresh Ore** | | | | | | | | | | | | | | | |
| Mill availability + utilization | | | - | - | 0.16 | 0.88 | 0.98 | 0.93 | 0.93 | 0.93 | 0.93 | 0.88 | - | - | - |
| Ore processed | | 7,221,032 | - | - | 274,590 | 1,003,488 | 1,100,000 | 1,100,000 | 1,100,000 | 1,100,000 | 1,100,000 | 442,954 | - | - | - |
| Grade % | | 19.56% | - | - | 13.27 | 18.70 | 19.50 | 19.41 | 19.40 | 20.56 | 21.37 | 19.28 | - | - | - |
| CaF2 Recovery | | 79.60% | - | - | 77.52 | 79.40 | 79.69 | 79.69 | 79.69 | 79.69 | 79.69 | 79.69 | - | - | - |
| Tonnes Produced | | 1,124,058 | - | - | 28,253 | 148,988 | 170,939 | 170,129 | 170,063 | 180,264 | 187,370 | 68,052 | - | - | - |
| **Tailings Retreatment** | | | | | | | | | | | | | | | |
| Ore processed | | 150,000 | - | 70,000 | 80,000 | - | - | - | - | - | - | - | - | - | - |
| Grade % | | 16.00% | - | 16.00 | 16.00 | - | - | - | - | - | - | - | - | - | - |
| CaF2 Recovery | | 60.00% | - | 50.00 | 60.00 | - | - | - | - | - | - | - | - | - | - |
| Tonnes Produced | | 13,280 | - | 5,600 | 7,680 | - | - | - | - | - | - | - | - | - | - |
| **Total Tonnes CaF2 Produced** | | | - | 5,600 | 35,933 | 148,988 | 170,939 | 170,129 | 170,063 | 180,264 | 187,370 | 68,052 | - | - | - |
| **Fluorspar** | | | | | | | | | | | | | | | |
| DMT Tonnes Sold (@97% CaF2) | | 1,137,338 | - | 5,600 | 35,933 | 148,988 | 170,939 | 170,129 | 170,063 | 180,264 | 187,370 | 68,052 | - | - | - |
| WMT Produced (@97% CaF2) - 8.5% Moisture | | 1,242,993 | - | 6,120 | 39,271 | 162,829 | 186,819 | 185,933 | 185,861 | 197,010 | 204,776 | 74,374 | - | - | - |
| WMT shipped (@97% CaF2) | | 1,242,993 | - | - | 45,391 | 162,829 | 186,819 | 185,933 | 185,861 | 197,010 | 204,776 | 74,374 | - | - | - |
| **DMS Reject Aggregate** | | | | | | | | | | | | | | | |
| DMS Reject Aggregate Tonnes Produced | | 3,478,413 | - | 350,000 | 349,836 | 401,395 | 440,000 | 440,000 | 440,000 | 440,000 | 440,000 | 177,182 | - | - | - |
| DMS Reject Aggregate Tonnes Sold | | 2,400,000 | - | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 |
| DMS Reject Aggregate Stockpile | | | | 150,000 | 299,836 | 501,231 | 741,231 | 981,231 | 1,221,231 | 1,461,231 | 1,701,231 | 1,678,413 | 1,478,413 | 1,278,413 | 1,078,413 |
| **Financial Statistics** | | | | | | | | | | | | | | | |
| CaF2 Price (CAD) | | | 0 | 674 | 674 | 674 | 674 | 674 | 674 | 674 | 674 | 674 | 674 | 674 | 674 |
| DMS Reject Aggregate Price (CAD) | | | 0 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| **Revenue** | | | | | | | | | | | | | | | |
| CaF2 Sales | | 766,452,268 | - | 3,779,840 | 24,215,082 | 100,403,275 | 115,195,862 | 114,649,752 | 114,605,323 | 121,479,971 | 126,268,680 | 45,860,483 | - | - | - |
| Less: CaF2 Logistics | $6.00/t | 7,457,956 | - | - | 272,346 | 976,973 | 1,120,912 | 1,115,598 | 1,115,166 | 1,182,060 | 1,228,656 | 446,245 | - | - | - |
| **Net CaF2 Sales** | | 758,994,312 | - | 3,773,840 | 23,942,736 | 99,426,302 | 114,074,950 | 113,534,154 | 113,490,157 | 120,297,911 | 125,040,024 | 45,414,238 | - | - | - |
| Aggregate Sales | | 48,000,000 | - | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 4,000,000 |
| Less: Aggregate Logistics | $4.00/t | 9,600,000 | - | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 |
| **Net Aggregate Sales Revenue** | | 38,400,000 | - | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 | 3,200,000 |
| Gross Revenue | | 814,452,268 | - | 7,779,840 | 28,215,082 | 104,403,275 | 119,195,862 | 118,649,752 | 118,605,323 | 125,479,971 | 130,268,680 | 49,860,483 | 4,000,000 | 4,000,000 | 4,000,000 |
| Total Logistics | | 17,057,956 | - | 800,000 | 1,072,346 | 1,776,973 | 1,920,912 | 1,915,598 | 1,915,166 | 1,982,060 | 2,028,656 | 1,246,245 | 800,000 | 800,000 | 800,000 |
| **Total Net Revenue** | | 797,394,312 | - | 6,973,840 | 27,142,736 | 102,626,302 | 117,274,950 | 116,734,154 | 116,690,157 | 123,497,911 | 128,240,024 | 48,614,238 | 3,200,000 | 3,200,000 | 3,200,000 |
| **Mine Operating Costs** | | | | | | | | | | | | | | | |
| Mining Operating Cost | $4.28/t | 281,939,475 | - | 2,778,641 | 33,673,666 | 51,144,570 | 29,823,498 | 43,678,046 | 49,224,973 | 38,524,237 | 26,268,303 | 6,823,540 | - | - | - |
| Pit Dewatering Cost | $0.10/t | 6,576,857 | | 54,408 | 786,768 | 1,194,967 | 686,811 | 1,020,515 | 1,150,116 | 900,099 | 613,745 | 159,429 | | | |
| Mill Operating Cost | $16.25/t | 119,779,270 | - | 1,137,500 | 5,762,088 | 16,306,680 | 17,875,000 | 17,875,000 | 17,875,000 | 17,875,000 | 17,875,000 | 7,198,003 | - | - | - |
| DMS Aggregate Operating Costs | $2.00/t | 4,800,000 | - | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 | 400,000 |
| Site Support Costs (G&A, Finance, Proc.) | | 57,804,672 | 423,653 | 4,356,083 | 5,957,858 | 5,957,858 | 5,957,858 | 5,957,858 | 5,957,858 | 5,957,858 | 5,957,858 | 5,957,858 | 1,787,357 | 1,787,357 | 1,787,357 |
| Sprott Royalty | 4.75% | 38,686,483 | - | 308,257 | 1,340,216 | 4,959,156 | 5,661,808 | 5,635,863 | 5,633,753 | 5,960,299 | 6,187,762 | 2,368,373 | 190,000 | 190,000 | 190,000 |
| **Total Operating Costs** | | 509,586,757 | 423,653 | 9,095,889 | 47,920,596 | 79,963,231 | 60,414,970 | 74,567,283 | 80,241,700 | 69,617,493 | 57,302,669 | 22,907,202 | 2,377,357 | 2,377,357 | 2,377,357 |
| **Total Operating Income** | | 287,807,555 | (423,653) | (2,122,049) | (20,777,860) | 22,663,072 | 56,859,980 | 42,166,871 | 36,448,456 | 53,880,419 | 70,937,355 | 25,707,036 | 822,643 | 822,643 | 822,643 |
| **Capital Expenditures** | | | | | | | | | | | | | | | |
| Asset Disposal | | (2,829,200) | (529,000) | (2,300,200) | - | - | - | - | - | - | - | - | - | - | - |
| Mining including Mobilization & Preproduction | | 15,082,006 | 912,620 | 14,169,386 | - | - | - | - | - | - | - | - | - | - | - |
| Mill & Infrastructure Refurbishment & Sustaining Capital | | 27,483,675 | 2,467,902 | 19,373,403 | 3,542,370 | 100,000 | 100,000 | 800,000 | 100,000 | 800,000 | 100,000 | 100,000 | - | - | - |
| TMF | | 3,077,384 | - | 250,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 1,777,384 | 150,000 | 150,000 | - | - | - |
| Blue Beach Remediation & Infrastructure | | 864,916 | - | - | 864,916 | - | - | - | - | - | - | - | - | - | - |
| Water Treatment Plant | | 2,122,943 | - | 154,100 | 1,968,843 | - | - | - | - | - | - | - | - | - | - |
| Rehabilitation & Closure Costs | | 8,700,000 | - | 150,000 | 50,000 | 900,000 | 900,000 | 150,000 | 150,000 | 150,000 | 500,000 | 1,483,333 | 2,466,667 | 900,000 | 900,000 |
| **Total Capital Expenditure** | | 54,501,724 | 2,851,522 | 31,796,689 | 6,576,129 | 1,150,000 | 1,150,000 | 1,100,000 | 400,000 | 2,727,384 | 750,000 | 1,733,333 | 2,466,667 | 900,000 | 900,000 |
| **Net Free Cash Flow** | | 233,305,832 | (3,275,175) | (33,918,738) | (27,353,989) | 21,513,072 | 55,709,980 | 41,066,871 | 36,048,456 | 51,153,035 | 70,187,355 | 23,973,703 | (1,644,024) | (77,357) | (77,357) |

# 13 Possible Changes to the Development Plan

In addition to work already completed CFI has embarked on engineering studies related to the retreatment of tailings, expansion/upgrading of the Blue Beach Marine Terminal (BBMT), a 2.6mtpa aggregate plant, a water treatment plant as well as the development of the South Ridge open pit, North Ridge (formerly Director) and Tarefare underground mines. Construction of the BBMT and Aggregate plant is planned to be completed by 2025, subject to regulatory approval and engineering as well as procurement of long lead equipment has already commenced.

The aggregate plant will consist of a crushing and screening plant and associated infrastructure and will produce course and fine construction aggregates from waste rock mined from the AGS pit (GNP, CP, PP) as well as DMS reject streams.

The expansion/upgrading of the BBMT will allow the export of both 200,000 dry tonnes of acid-grade CaF2 concentrate and 2,600,000 dry tonnes of aggregates annually. Concentrate shipments will range between 10,000 and 15,000 tonnes while the maximum aggregate shipment BBMT will accommodate is expected to be up to 60,000 tonnes via Panamax class vessel.

Mine development of the South Ridge open pit is expected to commence in 2027. The North Ridge (formerly Director) and Tarefare underground mine development is expected to start in 2029 and 2032 respectively. Preliminary designs for the South Ridge open pit as well as the North Ridge and Tarefare underground mines have been completed, and detail engineering, environmental assessments and regulatory approvals will be completed ahead of planned development.

Once engineering and feasibility studies for these projects have been completed CFI will submit revised Mine Development Plans and Rehabilitation and Closure Plans.

CFI will provide advanced notice to the IET should substantial changes to the Development Plan arise that require revisions to this plan and further approval under the Mining Act. This plan will be updated and resubmitted to the IET at a minimum of every five years

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# Appendix 2-4: Canada Fluorspar Inc. (CFI) Environmental Effects Monitoring Plan

JUNE 2017

# ST. LAWRENCE FLUORSPAR PROJECT

# Environmental Effects Monitoring Plan: Operations Phase

**Submitted to:**
Newfoundland and Labrador Department of Municipal Affairs and Environment, Environmental Assessment Division

Submitted by:
Canada Fluorspar (NL) Inc.

REV 0 - EEMP

CFI
CANADA FLUORSPAR INC.

# Revision Control Table

| Revision Date | Section Revised | Signature |
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# 1.0 INTRODUCTION

Canada Fluorspar (NL) Inc. (CFI) is developing the St. Lawrence Fluorspar Mine (the Project) in St. Lawrence, in the province of Newfoundland and Labrador (NL). The Project includes the construction, operation, and rehabilitation and closure of a surface and underground mine, a Mill, a Tailings Management Facility (TMF), and ancillary infrastructure (the Project). Concentrate will be hauled to an existing ship loading facility located approximately 45 km northeast of St. Lawrence. The Project is located partly on a brownfield site used historically for mining. The Project is located entirely within the municipal boundaries of the Town of St. Lawrence, on the southern tip of the Burin Peninsula in Newfoundland.

On June 12, 2015, CFI filed an Environment Assessment (EA) Registration with the NL Department of Municipal Affairs and Environment (MAE), formerly known as the Department of Environment and Conservation (DOEC). Following the determination that additional information was required, CFI submitted an Environmental Preview Report (EPR) on September 23, 2015. The Project was released from further EA by the Minister of Municipal Affairs and Environment on November 5, 2015, subject to certain conditions. One of the conditions is that an Environmental Effects Monitoring Program (EEMP) must be submitted to, and approved by, the Minister of Municipal Affairs and Environment prior to the start of the Project. Other plans that have been prepared for the Project, and submitted to the NL government, include the Environmental Protection Plan (EPP) (approved May 13, 2016), Mine Development Plan (approved March 01, 2017), and Rehabilitation and Closure Plan (approved March 01, 2017). Construction of the Project began in May, 2016. The mill commissioning for operations is expected to begin in August, 2017.

This EEMP, updated for operations, outlines the monitoring and reporting requirements and commitments that CFI will implement during the operations phase of the Project. The purpose of the EEMP is to implement follow-up monitoring to determine if the environmental effects conclusions presented in the EA documentation are accurate. The EEMP will be modified, as necessary, as the project progresses. This EEMP also provides direction on the monitoring and reporting requirements outlined in the Project permits, approvals, and authorizations.

This EEMP includes the following information:

- Roles and responsibilities of personnel within CFI as well as contractors.
- Specific environmental monitoring.
- Reporting requirements.

This EEMP is a living document that will be revised as appropriate, given the conditions encountered at the Project site, changes to the overall work program, changes to regulatory permits or approvals, or guidance from regulatory agencies. This EEMP has been designed specifically for the operations phase and will be adapted for the rehabilitation and closure phase, as appropriate.

## 2.0 PROJECT OVERVIEW

The operations phase of the Project includes the following primary components (Figure 1):

- surface and underground mine development and operation at the AGS Vein
- mill operation
- operation of a TMF
- upkeep and improvement of project infrastructure to support the Mine and Mill (i.e., access roads, explosives magazine, administration building, warehouse, maintenance building, employee facilities, concentrate storage building, security building, sewage and water treatment units, laboratory, and electrical buildings)
- stockpiling

CFI will execute the proposed works in an environmentally responsible and safe manner, and will obtain and maintain all necessary regulatory approvals and permits.

The operations phase is anticipated to last approximately 10 years based on the current resource estimate and mine plan. Once the operations phase of the Project has ended, the facilities will be properly closed and rehabilitative measures will be taken to return areas to an environmentally appropriate condition. A Rehabilitation and Closure Plan has been developed with the intent to restore, to an acceptable state, the biological, chemical, and physical quality of the environment that may have been affected by the Project.

The environmental requirements for the Project are generally outlined in the EA Registration and the EPR (CFI, 2015a; CFI, 2015b), approvals, permits, and agreements for the Project.

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220 HIGHWAY
MEMORIAL DRIVE
PARK
ST.
DOCTORS POND
JONES POND
RVIEW AVENUE
MARION DRIVE
WATER STREET EST
LAURENTIAN AVENUE
MINE COVE
BLACK DUCK POND
LONG POND
HAY POOK POND
PROPOSED TOWN BYPASS ROAD
OVERBURDEN STOCKPILE
JOHN FITZPATRICK POND
DIRECTOR DRIVE
BLAKES POND
CLARKES POND
EXISTING MILL
POLLUX CRESCENT
AGS EAST TAILINGS MANAGEMENT FACILITY
SOUTH ROCK DUMP
AGS MILL
UPPER ISLAND POND
IRON SPRING ROAD
MINWORTH TAILINGS DAM
PROPOSED EXPLOSIVES STORAGE
SHOAL COVE POND
HARES EARS POND
ISLAND POND
SALT COVE
Little Lawrence
Harbour Rock
Spears Head
Little St. Lawrence Harbour
Herring Cove
Blue Beach Point
Blue Beach Cove
Great St. Lawrence Harbour
Calpeaux
Keenan Point
Maple Head
Chapeau Rouge
Cape Chapeau Rouge
Deadmans Cove
Shoal Cove
Cape Rosey
Red Cliff
Red Land Cove
Ferryland Head
Hares Ears
Pinnacle
Lawn Bay
Seal Gulch
Lawn Point
Spitfire Cove
Chambers Cove
Salt Cove
Little Lawn Point
Mine Cove
Shingle Point

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**LEGEND:**

- EXISTING BUILDINGS
- EXISTING ROAD
- PROPOSED ROAD
- PROPOSED POWERLINE
- WATER
- WETLAND
- PRE-DEVELOPMENT WATER EXTENT
- EMBANKMENT
- PIT
- MINE DUMP
- TAILINGS
- MILL

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**NOTES:**

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 21N.
2. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009). ALL RIGHTS RESERVED.
3. CONTOUR INTERVAL IS 20 METRES.
4. PLAN BASED ON INFORMATION PROVIDED BY LYCOPODIUM, DECEMBER 2, 2015. PLANT SITE, PORT LOCATIONS, PROPOSED ROADS BASED ON INFORMATION PROVIDED BY LYCOPODIUM, DECEMBER 30, 2015. DUMPS AND PITS BASED ON INFORMATION PROVIDED BY AGP JANUARY 15, 2016.

CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

*Figure 1: Project Site Plan*

**OVERALL GENERAL ARRANGEMENT**

Knight Piésold CONSULTING

PIA NO. NB101-642/6

REF NO. NB16-00223

**FIGURE 1**

REV 0

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# 3.0 ROLES AND RESPONSIBILITIES

An overview of the key roles and responsibilities for the EEMP are outlined below.

The CFI Operations Team will be responsible for:

- Ensuring compliance with the EPP and other environmental plans, procedures, commitments and opportunities, permitting and approval requirements, and health, safety, and environment (HSE) protocols.
- Providing support and guidance to employees and contractors to ensure compliance with the EPP and other environmental plans, procedures, commitments and opportunities, and permitting.
- Providing appropriate CFI team resources for non-compliance issues reported by the HSE technician.

The HSE team will be responsible for:

- Developing and implementing the EEMP in cooperation with the CFI Operations Team.
- Ensuring compliance with the EPP and other environmental plans, procedures, commitments and opportunities, permitting and approval requirements, and HSE protocols.
- Providing environmental field staff and other employees with indoctrination of the Project environmental requirements.
- As appropriate, auditing environmental field work, sampling and reporting procedures and outcomes, and providing direction and additional training where required.
- Developing reports for compliance with regulatory approvals, permitting, and authorizations for submission to CFI.
- As appropriate, liaising with the public, regulators, and other stakeholders on environmental issues.
- Collecting and managing environmental monitoring data.
- As appropriate, providing technical specialist (e.g., hydrologists, and air and noise specialists) input on the monitoring and reports regarding their specific expertise.
- Keeping the CFI team and other workers informed of any concerns, incidents, and unmitigated risks.
- Assisting and supporting on-site Project personnel on environmental issues, and following-up on environmental concerns and issues to ensure they are addressed in a timely manner.
- Stopping work at a location or an activity, if an incident is imminent, allowing immediate temporary corrective actions to be taken. Working with the CFI Operations Team to ensure a long-term corrective action is implemented and monitored.
- Conducting site visits, as appropriate for the conditions, and assessing the implementation and effectiveness of the environmental mitigation through monitoring.
- Initiating actions to resolve environmental issues, where appropriate.

Employees and other workers will be responsible for:

- Cooperating fully with the HSE technician and inspectors (CFI, HSE team, or regulatory) and providing all documentation and procedures for the work, as required.

- Updating the HSE team and CFI Operations team on changes that may affect monitoring requirements.
- Providing records identified as required for environmental reporting.
- Immediately notifying the HSE manager regarding any environmental concerns. As outlined in the EPP (CFI 2017), the HSE manager will immediately report any environmental concern to the General Manager.

# 4.0 DEVELOPMENT AND IMPLEMENTATION OF THE ENVIRONMENTAL EFFECTS MONITORING PLAN

This EEMP has been revised for the operations phase, taking into consideration the information from, and commitments made, as part of the EA process, regulatory requirements, permits, approvals, and guidance documents. This EEMP will evolve throughout the life of the Project to meet the requirements of the next Project phase. This EEMP is a living document that will be revised as appropriate, given the conditions encountered at the Project site, changes to the overall work program, changes to regulatory permits or approvals, or guidance from regulatory agencies.

The EEMP provides methodologies for monitoring the effectiveness of mitigation strategies proposed for the Project. The strategy of the EEMP is to focus on those environmental components which have been assessed in the EA to predict environmental effects, particularly those where an effect may occur and/or where predictions are uncertain. This approach will allow effective environmental monitoring of the Project.

## 4.1 Monitoring Objectives

Historical data and data collected during baseline surveys, as well as construction-phase monitoring, provide a foundation upon which the operations EEMP can be developed. A baseline survey is intended to be broad-based and could include parameters and sampling stations that may not be carried into the final EEMP.

The proposed EEMP includes monitoring methodologies for several environmental components including:

- water quality
- air quality
- noise

The objectives of the monitoring programs included in the EEMP are to:

- test whether effects on the environment are within the bounds predicted by the EA,
- fulfill regulatory requirements in terms of permitting requirements and commitments made in the EA,
- address public concerns; and
- provide an early warning of a potential adverse environmental effect.

The EEMP is not designed to cover effects from accidental releases, malfunctions, or unplanned events, including monitoring for Occupational, Health and Safety (OHS) requirements. Mitigation planning for these events will be discussed with regulatory agencies and addressed in the EPP and the Emergency Response Plan (ERP).

The EEMP uses the adaptive management philosophy. Therefore, the monitoring stations and variables may be adjusted depending on results obtained from ongoing monitoring activity. However, the importance of maintaining

the EEMP's scientific defensibility and integrity is recognized, and the utmost effort will be made to maintain its consistency and repeatability.

Through the EEMP, specific changes to environmental components will be detected and measured. Monitoring parameters are chosen based on their relevance to issues important to the public, stakeholders, and/or regulators. Where the monitoring program can measure a direct effect (e.g. changes in chemistry), test results can be compared to regulatory limits.

Data will be interpreted using scientifically defensible techniques (i.e. comparisons to reference and baseline data); however, statistically significant results are not necessarily environmentally significant results. Therefore, appropriate effects-based benchmarks may be used in data interpretation. Due to the unique conditions at the Project site (e.g. partly a brownfield site), site-specific benchmarks for some parameters may be developed.

## 4.2 Implementation

Data collected at reference stations both before and during operations will be used to assess the magnitude of seasonal and year-to-year variation. The statistical models or tools used to assess whether significant environmental effects are occurring or have occurred as a consequence of Project activities are typically based on Analysis of Variance (ANOVA) or regression techniques. These methods allow for the natural variability of a parameter to be described, such that significant changes can be detected. Following the principle that simplicity and clarity in statistical analysis are preferred, the following approach is suggested. The baseline EEMP data set will be used to determine the typical range of natural, pre-Project variability for each of the measured environmental variables. This variability will be assessed using standard exploratory data analysis techniques, such as ANOVA or regression.

Data collected during sampling events scheduled during and after operation will be compared to the typical range of conditions determined during baseline sampling. It is assumed that near-field, far-field, and reference stations are affected in the same way by seasonal and long-term trends. Data identified as outliers in either the near-field or the far-field sampling stations will be subject to investigation.

## 4.3 Maintenance of the EEMP

Subsequent to the filing of the EEMP with NL DMAE, CFI will maintain and keep the document current. CFI will provide the most current and comprehensive version of the EEMP to Project personnel and applicable regulatory agency representatives and permit providers (e.g. NL DMAE, Environment Canada).

An updated EEMP Table of Contents and Revision Control Table (provided at the beginning of the EEMP) will be included as required with each revision. The Revision Control Table will be kept current by CFI to track any revisions made to each section and sub-section of the EEMP. The EEMP Table of Contents will indicate the current revision status of each section.

## 4.4 Quality Assurance and Quality Control

Quality assurance can be defined as a "set of operating principles that, if strictly followed during sample collection and analysis, will produce data of known and defensible quality whose analytical accuracy can be stated with a high level of accuracy" (APHA 1992). Quality assurance comprises two separate but interrelated activities; quality control and quality assessment (NRC 1990).

Quality control ensures the data collected are of adequate quality, given the monitoring program objectives and the specific hypothesis to be tested. Quality control activities would include standardized protocols for sample

collection and processing. The goals of quality control are to ensure sampling, processing, and analysis techniques are consistent, uncollected samples are minimized, data are comparable with similar data collected elsewhere, and study results can be reproduced (NRC 1990).

Quality assessment uses external and internal quality measures to determine the quality of the data produced by a given laboratory. Quality assessment activities are undertaken to ensure the effectiveness of quality procedures. Quality assessment consists of activities such as repetitive measurements, internal test samples, exchange of samples among laboratories, and use of reference samples (NRC 1990). A minimum of 10% duplicate water sampling will be conducted in the field.

A quality assurance and quality control (QA/QC) program will be implemented to monitor the quality of data collected as part of the EEMP. An overview of the Quality Assurance (QA) Plan and sample collection procedures are outlined in the following subsections.

### 4.4.1 Quality Assurance Plan

A QA Plan will be developed prior to sampling to monitor the accuracy and defensibility of the environmental data collected as part of this EEMP. QA planning helps achieve the production of high quality data that can be substantiated. To be effective, the QA Plan will include organization, record keeping, and standard operating procedures (SOPs) for such tasks as field surveys, sample handling, laboratory analyses, and data management.

The following is considered for inclusion in the QA Plan:

- responsibilities defined for each HSE department member
- statement and prioritization of monitoring program objectives
- description of survey area, including sampling station locations, samples, and sample station identifiers
- complete identification of variables to be measured and corresponding containers and preservatives
- identification of all QA/QC samples to be submitted with the samples
- description of the sampling methods, including sampling station positioning, sampling devices, replication, and other special considerations
- detailed program schedule including time, date, and georeferenced location of sampling stations
- storage and shipping procedures (including chain-of-custody procedures)
- identification of laboratories to which samples will be shipped
- field team requirements
- location and availability of alternate equipment
- equipment necessary to undertake the monitoring program
- equipment checklists and manifests prepared to ensure that all required sampling equipment, supplies, spare parts, and alternative equipment are available

### 4.4.2 Sample Collection

Specific QA/QC methods to be used for the data collection surveys are outlined in the following subsections.

#### 4.4.2.1 Sampling Locations

Accurate positioning is essential to be able to plot and relocate sampling stations with a high degree of certainty. All locations will be fixed by Geographical Positioning System (GPS). All personnel using such devices will be trained in their proper use, care, and limitations.

#### 4.4.2.2 Sample Handling

All stages of sample handling will be carefully documented to meet sample handling requirements, and to minimize errors in collection, shipping, and analyses of the samples. The use of SOPs is required to ensure all field personnel activities are conducted in the same manner regardless of the individual conducting the activity.

Sampling programs will maintain the integrity of the sample from time of collection to data reporting. Chain-of-custody procedures will be established to manage possession and handling of samples and allow them to be traced from collection to final disposal.

Sample labels will be waterproof and securely fastened, and contain the following information:

- sample identification (identifier)
- preservation technique
- date/time of collection
- sample analysis required

Chain-of-custody forms will be filled out with information from the sample label and accompany every sample shipped to a laboratory or consultant for analysis. Each person who has had custody will sign-off for sample traceability. Shipment manifests will accompany every sample shipped to a laboratory or consultant for analysis, with the consigner and consignee signing off on the shipment.

#### 4.4.2.3 Sample Shipment

All samples will be shipped in a manner such that they are received at the appropriate destination within an acceptable holding time. Shipping containers will be in good condition and capable of surviving rough treatment. Samples will be tightly and, if necessary, individually packed. Dividers will separate glass containers and empty spaces will be filled so jars are secure. Leak proof containers must be used wherever appropriate.

Sample request form and/or chain-of-custody forms will accompany all samples. A chain of custody form should be filled out for each shipment. The original chain-of-custody should be placed inside the shipping container in such a manner that it is protected and can serve as a sample request form. A copy of the chain-of-custody form is to be retained by the shipper.

Shipping containers will be either hand delivered or sent by a courier that will provide a delivery slip. All shipping charges are to be prepaid to avoid rejection of the shipment by the consigner.

#### 4.4.2.4 Laboratory Analysis

Any laboratory utilized to perform an analysis will conform to the NL DOEC *Accredited Laboratory Policy* (NL DOEC 2011), and have an acceptable QA/QC program and corporate Safety and Environmental Protection Policies and Procedures in place. The laboratory will be equipped to meet the analytical requirements for the analyses to be undertaken.

All laboratories used will assign a specific staff member or designate, who will be responsible for the project and will act as the liaison person with CFI in terms of delivery of results, quality reference of results, and overall activities of the laboratory. This person will be responsible for:

- sample reception
- maintenance of chain-of-custody
- maintenance of sample tracking logs
- distribution of samples for laboratory analyses
- subcontracting samples to other facilities
- supervision of labelling, log keeping, data reduction, and data transcription
- storage and security of all samples, data and documents
- reports of results from all lab analyses

The laboratory will provide all necessary forms and documentation required for sample submission. The laboratory will notify CFI in writing of inconsistencies between labels and sample request forms and hold time violations. Prior to initiation of testing, all parameters and specific Levels of Quantification (LOQs) of each parameter will be confirmed with CFI.

Data transfer will be completed by either electronic copy, hard copy in mail, or, where available, by facsimile.

The chosen analytical laboratory will be required to analyze samples on a 10% replicate (duplicate) basis or one replicate (duplicate) per batch, whichever is more frequent.

Where available, Certified Reference Materials (CRMs) will be run in conjunction with each batch of samples. The laboratory will provide appropriate QA/QC reports or data for each set of samples analysed. The reported data will include results of laboratory duplicates, reference samples, method blanks, and spike recovery. The laboratory will provide validation of these QA/QC data to demonstrate their acceptability. The laboratory shall provide full references for all methods used.

#### *4.4.2.5 Data Management*

Data management involves a number of systematic processes and protocols that are designed to provide a framework for quality environmental data with a high degree of credibility. The major components for a data management system used for the EEMP will include or consider items such as:

- data documentation (computer programs, and statistical, normalization, and error reference procedures)
- data recording (laboratory reports, field notebooks, field maps, and auxiliary data records)
- data custody and transfer (chain-of-custody records, QA/QC procedures for authorizing changes to data, QA/QC documentation of transfer formats, data recording forms, and data verification and validation)
- data validation (data identification, transmittal errors, flagged or rejected data, data comparability, and data review and evaluation)
- data verification (sample results reported and checked for transmission errors, sample labels verified, cross-referencing field data sheets and laboratory results, data review, flagging and screening)
- data presentation (tables, graphs, and figures)

# 5.0 ENVIRONMENTAL MONITORING

Project operations will be initiated once all applicable permits and regulatory approvals have been acquired. An overview of the applicable regulatory requirements is provided in the EA Registration (CFI 2015a). The following section outlines the procedures and methodologies proposed to monitor potential effects of the Project on the environment during operations activities. As the work advances, these procedures may be modified or new procedures added, to account for new activities, site conditions, and/or lessons learned from the work as it is carried out.

## 5.1 Environmental Monitoring Requirements

Environmental monitoring will occur for both compliance with regulatory requirements and commitments made by CFI to regulatory agencies or stakeholder groups throughout the life of the Project. The following sections provide the methodologies for monitoring, sampling, analysing, and reporting for each environmental component that has been identified as a commitment or a regulatory requirement. Data collected throughout the compliance and commitments monitoring will be used to assess the effectiveness of the environmental mitigation measures implemented as part of Project activities.

The HSE technician will be responsible for conducting most of the activities associated with environmental monitoring. All operations staff are responsible for identifying, to the appropriate person, any conditions that may be causing the Project to be out of compliance with regulatory or operation permit requirements.

Generally, the following environmental monitoring will be completed by CFI for compliance with regulatory approvals and permits:

- water quality monitoring
- air quality monitoring
- additional monitoring requirements of applicable permits will be included as permit conditions are received

Prior to Project commissioning, CFI will conduct a noise assessment. The development of a Hearing Protection and Conservation Program has been created as a part of the Project's HSE plan. CFI will re-evaluate the requirements as the Project progresses into the various phases. Other noise mitigations are included in the EPP.

## 5.2 Water Quality Monitoring

Surface water quality on-site will be monitored to track the effectiveness of mitigation measures implemented to control sediment. The overall design of the surface water quality monitoring program during the operations phase is provided in the following subsections. Measurements identified are related to diffuse discharges primarily caused by episodic events throughout operation activities.

Real-time monitoring (RTM) of water quality and quantity has been established in agreement with the DMAE and CFI. Two stations have been installed at the St. Lawrence AGS Fluorspar mine site that will record water quality and hydrology. A detailed list of parameters for RTM stations and surface water grab samples can be found in Table 1.

**Table 1: Water Quality Sampling Requirements**

| Sampling Points | Parameters | Frequency | Number of Location |
|---|---|---|---|
| Real-time monitoring locations | Temperature, pH, Turbidity, Dissolved Oxygen (DO), Conductivity, Total Dissolved Solids (TDS)<br><br>Water flow data | Frequency will be established based on Real-Time Monitoring Network Agreement<br><br>(water quality equipment deployed in ice free months; water quantity equipment is deployed year round) | Two monitoring locations are installed: Outflow of Unnamed Pond South of Long Pond (RTM 1), and Outflow Grebes Nest Pond (RTM 2) (Figure 2). |
| Surface water sampling locations (grab) | Temperature, pH, Turbidity, DO, Conductivity, TDS, Total Suspended Solids (TSS)<br><br>Total and dissolved metals as appropriate<br><br>See full list of parameters to be monitored in Table 3. | Weekly, Monthly, Quarterly | Locations on Figure 2 and in Table 2. |

### 5.2.1 Real Time Water Monitoring

The purpose of real-time water monitoring is to monitor, process, publish, and archive real-time hydrometric information and real-time water quality. There are two locations installed to allow for continued monitoring of surface water quality:

- RTM 1 (Outflow of Unnamed Pond South of Long Pond)
- RTM 2 (Outflow Grebes Nest Pond)

The installed locations are downstream of the Mine Site at the Grebes Nest Pond outlet (UTM Zone 21T 617071 m E 5196306 m N), and downstream of the TMF at the AGS east outlet (UTM 21T 618525 m E 5195662 m N), (Figure 2).

Table 1 above provides an outline of CFI's monitoring requirements.

### 5.2.2 Surface Water Monitoring

Monitoring of surface water will be completed using visual field assessment, portable analysers, and sampling with laboratory analysis. Sampling locations are listed in Table 2. Specific monitoring requirements are defined within the regulatory permits and approvals as well as monitoring requirements to assess erosion control.

Radium-226 is a parameter being tested for in monthly surface water samples at sites WQ-STA-22, WQ-STA-23, WQ-STA-24, and WQ-STA-25 as a part of the water quality monitoring program. Table 3 provides an outline of the water quality parameter list. Table 1 above provides an outline of expected monitoring requirements including sampling frequency.

The frequency of surface water quality monitoring is weekly (at least 24 hours apart), monthly (at least 15 days apart) and quarterly (four times per year at least 30 days apart), depending on location. Surface water quality

sampling will be conducted at a total of twenty one stations in accordance with the Certificate of Approval-Operations (AA17-065644) issued by NL DMAE. (Table 2; Figure 2). The GPS locations of all sampling stations can be found in Table 2.

*Figure 2: Surface Water Quality Monitoring Station Locations*

615 500 E | 616 100 E | 616 700 E | 617 300 E | 617 900 E | 618 500 E | 619 100 E

5 197 200 N | 5 196 600 N | 5 196 000 N | 5 195 400 N | 5 194 800 N

MINE COVE WATERSHED

GREBES NEST WATERSHED

NORTHWESTERN POND WATERSHED

UPPER ISLAND POND WATERSHED

SALT COVE WATERSHED

WQ-STA-6
WQ-STA-14
WQ-STA-13
WQ-STA-9
WQ-STA-22
SW-3
SW-2
WQ-STA-3
WQ-STA-15
WQ-STA-11
WQ-STA-16
RTM2
WQ-STA-2
WQ-STA-25
WQ-STA-17
WQ-STA-18
RTM1
WQ-STA-23
WQ-STA-1
WQ-STA-19
SW-1
WQ-STA-7
WQ-STA-24
WQ-STA-20
WQ-STA-21
SW-4

OPEN CUT PIT
OVERBURDEN STOCKPILE
CENTER PIT
JOHN FITZPATRICK POND
LONG POND
GREBES NEST POND
GREBES NEST PIT
TAILINGS IMPOUNDMENT
SOUTH ROCK DUMP
POLISHING POND
UPPER ISLAND POND
MILL SITE

**LEGEND:**

- WATER
- FORMER POND EXTENT
- RIVER/STREAM/DRAINAGE
- PROPOSED ACCESS ROAD
- PRE-DEVELOPMENT WATERSHED
- GENERAL DIRECTION OF WATERSHED FLOW
- SURFACE WATER MONITORING LOCATION
- REAL TIME MONITORING LOCATION
- HYDROLOGY STATION (EXISTING)

**NOTES:**

1. COORDINATE GRID IS UTM NAD83 ZONE 21.
2. PLAN BASED ON INFORMATION PROVIDED BY LYCOPODIUM, NOVEMBER 4, 2015.
3. CONTOUR INTERVAL IS 2 METRES.
4. DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. COORDINATES OF SURFACE AND GROUNDWATER SAMPLING LOCATIONS PROVIDED BY CFI.

**DRAFT**

SCALE 120 60 0 200 400 600 m

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
| A | 05JUN'17 | ISSUED WITH TRANSMITTAL | JAM | AS | - |

CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**ENVIRONMENTAL BASELINE AND EFFECTS SURFACE MONITORING LOCATIONS**

Knight Piésold CONSULTING

P/A NO. NB101-642/16 | REF NO. NB17-00396

**FIGURE 2** | REV A

SAVED: I:\1101\0642\16\A\Acad\FIGS\802_rA_6/5/2017 11:09:11 AM, ASIMPSON PRINTED: 6/5/2017 11:12:46 AM, FIG 2, ASIMPSON
XREF FILE(S): V:\V-TDP\O-V\CO-2014-11-25_X-C\P-SH-POND_X-C-SITE-LAYO_A\V-WATERSHED-BOUNDARIES_X-C-EMBK-FAL-DAM+-ULTM_X-C-EVNT-POND-DRGD-DVRS_5007_X_PP_BULK_EARTHWORKS_OP2_X-C-SI---GIS---GW---SW---HYDR-MON-LOCA_X-C-EVNT-POND-ABLT IMAGE FILE(S):

**Table 2: Surface Water Quality Sampling Locations**

| Station ID | Location | Northing | Easting |
|---|---|---|---|
| WQ-STA-1 | Upper Island Pond | 5,195,504 | 617,488 |
| WQ-STA-2 | Outlet of Grebes Nest Pond | 5,196,316 | 617,093 |
| WQ-STA-3 | Outlet of John Fitzpatrick Pond | 5,196,701 | 617,017 |
| WQ-STA-6 | Downstream of John Fitzpatrick Pond | 5,197,120 | 616,844 |
| WQ-STA-7 | Downstream of Upper Island Pond | 5,195,035 | 617,429 |
| WQ-STA-9 | Downstream of Unnamed Pond | 5,196,766 | 616,066 |
| WS-10 | Salt Cove Brook - Farfield | 5,193,512 | 620,347 |
| WQ-STA-11 | Downstream of proposed South Dump and Central North Pit | 5,196,460 | 615,825 |
| WQ-STA-13 | Unnamed Stream Downstream of Open Cut Pit | 5,196,746 | 615,686 |
| WQ-STA-14 | Unnamed Stream Downstream of the Overburden Dump | 5,196,811 | 616,850 |
| WQ-STA-15 | Unnamed Pond Located Downstream and Northeast of TMF | 5,196,632 | 617,813 |
| WQ-STA-16 | Long Island Pond | 5,196,443 | 618,836 |
| WQ-STA-17 | Unnamed Pond Located Downstream and Southeast of the TMF | 5,195,848 | 618,355 |
| WQ-STA-18 | Unnamed Stream Draining the Unnamed Pond located Southeast of the TMF | 5,195,767 | 618,505 |
| WQ-STA-19 | Unnamed Stream Located Downstream of the Polishing Pond | 5,195,485 | 618,538 |
| WQ-STA-20 | Unnamed Stream located Downstream of the Mill Site | 5,195,007 | 618,465 |
| WQ-STA-21 | Unnamed Stream located at Proposed Access Road Downstream of the TMF | 5,194,842 | 619,063 |
| WQ-STA-22 | Mine Site Sediment Pond Discharge (1) | 5,196,665 | 616,172 |
| WQ-STA-23 | Polishing Pond Discharge | 5,195,571 | 618,150 |
| WQ-STA-24 | Mill Site Event Pond Discharge | 5,195,080 | 618,401 |
| WQ-STA-25 | Mine Site Sediment Pond Discharge (2) | 5,196,265 | 616,904 |

The list of water quality parameters to be analyzed at the surface water monitoring locations is provided in Table 3.

**Table 3: Water Quality Parameter List**

| Station ID | Parameters | Frequency |
|---|---|---|
| WQ-STA-1<br>WQ-STA-2<br>WQ-STA-3<br>WQ-STA-6<br>WQ-STA-7<br>WQ-STA-9<br>WS-10<br>WQ-STA-11<br>WQ-STA-13<br>WQ-STA-14<br>WQ-STA-15<br>WQ-STA-16<br>WQ-STA-17<br>WQ-STA-18<br>WQ-STA-19<br>WQ-STA-20<br>WQ-STA-21<br>WQ-STA-22<br>WQ-STA-23<br>WQ-STA-24<br>WQ-STA-25 | General Parameters: (all parameters are measured in mg/L unless otherwise noted)<br><br>Temperature (°C), dissolved oxygen(DO), nitrate+nitrite, pH (units), TSS, colour (TCU), sodium, potassium, calcium, sulphide, magnesium, ammonia, alkalinity, sulphate, chloride, turbidity (NTU), reactive silica, orthophosphate, phosphorus, DOC, conductance (µS/cm), TDS (calculated), phenols, carbonate ($CaCO_3$), hardness ($CaCO_3$), bicarbonate ($CaCO_3$)<br><br>Metals Scan:<br><br>aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, mercury, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, zinc | Four times per calendar year (not less than 30 days apart) |
| WQ-STA-22 | EDC (except for TPH and Ra226) | Weekly (at least 24 hours apart) |
| | TPH and Ra226 | Monthly (at least 15 days apart) |
| WQ-STA-23 | EDC (except for TPH and Ra226) | Weekly (at least 24 hours apart) |
| | TPH and Ra226 | Monthly (at least 15 days apart) |
| WQ-STA-24 | EDC (except for TPH and Ra226) | Weekly (at least 24 hours apart) |
| | TPH and Ra226 | Monthly (at least 15 days apart) |
| WQ-STA-25 | EDC (except for TPH and Ra226) | Weekly (at least 24 hours apart) |
| | TPH and Ra226 | Monthly (at least 15 days apart) |

*(a) EDC (Effluent Discharge Criteria)*

Thresholds for effects resulting from operations activities are based on the *Environmental Control Water and Sewage Regulations,* 2003 (NL, 2003). The 24-hour guideline outlines that increasing sediment concentrations of < 25 mg/L above background poses a very low risk to fish and their habitat. The Canadian Council of Ministers of the Environment (CCME) guideline provides guidance on turbidity thresholds. Turbidity should not increase more than 8 Nephelometric Turbidity Unit (NTU) above background over a 24-hour exposure period. In the event that the turbidity approaches the threshold criteria, increased mitigation will be employed at the location.

When conducting the water quality sampling program, steps will be taken to collect representative samples (i.e. safety first, avoid contamination, collect representative data, double-check unusual measurements, clearly document data). The HSE technician will label sample bottles with the date/time, sample identification (identifier), preservation technique and record observations. The following will be recorded:

- GPS coordinates at each station;
- field conditions: weather, surrounding vegetation, and substrate;
- water observation: colour, clarity, and odour; and,
- a photo log will be kept for all photos taken on-site, including a description of the photo and waypoint.

*In-situ* monitoring for temperature, pH, DO, specific conductivity, and TSS will be conducted with portable water quality meters.

For parameters requiring laboratory analysis, water samples will be taken in laboratory-supplied containers. Samples will be stored at 4°C and shipped to the laboratory in compliance with the shipping timelines provided by the laboratory. The general procedure for collection of surface water is as follows:

- Where safe to do so, sampling stations will be located close to the centre of the water body/watercourse.
  - Where this is not possible, water will be collected as far from the bank as safely possible without disturbing the bottom sediment.
- Sample bottles will be immersed below the water surface and facing upstream.
- Bottles pre-charged with preservatives will be filled by pouring off the contents of a clean, non-charged bottle (“General Parameters”, or similar).
  - Water for samples not requiring filtration can be decanted to individual sample bottles from a clean non-charged sample bottle (rinsed three times with sample water).
  - Samples requiring filtration will be collected with a sterile syringe and passed through a 0.45 micrometre (µm) sterile filter into individual sample bottles. A new syringe and filter are required for each sample location.
- When filling bottles, the lid will be removed and held aside without touching the inner surface. The sample bottle will be held well below the neck. The bottle will be plunged into the water to be sampled, ensuring that hands are always downstream in flowing water, or well away from the bottle opening in standing water. Containers will be tightly capped.

All data collected during the monitoring program will be tracked to allow for assessment of trends in the data. In the event that assessment of the data indicates the current levels of mitigation are not effective, the HSE technician will work to improve the mitigation measures. Increased monitoring of areas of concern will continue until monitoring indicates the mitigation is effective.

As outlined in Section 4.4, an accredited laboratory under either the Canadian Association for Laboratory Accreditation (CALA) or Standards Council of Canada (SCC) will be subcontracted to analyze the freshwater samples. All analyses will conform to the NL DOEC *Accredited Laboratory Policy* (NL DOEC 2011).

## 5.3 Air Quality Monitoring

Atmospheric emissions will result from Project activities throughout the life of the Project. An ambient air monitoring station was commissioned in December, 2016 during the construction phase of the project to collect background information. During the operations phase of the Project, it will monitor emissions of air contaminants that may result from activities such as the combustion of fuel and travel of vehicles on site. The majority of emissions during operations are likely to occur as a result of fugitive releases of particulate matter (total particulate matter [TPM], and particulate matter $PM_{10}$ and $PM_{2.5}$) from material handling and processing (e.g. crushing and screening activities) and road dust. During the operations phase, ore extraction, processing, and transportation will likely result in the emission of particulate matter, volatile process chemicals, and combustion by-products. Air quality will be monitored during the operations phase to assess changes in air quality associated with the Project as well as to confirm the effectiveness of proposed mitigation measures, and in so doing, determine if alternate mitigation strategies are required.

### 5.3.1 Ambient Air Monitoring

The air quality monitoring program will consist of continuous sampling for $NO_x$, TPM and $PM_{2.5}$. Ambient concentrations of $PM_{10}$ will be inferred based on the data collected for TPM and $PM_{2.5}$.

Large industrial facilities in the province, particularly industries utilizing combustion process equipment, are required to establish an ambient air monitoring program for the purpose of ensuring that emissions of air contaminants are less than the maximum permissible standards as set forth in *the Air Pollution Control Regulations 39/04*. The data collected from the ambient air monitoring program is used for human health risk assessments, public awareness, ensuring environmental compliance in accordance with guidance document GD-PPD-009.3 is achieved and maintained, and validation of compliance modelling (NL DOEC, 2010).

There is one sampling station installed downwind of the Project operations activities, which will assess the Project's contribution to local air quality. This station is equipped with two beta attenuation monitors (BAMs) to measure TPM and $PM_{2.5}$, and an API Teledyne T200 to measure $NO_x$. The specific location of the sampling station was selected based on the dominant wind direction, which is from the west, the location of site activities, and through consultation with the DMAE. This sampling arrangement will assist in determining the general effects of the operation activities on the ambient air quality. The Ambient Air Monitoring Station is located at UTM 21T 5,196,769 m N 621,787 m E.

The air monitoring equipment is subject to regular maintenance at the earliest of a bi-weekly period, which includes filter changes, lens cleaning, flow checks etc. Procedures and information on how to complete this maintenance can be found in the equipment operator's manuals, as well as the Ambient Air Monitoring Guidance Document GD-PPD-065 (NL DOEC, 2010). The equipment is maintained and monitored by CFI's HSE technician.

#### *5.3.1.1 Ambient Air Quality Standards*

The maximum concentration of criteria air pollutants considered to be protective of the environment are defined in the *Air Pollution Control Regulations, 2004.* For the pollutants routinely monitored in the province, the ambient air quality standards are detailed in Table 4 (NL DOEC, 2010).

**Table 4 - Ambient Air Quality Standards in NL**

| Pollutant | Averaging Period | Concentration (µg/m$^3$) |
|---|---|---|
| Nitrogen Dioxide ($NO_2$) | 1-hour | 400 |
| | 24-hour | 200 |
| | 1-year | 100 |
| Particulate Matter ($PM_{2.5}$) | 24-hour | 25 |
| Particulate Matter Total (TPM) | 24-hour | 120 |
| | 1-year | 60 |

#### 5.3.1.2 *Performance Audits*

Performance audits of industrial ambient air monitoring stations will be conducted on a schedule determined by the Department. The Department may provide notification prior to conducting an audit. A report of the audit findings are required and/or recommended corrective actions will be provided to the respective person subsequent to the audit (NL DOEC, 2010).

### 5.3.2 Greenhouse Gas Monitoring

Greenhouse gas emissions from the Project can be used to assess the potential adverse effect the Project may have on global climate change. Climate change will be considered during the Project by monitoring and reporting greenhouse gas emissions under the *Management of Greenhouse Gas Reporting Regulations* under the *Management of Greenhouse Gas Act, 2017*. This Act applies to an industrial facility that emits 15,000 tonnes of carbon dioxide equivalent or more of greenhouse gases in any year after the coming into force of the Act.

Fuel consumption data will be collected on a monthly basis for all mobile equipment as a part of the Greenhouse Gas Monitoring. Fuel consumption will be measured by recording the amount of fuel distributed by the fueling technician.

### 5.3.3 Radon Monitoring

Radon is a noble gas, similar to other noble gases such as helium and argon, that readily disperses to the atmosphere in surface waters. Generally, the radon levels in surface waters are variable and highly dependent on the sources of groundwater, surface and groundwater mixing, and surface water flow variables.

CFI will monitor radon in air with a RAD7 Radon Detector. The RAD7 is a sophisticated measuring instrument widely used in laboratories and research work around the globe, by radon testers, mitigators, and home inspectors, in all elevations, climates, and temperatures. Radon will be monitored with the RAD7 in the pit developments, mainly in areas of lower elevations, monthly for a 48 hour period. A more developed radon monitoring plan will be established once the project transitions to go underground.

## 5.4 Noise Effects Monitoring

CFI will carry out a noise assessment prior to Project commissioning. This noise assessment will be completed by professional and/or trained consultants using methods recognized by industry standard.

CFI has also developed a Hearing Protection and Conservation Program as a mitigation measure implemented into the Project's HSE plan. A training session for the Hearing Protection and Conservation Program will be provided to all employees.

# 6.0 REPORTING

Analytical and field results will be tracked and reviewed throughout the Project to assess the monitoring results against the requirements outlined in regulatory permits and approvals, mitigation measures, and other requirements of the Project, where applicable. Baseline sampling at the initiation of the field program, in conjunction with regulatory requirements, has been used to set appropriate thresholds and triggers for implementation of increased mitigation.

Data from the field assessment and analytical results will be compiled to determine if results from monitoring activities are shifting away from baseline results and potentially toward regulatory thresholds. In the event that an adverse trend is apparent in the data, early detection through ongoing assessment of the data will allow for mitigation correction to improve the results of future sampling events.

## 6.1 Water Quality Reporting

Reports to regulatory agencies will be submitted in compliance with the requirements of permits and regulatory approvals. Monthly reports containing the environmental compliance monitoring and sampling information required within the Certificate of Approval-Operations (AA17-065644) shall be submitted within 30 days of the reporting month. All related laboratory reports shall be submitted with the monthly report in an XML format which will be uploaded to an Environmental Data Management System to the Government of Newfoundland and Labrador Pollution Prevention Department.

## 6.2 Air Quality Reporting

The Department requires real-time, on-demand access to raw and diagnostics data. This data may not be modified in any way. CFI's Ambient Air monitoring will be reported through a DR DAS system. The DR DAS system software package has been chosen by the Department as the data-acquisition recovery system. Communication between the central data polling computer and the ambient air monitoring station for data retrieval shall be accomplished via an IP address or a standard telephone line and fax modem. For data stability purposes, a connection via an IP address is preferred.

## 6.3 Greenhouse Gas Reporting

CFI will submit to the Minister annually a report regarding Greenhouse Gas Emissions, and containing other information prescribed in the Regulations. As per the *Management of Greenhouse Gas Reporting Regulations, 2017,* the reporting period is for the calendar year from January 1 to December 31 of any given year. Industrial facilities that emit 15,000 tonnes or more of GHG emissions in a given year are required to file an emissions report no later than June 1 of the following year. Industrial facilities that have GHG emissions of 25,000 tonnes or more

in a given year must also have their emissions report verified and a verification report submitted no later than September 1 of the following year. Completed emission forms can be e-mailed to statenv@gov.nl.ca

# 7.0 REFERENCES

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US EPA. 1999. *Determination of Metals in Ambient Particulate Matter Using Inductively Coupled Plasma (ICP) Spectroscopy- Compendium Method IO-3.4*

US EPA. 2012. *40 CFR Part 50 – National Primary and Secondary Ambient Air Quality Standards, Appendix B – Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)*.

# Appendix 2-5: Canada Fluorspar Inc. (CFI) Environmental Effects Monitoring Plan Addendum.

APRIL 2020

ST. LAWRENCE
FLUORSPAR PROJECT

# Environmental Effects Monitoring Plan:

## Addendum for the

## Blue Beach Marine Terminal Construction Project

**Submitted to:**
Newfoundland and Labrador
Department of Municipal Affairs and
Environment

**Submitted by:**
Canada Fluorspar (NL) Inc.

CFI
CANADA FLUORSPAR INC.

# 1.0 INTRODUCTION

Canada Fluorspar (NL) Inc St. Lawrence AGS Vein Fluorspar Mine Project was released from further Provincial Environmental Assessment on November 5, 2015. Construction of the Project commenced in the 2nd quarter of 2016. Since then, all major components of the approved Project including the Mill, Mine Development, Tailings Management Facility and Ancillary Infrastructure have been completed with the exception being the St. Lawrence Marine Shipping Facility at Blue Beach. Now that the project is up and running, it is CFI's intention to commence the construction phase of a marine shipping facility in St. Lawrence (see Figure 1).

The addendum to CFI's current ***Environmental Effects Monitoring Plan – Operations*** **REV 0**, which received Ministerial approval in January 2018, is meant to include additional monitoring requirements for construction and operation activities for the Marine Shipping Facility component of the Project at Blue Beach, named Blue Beah Marine Terminal.

Given the expected timeline for project approval, and the efforts to maintain the overall project schedule during the construction season, CFI is including these additional activities as a separate addendum in advance to the full EEMP revision. These new monitoring activities will be incorporated into the actual plan in short order, and a detailed revision to the original plan will be completed and resubmitted.

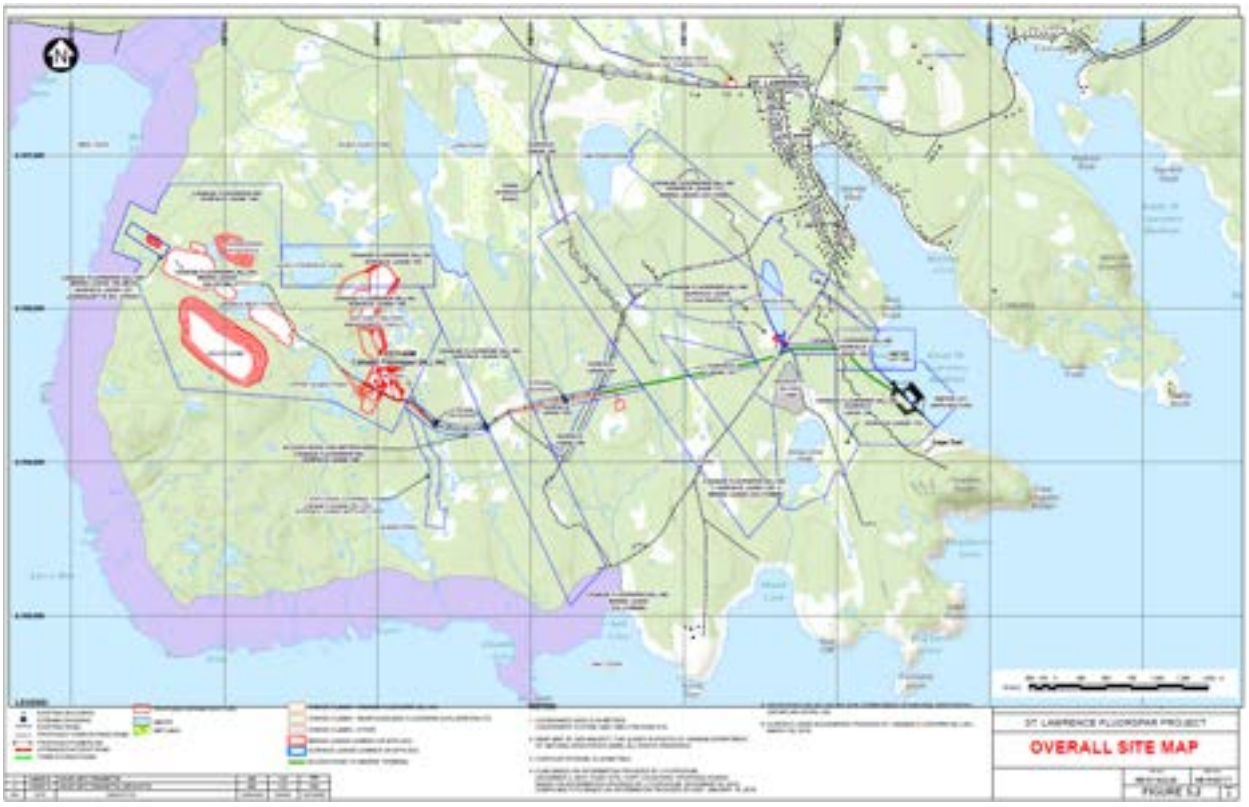


Figure 1: Overall Site Plan

# 2.0 ENVIRONMENTAL MONITORING

Environmental monitoring will occur for both compliance with regulatory requirements and commitments made by CFI to regulatory agencies or stakeholder groups throughout the life of the Project.

## 2.1 Water Quality Monitoring

Surface water quality on-site will be monitored to track the effectiveness of mitigation measures implemented to control sediment. Measurements identified are related to diffuse discharges primarily caused by episodic events throughout construction and operation activities. The following sections include five additional quarterly water sampling sites to the original EEMP. The sampling methods will follow the same procedures as listed in the original EEMP. Water samples will be taken at the listed locations prior to start of construction.

### 2.1.1 Surface Water Monitoring

Monitoring of surface water will be completed using visual field assessment, portable analysers, and sampling with laboratory analysis. Three new surface water monitoring sites have been selected along the port access road. Two additional surface water monitoring sites that were a part of CFI's 2015 Preliminary Water Quality Baseline Report (Golder, 2015c) will now be a part of the current sampling program. Sampling locations are listed in Table 1 and displayed on a map in Figure 2. Table 3 provides an outline of the water quality parameter list and sampling frequency.

**Table 1: Surface Water Quality Sampling Locations**

| Station ID | Location | Northing | Easting |
|---|---|---|---|
| WQ-STA-26 | Hay Pook Pond Outlet #1, Downstream of Port Access Road | 5,195,131 | 620,701 |
| WQ-STA-27 | Hay Pook Pond Outlet #2, Downstream of Port Access Road | 5,195,187 | 621,000 |
| WQ-STA-28 | Clarke's Pond Outlet, Downstream of Port Access Road | 5,195,480 | 622,123 |
| WS-2 | Clarke's Pond Outlet, Upstream of Port Access Road | 5,195,673 | 621,983 |
| WS-5 | Shoal Cove Pond Outlet, Upstream of Port Access Road | 5,194,073 | 622,010 |

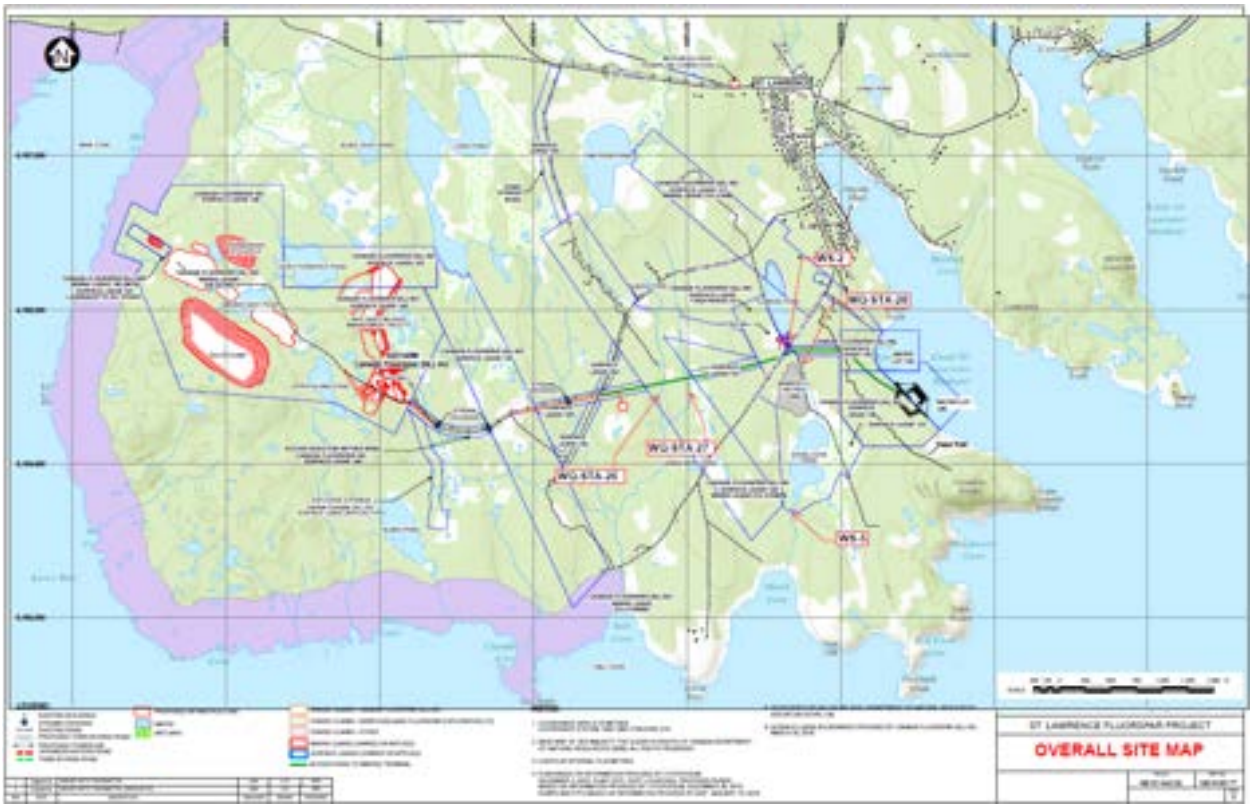


Figure 2: Surface Water Quality Monitoring Station Locations

**Table 2: Water Quality Parameter List**

| Station ID | Parameters | Frequency |
|---|---|---|
| WQ-STA-26<br>WQ-STA-27<br>WQ-STA-28<br>WS-2<br>WS-5 | General Parameters: (all parameters are measured in mg/L unless otherwise noted)<br><br>Temperature (°C), dissolved oxygen(DO), nitrate+nitrite, pH (units), TSS, colour (TCU), sodium, potassium, calcium, sulphide, magnesium, ammonia, alkalinity, sulphate, chloride, turbidity (NTU), reactive silica, orthophosphate, phosphorus, DOC, conductance (µS/cm), TDS (calculated), phenols, carbonate ($CaCO_3$), hardness ($CaCO_3$), bicarbonate ($CaCO_3$)<br><br>Metals Scan:<br><br>aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, mercury, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, zinc | Four times per calendar year (not less than 30 days apart) |

## 3.0 REPORTING

Analytical and field results will be tracked and reviewed throughout the Project to assess the monitoring results against the requirements outlined in regulatory permits and approvals, mitigation measures, and other requirements of the Project, where applicable.

Data from the field assessment and analytical results will be compiled to determine if results from monitoring activities are shifting away from results gathered prior to start of construction and potentially toward regulatory thresholds. In the event that an adverse trend is apparent in the data, early detection through ongoing assessment of the data will allow for mitigation correction to improve the results of future sampling events.

### 3.1 Water Quality Reporting

Reports to regulatory agencies will be submitted in compliance with the requirements of permits and regulatory approvals. Quarterly reports containing the environmental compliance monitoring and sampling information shall be submitted within 30 days of the reporting month. All related laboratory reports shall be submitted with the quarterly report in an XML format which will be uploaded to an Environmental Data Management System to the Government of Newfoundland and Labrador Pollution Prevention Department.

## 4.0 REFERENCES

CFI (Canada Fluorspar (NL) Inc.) 2015a. AGS Fluorspar Project, Environmental Assessment Registration Pursuant to the Newfoundland and Labrador *Environmental Protection Act.* Submitted to the Newfoundland and Labrador Department of Environment and Conservation, 230 pp.

CFI (Canada Fluorspar (NL) Inc.) 2017. *Environmental Effects Monitoring Plan for Project Operation Phase, St. Lawrence Fluorspar Project*. June 2017.

Golder 2015c. AGS Project Preliminary Water Quality Baseline Report. Report Submitted to Canada Fluorspar (NL) Inc., May 2015.

# Appendix 2-6: Canada Fluorspar Inc. (CFI) Environmental Protection Plan

JUNE 2017

# ST. LAWRENCE FLUORSPAR PROJECT

# Environmental Protection Plan: Operations Phase

**Submitted to:**
Newfoundland and Labrador Department of Municipal Affairs and Environment, Environmental Assessment Division

Submitted by:
Canada Fluorspar (NL) Inc.

REV 0 - EPP

CFI
CANADA FLUORSPAR INC.

# Revision Control Table

| Revision Date | Section Revised | Control Copy Holder Signature |
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# Revision Control Sheet

| Revision Date | Section and Page Number Revised | Revision Instructions |
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Department of Fisheries and Land Resources Newfoundland and Labrador Species at Risk Data Sheets

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Environmental Protection Procedures

**APPENDIX E**

Newfoundland and Labrador Department of Municipal Affairs and Environment Water Resources Management Division - Environmental Guidelines

# 1.0 INTRODUCTION

Canada Fluorspar (NL) Inc. (CFI) is in the process of developing the St. Lawrence Fluorspar Mine (the Project) located in St. Lawrence, Newfoundland and Labrador (NL). The Project is located partly on a brownfield site used historically for mining. The Project includes the construction, operation, rehabilitation, and closure of a surface and underground Mine, a Mill, a Tailings Management Facility (TMF), and ancillary infrastructure. Concentrate will be trucked to an existing ship loading facility at Kiewit Offshore Services' (KOS) Cow Head Facility in Mortier Bay. The surface Mine will consist of three open pits: Open Cut Pit (OCP), Center Pit (CP), and Grebes Nest Pit (GNP). Underground mining will be phased in when portal access can be established within the open pits, which will not occur until later in the operations phase of the Project. As such, the underground mining activities are not covered in this *Environmental Protection Plan (EPP)*, which will be revised prior to underground mining. The operations phase is expected to last approximately ten years and will be followed by the rehabilitation and closure phase. The length of the operations phase is based on the current resource estimate and may be lengthened should additional resources be identified. The Mine will supply adequate ore to meet a production of 200,000 tonnes per year of concentrate throughout the life of the Mine. Construction of the Project began in May, 2016. The anticipated mill commissioning date is August, 2017.

## 1.1 Purpose

The Project's Environmental Assessment (EA) Registration, completed by Golder Associates Ltd. (Golder) and submitted to the NL Department of Municipal Affairs and Environment (DMAE), formerly the NL Department of Environment and Conservation, in June 2015, identified potential environmental effects related to routine activities associated with construction, operation, rehabilitation, and closure of the Project. It also identified possible accident scenarios during all Project phases (CFI 2015). Mitigation measures are required for each phase of the Project to properly address these potential environmental effects either from routine activities or from potential accident scenarios.

The Project was released from further EA by the Minister of Environment and Conservation on November 5, 2015, subject to certain conditions. One of the conditions was that an Environmental Protection Plan (EPP) must be submitted to and approved by the Minister of Environment and Conservation, at the time, prior to the start of construction. The *EPP for the Construction Phase* was prepared by Golder on behalf of CFI to document mitigation measures for the construction phase of the Project. This *EPP for the Operations Phase* has been prepared by CFI as an update to the construction version. This operations phase document will evolve through the next Project phases and will be adapted for the decommissioning, and mine closure phases, as appropriate.

## 1.2 Objective

Environmental Protection Plans (EPPs) are important to mining projects. This EPP documents the applicable environmental regulations and the practices and procedures that must be implemented to mitigate adverse environmental effects associated with the Project.

CFI is committed to implementing and continually developing this EPP (i.e. adaptive management). In this way, a high level of environmental protection will be ensured throughout the Project's work areas and activities. This EPP is a working document to be used on-site by Project personnel and contractors. It is also to be used at the corporate level to ensure policy statements are followed. This EPP can serve as a tool for site personnel and regulators to monitor regulatory compliance, and for CFI to improve on their environmental performance.

This EPP contains environmental protection procedures for routine activities anticipated during the operations phase of the Project, identifies applicable permits, authorizations, and approvals, and provides general guidance for responding to incidental events.

This document forms an integral part of CFI's Health, Safety and Environment (HSE) Management System. This EPP will be used in conjunction with other Project documents and manuals to ensure compliance with regulatory requirements or conditions during Project operation. Specifically, the objectives of this EPP are to:

- Document and describe the measures to mitigate potential adverse environmental effects resulting from Project operations activities.
- Provide clear and concise direction to Project personnel and contractors regarding the procedures for protecting the environment.
- Communicate environmental mitigation requirements and provide instructions to Project personnel and contractors.
- Outline inspection and monitoring requirements for Project personnel and contractors.
- Provide the basis for the environmental monitoring and documentation process to ensure compliance and demonstrate that the Project's environmental commitments have been met.
- Be used as an education tool for the orientation and training of Project personnel and contractors.
- Define Project personnel and contractor's roles and responsibilities for the protection of the environment under the terms of their employment with CFI.
- Communicate environmental commitments and mitigation measures to regulatory agencies, stakeholders, and the public following the established protocol.
- Communicate changes in the Project through the revision process.
- Provide a reference to applicable legislative requirements and guidelines.

The environmental management practices and mitigation measures for Project operations presented in this EPP will be used for guidance in Project operation and maintenance activities. This EPP will be adapted as the Project continues.

In preparing this EPP, every effort has been made to include all of the environmental commitments made by CFI during the course of the regulatory permitting and approvals process for the Project. This EPP is a stand-alone document. As approvals and permits for the Project are issued, their conditions will be reviewed to determine if a revision to this EPP is warranted (see Section 3.1 for the revision control process).

## 1.3 Scope of Application

Canada Fluorspar (NL) Inc.'s HSE Management System includes an environmental plan representing the way in which they will manage environmental functions and requirements. This plan will be adapted where required throughout the extent of the Project.

- Environmental Protection Plans developed for each Project phase (i.e. construction, operation, and rehabilitation and closure) are the foundations that support the Project's overall environmental management system. Environmental Protection Plans are critical for communicating environmental protection procedures

and serve as an important reference for those that implement the environmental protection measures. Furthermore, it is against the EPP backdrop that the Project's environmental performance will be evaluated. Other plans and programs, which collectively form the Project's HSE Management System, include the following:

- Waste Management Plan
- Best Management Practise Plan (BMPP)
- Best Available Control Technology (BACT)
- Environmental Effects Monitoring Plan (EEMP)
- Mine Development Plan
- Rehabilitation and Closure Plan

The scope of this version of the EPP is intended only for the operations phase of the Project. This document will evolve and be adapted for the rehabilitation and closure phases.

## 1.4 Degree of Application

The application of this procedure is:

- Mandatory ☒
- Recommended ☐
- Optional ☐

## 1.5 Document Organization

This *EPP for the Operations Phase* comprises the following sections:

- *Section 1:* Introduces the purpose, objective, scope, and degree of application and content of the EPP.
- *Section 2 and Section 3:* Roles and responsibilities of the Project's Environmental Management Team are discussed, as well as the strategy for development, implementation and maintenance of the EPP. Contact phone numbers are provided in Appendix A.
- *Section 4*: Provides relevant legislation, in addition to regulatory requirements, authorizations, permits, and approvals required for the operations phase of the Project. This section includes references for useful information, some of which is referenced in Appendices B, C, D, and E.
- *Section 5:* Overview of environmental concerns and general environmental protection procedures associated with the various activities anticipated to occur during Project operations. Specific procedures are included in Appendix D.
- *Section 6:* Contains area-specific information and procedures for the principle Project work areas (i.e. project infrastructure, stockpiling, the TMF, and the Mine and Mill Sites, and KOS Marine terminal). Other area-specific information may be developed for other Project areas in the future, as appropriate. Area specific information will be modified or expanded as needed throughout the Project's operations phase.

- *Section 7:* Provides general information on the contingency plans for incidents and unplanned events.
- *Section 8:* Outlines the communications protocol to be implemented for the duration of the Project's operations phase.
- *Section 9:* Describes the forms to be used to document the implementation of the EPP during the Project's operations phase.

The following appendices provide information and forms referred to in these sections. A short description of each of appendices is provided below:

*Appendix A:* Contact information for Project key individuals, which are referred to in Section 2 to Section 3;

*Appendix B*: Guidance Documents;

*Appendix C*: NL DMAE Species at Risk Data Sheets;

*Appendix D* Environmental Protection Procedures; and

*Appendix E*: NL DMAE (Water Resources Management Division) Environmental Guidelines.

# 2.0 ROLES AND RESPONSIBILITIES

This section provides an outline of the participants in the Project operations phase, their roles, and their respective responsibility for environmental compliance, stewardship, mitigation, reporting, and monitoring. All parties are responsible for the protection of the environment and it is critical that roles and responsibilities in both general duties and emergency situations are defined and understood.

The EPP will be implemented by an Environmental Management Team. It is expected that all personnel working on the Project site be familiar with and implement protection measures outlined in the EPP.

## 2.1 General Manager

Canada Fluorspar (NL) Inc.'s General Manager is responsible for providing overall direction for the Project and its (HSE) Management System, and approving environmental policies and plans. The General Manager has executive responsibility for ensuring that the EPP is developed and the Project is implemented such that the EPP objectives are achieved and regulatory requirements are met. The General Manager will review the effectiveness of the environmental management practices with respect to compliance with the EPP requirements, Project-specific environmental requirements, and applicable environmental laws and regulations. The General Manager will ensure plans for corrective action are developed and implemented for any identified non-compliances.

## 2.2 Health, Safety, Environment (HSE) Manager

Canada Fluorspar (NL) Inc.'s HSE Manager will report directly to CFI's General Manager, and will be responsible for the implementation of the EPP, initiating and participating in team meetings, being involved in obtaining required environmental permits and authorizations, and will be responsible for site environmental monitoring. During operations, the HSE Manager will provide leadership, oversight, and accountability to the employees, who will be directly supported by the HSE team. The HSE Manager is also responsible for the integration and implementation of CFI's Occupational Health and Safety (OH&S) Standards in the EPP and on the Project site.

The HSE Manager has the authority to provide direction to employees, including issuance of stop-work orders where employees are not in compliance with approved health, safety or environmental procedures. The HSE Manager will be a resource to the General Manager and employees, and will provide advice on all environmental matters as they arise.

Specific responsibilities include, but are not limited to:

- Promoting an understanding of the approved environmental programs and plans, and promoting environmental awareness among onsite personnel.
- When required, providing Project personnel training on the EPP, environmental management, and social responsibility requirements.
- As appropriate, assisting and supporting all Project personnel on environmental issues, and follow-up on environmental concerns / issues, incidents and malfunctions, as well as unsafe acts and conditions to ensure they are addressed in a timely manner.
- Providing oversight and guidance to the HSE technician.
- Conducting formal and informal HSE inspections and issue reports as required. This may include environmental issues, as appropriate.

- Immediately reporting to CFI's General Manager any environmental compliance issue or failed mitigation.
- Immediately reporting to CFI's General Manager identification of any species at risk.
- Immediately reporting to CFI's General Manager any identification of cultural heritage artifacts.
- Updating the General Manager and Department Superintendents on environmental issues occurring on the Project site, as identified.
- Verifying and ensuring emergency readiness, and participate in response and recovery, in coordination with the General Manager and Department Superintendents.

## 2.3 HSE Technician

The environmental monitoring will be completed by an HSE technician who will report to the HSE Manager. The HSE technician will be responsible for monitoring compliance of employees with measures identified in this EPP and verifying implementation of environmental mitigation measures to ensure the operations activities are implemented in a safe, environmentally responsible, and productive manner.

Specific responsibilities include, but are not limited to:

- Monitoring operations activities for compliance with all applicable environmental commitments, laws, standards and regulations, and the provincial / federal environmental regulations and permit requirements.
- Providing operations site personnel support and guidance on the Project's environmental requirements.
- Conducting site visits, as appropriate for the condition and the Project activity, and assessing the implementation and effectiveness of the environmental mitigation.
- Attending any high risk procedures undertaken at the site.
- Initiating actions to resolve environmental issues, where appropriate.
- Working with employees to improve any mitigation measures that are ineffective or equipment that is in a state of disrepair. In urgent conditions, where a supervisor is unavailable and the environment is in imminent danger, repairing mitigation controls that have been damaged, where it is safe to do so.
- Collecting and reporting on required environmental monitoring data.
- Maintaining environmental monitoring and sampling equipment.
- Collecting, preserving, appropriately documenting, and sending for analysis all samples, including Quality Assurance / Quality Control (QA/QC) samples, requiring off-site analysis for monitoring the Project operations as defined in the operations-based EEMP and supporting documentation.
- Conducting and documenting the results of field analysis (e.g. water sampling programs).
- Assisting and supporting supervisors, workers, and contractors on the appropriate training and education needed to perform required tasks in an environmentally responsible manner.
- Assisting in the delivery of Project specific training (e.g. orientations, supervisor responsibilities, wildlife awareness, mitigation) and supplemental on-the-job training in environmental mitigation, spills prevention, and other tasks as required.

- Providing input to the HSE Manager for the HSE performance reports (e.g. weekly and monthly environmental performance statistics).
- Keeping the HSE Manager informed of any concerns, incidents, and unmitigated risk.
- In conjunction with the HSE Manager, confirming that applicable permits and approvals are in place prior to initiation of work, and communicating Project scope changes that could require additional permits or amendments to existing approvals.
- Recognizing and rewarding people who have positively affected environmental performance.
- Conducting formal and informal environmental inspections and issuing reports as required by the HSE Manager.

## 2.4 Department Superintendents

The Mine, Mill, and Maintenance Superintendents (Department Superintendents) are responsible for managing the operations of the project, including the Project's environmental management system, and reporting directly to CFI's General Manager, and working in collaboration with the CFI HSE Manager. The Department Superintendents are responsible for ensuring that Project teams and contractors understand the Project commitments and the expectations for dealing with stakeholders, including the public.

During operations, the Department Superintendents will provide leadership, oversight, and accountability to each employee, who will be directly supported by the environmental team.

Specific responsibilities include but are not limited to:

- Allocating resources and assigning responsibilities for the implementation, operation and ongoing improvement of the Project's environmental management processes including all requirements of the EPP.
- Requiring that adequate resources, including competent personnel, are provided, and processes are in place for the achievement of environmental objectives.
- Visibly leading by personal example the implementation of the EPP and to support all Project environmental initiatives.
- Setting expectations and holding supervisors accountable for environmental deliverables and meeting agreed performance metrics.
- Monitoring, reviewing, and reporting on environmental performance, as required.
- Actively promoting environmental excellence and the environmental vision to create a strong culture of environmental protection awareness.
- As appropriate, liaising with external regulators and stakeholders.
- Reporting any onsite occurrences of non-compliance issues to CFI's General Manager, as well as the HSE Manager.
- Intervening and correcting at-risk behaviour and correcting inappropriate environmental performance.
- Understanding and applying general legislative environmental requirements.

- Developing and providing data required for permitting, approvals, and other reporting requirements.
- Having and applying a full working knowledge of the EPP and an understanding of the requirements of the environmental management system as they apply to the Project.
- Consulting on and resolving environmental issues, including leading incident investigations, etc.
- Recognizing and rewarding people who have positively affected environmental performance.

## 2.5 Department Supervisors

The Mine, Mill, and Maintenance Supervisors (Department Supervisors) will be located on the Project site and will be responsible for overseeing operation. The Department Supervisors will report directly to their Department Superintendent and will work in collaboration with CFI's HSE Manager.

The Department Supervisors provide direction to project personnel in the application of the provisions of the EPP and associated procedures. The Department Superintendents and the HSE Manager provide guidance to the Department Supervisors as required. Under the direction of the Superintendents, the Supervisors have overall accountability for the environmental performance at the Project site.

Specific responsibilities include but are not limited to:

- Supporting the Department Superintendents, as well as the General Manager and HSE Manager, in the implementation of the EPP and environmental plans and procedures.
- Complying with and administering all legal obligations imposed on the Department Superintendents by governing regulations, codes and practices, and provincial, federal, and local regulations and legislation.
- Apart from those activities performed by the Department Superintendents, allocating resources and assigning responsibilities for the implementation, operation, and ongoing improvement of the Project environmental management processes as defined in the EPP and other Environmental Management Plans.
- Supporting the Department Superintendents with ensuring that adequate resources are provided and processes are in place for the achievement of the EPP objectives.
- Visibly leading by personal example the implementation of the EPP and supporting all Project environmental initiatives.
- Actively promoting environmental excellence and the environmental vision to create a strong culture of environmental protection awareness.
- Setting expectations and holding management accountable for delivery of environmental deliverables and meeting agreed performance metrics.
- Ensuring all personnel receive the appropriate environmental training.
- Ensuring all mitigation and spill containment equipment is supplied and maintained at the immediate workplace and is fit for purpose.
- Ensuring proper reporting and investigation of incidents that are the result of a near miss, harm to the environment, or damage to equipment is initiated by supervisors and that corrective actions are followed through.

- Attending, and participating in, toolbox and weekly environment meetings.
- Intervening and correcting at-risk behaviour and correcting inappropriate environmental performance.
- Immediately reporting to the appropriate Department Superintendent and CFI's HSE Manager any environmental compliance issue, failed mitigation, and changes to the schedule that may affect environmental mitigation implementation or monitoring.
- Immediately reporting to the appropriate Department Superintendent and CFI's HSE Manager identification of any species at risk.
- Immediately reporting to the appropriate Department Superintendent and CFI's HSE Manager any identification of cultural heritage artifacts.
- Understanding and applying all legislative environmental requirements.
- Consulting on and resolving environmental issues, including leading incident investigations, etc.
- Recognizing and rewarding people who have positively affected environmental performance.
- Participating in management reviews of the Project's Environmental Management Plans' procedures as required, including the EPP.

## 2.6 Contractors

Contractors will participate in the operations of the Project and will report directly to the appropriate Department Superintendent. Contractors are responsible for implementing environmental protection procedures as outlined in this EPP, and shall comply with all relevant regulations, policies, governing documents, guidelines, permits, approvals, and authorizations.

Specific responsibilities include but are not limited to:

- Understand and accept CFI's commitments and obligations as outlined in the EPP.
- Provide written procedures, where required, for CFI and regulatory review.
- Implement operations activities in accordance with the EPP, contractual requirements, and other Project-specific and regulatory requirements.
- Ensure all contractor site personnel are aware of the environmental requirements of the Project.
- Attend meetings with the HSE Manager, Department Superintendent, and site personnel, as required.
- Keep a current version of the EPP and all applicable permits on hand.
- Communicate regularly with the HSE Manager and appropriate Department Superintendent to ensure compliance with the requirements of the EPP and all applicable permits.
- Notify the HSE Manager and appropriate Department Superintendent of non-compliances with the EPP or regulatory requirements.
- Immediately notify the HSE Manager and appropriate Department Superintendent of any operations activity requiring agency notification (e.g. spills in reportable quantities) and / or other incidents that have the potential to affect the environment.

## 2.7 All Personnel

All Project personnel are responsible for following Project environmental requirements and undertaking their respective tasks in a manner that is respectful of the environment.

Specific responsibilities include but are not limited to:

- All personnel participating in the Project are responsible for the success of the environmental performance of the Project.
- Participating in the environmental training required for the Project.
- Understanding and applying Project environmental requirements.
- Utilizing the resources provided and the processes in place for the achievement of EPP objectives.
- Regarding health, safety, and environment as a central theme in their actions.
- Maintaining their competence, as required, enabling them to contribute fully to the successful environmental performance.
- Ensuring that the correct tools and equipment are used for all tasks.
- Knowing and implementing the environmental procedures and plans, as appropriate.
- Actively participating in the implementation of all Project environmental initiatives including hazard reporting and elimination.
- Reporting, to their Supervisor, any defects or concerns in equipment that could result in an adverse environmental effect.
- Immediately reporting any issues, changes, or concerns noted with respect to environmental mitigation (e.g. buffer zones, silt fences, dust levels) and instituting temporary corrective action until a more permanent solution can be administered.
- Immediately reporting any spills to their Supervisor or appropriate party. Implementing Contingency Plans in the event of an emergency or spill.
- Immediately reporting to their Supervisor or appropriate party any environmental compliance issue, failed mitigation, and changes to the schedule that may affect the implementation or monitoring of mitigation measures.
- Immediately reporting any identification of any species at risk to their Supervisor and CFI's HSE Manager.
- Immediately reporting to their Supervisor and CFI's HSE Manager any identification of cultural heritage artifacts.
- Notifying their Supervisor of any incident or near miss that occurs and supporting the investigation into the same.
- Intervening and correcting at-risk behaviour and correcting inappropriate environmental performance.
- Avoiding any improvising that entails additional risk to the environment.

- Warning other personnel of known hazards or environmentally sensitive areas.
- Participating in emergency response exercises, as required.
- Disposing of all waste materials in the correct manner.
- Reporting to their Supervisor, all health, safety, and environmental incidents and near misses at the time of their occurrence.

## 2.8 Provincial, Federal, and Municipal Government Representatives

Provincial, federal, and municipal government representatives will be invited to visit the Project site periodically to ensure compliance with applicable government regulations and permits, as per the mandates of their respective agencies. They will be asked to provide information and advice directly to CFI and the Department Superintendents.

# 3.0 DEVELOPMENT AND IMPLEMENTATION

The *EPP for the Operations Phase* may need to be revised and expanded as the Project proceeds. As additional approvals and permits for the Project are issued, their conditions will be reviewed to determine if a revision to the EPP is warranted.

## 3.1 Maintenance of the EPP

Subsequent to the filing of the *EPP for the Operation Phase* with NL DMAE, CFI will maintain and keep the EPP current. This will be the responsibility of the HSE Manager. CFI will provide the most current and comprehensive version of the EPP to Project personnel, applicable regulatory agency representatives, stakeholders, interested parties, and others as listed on the distribution list (Section 3.1.1). CFI is responsible for implementing the following actions:

- Provide a training course for relevant Project personnel including contractors, to ensure proper implementation of the best management practices (BMPs) and mitigation measures contained in the EPP.
- Distribute copies of the EPP to appropriate Project site locations and Project personnel, including contractors.
- Implement EPP revisions and issue approved revision pages of the EPP to those listed on the distribution list (i.e. control copy holders).
- Review applicable sections of the EPP as warranted ensuring the BMPs and mitigation measures contained therein are current and comprehensive.

### 3.1.1 Distribution List

The following distribution list provides the name, contact information, and member organization of the EPP control copy holders. All revisions and updates to the EPP will be distributed to every party on this list.

**Table 1: EPP for the Operation Phase Distribution List**

| Control Copy Number | Name | Organization | Contact Information |
|---|---|---|---|
| 00 | Lindsay Gorrill, President and CEO | Canada Fluorspar (NL) Inc. | PO Box 337<br>St. Lawrence, NL, Canada<br>A0E 2V0<br>(709) 873-3331 |
| 01 | John Harte, HSE Manager | Canada Fluorspar (NL) Inc. | PO Box 337<br>St. Lawrence, NL, Canada<br>A0E 2V0<br>(709) 873-3331 |
| 02 | TBD, General Manager | Canada Fluorspar (NL) Inc. | PO Box 337<br>St. Lawrence, NL, Canada<br>A0E 2V0<br>(709) 873-3331 |

| Control Copy Number | Name | Organization | Contact Information |
|---|---|---|---|
| 03 | Richard Strang, Mine Superintendent | Canada Fluorspar (NL) Inc. | PO Box 337<br>St. Lawrence, NL, Canada<br>A0E 2V0<br>(709) 873-3331 |
| 04 | Marius Nieuwoudt, Mill Superintendent | Canada Fluorspar (NL) Inc. | PO Box 337<br>St. Lawrence, NL, Canada<br>A0E 2V0<br>(709) 873-3331 |
| 05 | TBD, Maintenance Superintendent | Canada Fluorspar (NL) Inc. | PO Box 337<br>St. Lawrence, NL, Canada<br>A0E 2V0<br>(709) 873-3331 |
| 06 | Glen Rowe, Navigable Waters Protection Officer | Transport Canada | (709) 582-3241 |
| 07 | Dr. Amir Ali Khan, Manager – Water Rights and Investigation Section, Water Resources Management Division | Newfoundland Department of Municipal Affairs and Environment (NL DMAE) | (709) 729-2295 |
| 08 | Dexter Pittman, Manager - Industrial Compliance Section, Pollution Prevention Division | NL DMAE | (709) 729-6771 |
| 09 | Alex Smith, Director – Mines / Mineral Development | Newfoundland Department of Natural Resources (NL DNR) | (709) 729-6379 |

Additional copies of the EPP are circulated as dated and will include distribution to all regulatory permit providers listed in Table 1 and any additional interested parties, as requested. If the EPP has been updated, control copy holders will provide updated copies to those circulation copy holders to whom they had originally provided a copy.

### 3.1.2 Revision Notice

Circumstances may arise in which it may be appropriate to edit or change sections of the EPP during the course of Project operations. If it is determined a revision to the EPP is warranted, the following guidelines and internal process will apply. EPP revisions will be initiated by Project personnel only.

Project personnel may initiate revisions by forwarding suggested changes or additions to the HSE Manager on the Revision Request Initiation Form which is provided in Section 9.0. All revision requests must be approved by the HSE Manager. When a revision request is received by the HSE Manager, a draft will be issued to all control copy holders for review. After the draft is reviewed and deemed acceptable by all parties, a final version will be issued. If a revision request is not approved, the HSE Manager will forward a letter to the originator explaining the rationale for the decision.

Each revision will be accompanied by the Revision Control Sheet provided at the beginning of the EPP that provides the revision instructions, and lists the sections and specific pages being superseded.

An updated EPP Table of Contents and Revision Control Table (provided at the beginning of the EPP) will be included as required with each revision.

The Revision Control Table will be kept current by control copy holders to track any revisions made to each section and sub-section of the EPP. The EPP Table of Contents will indicate the current revision status of each section.

Within two working days of receiving a revision, control copy holders are required to:

- Read the text of the revision.
- Check the Revision Control Sheet to ensure that all listed pages have been received.
- Remove and destroy the superseded pages.
- Insert the revised pages in the proper place in the EPP.
- Page check the EPP, using the updated Table of Contents, to ensure that the EPP is complete.
- Enter the revision number and date on the Revision Control Table.
- Ensure that any circulated copies of the EPP under their direction are updated.
- Take appropriate actions to incorporate the revision into practice.

## 3.2 Procurement Requirements

Contractors invited to bid on work for the operation of the Project will receive a copy of the EPP as part of the bid package. This will provide potential contactors with clarity on the requirements of the EPP and entrench the contractual obligation to follow the requirements of the EPP within the procurement process. Changes to the EPP may occur between the time of the bidding process and the time when the work is completed. The contractor will be responsible for ensuring they have and follow the most up-to-date version of the EPP.

## 3.3 Competency

Achievement of environmental protection and health and safety objectives requires the selection of people who share CFI's values, beliefs, and commitment to environmental leadership. All Project personnel must demonstrate the expected behaviours and performance associated with their role and task.

All Project personnel must be adequately qualified, suitably trained, and supported with sufficient experience to conduct their work activities safely and in a socially and environmentally responsible manner.

### 3.3.1 Expectations

Project personnel and contractor management are expected to ensure:

- Recruitment and selection criteria may include a subjective evaluation of the applicant's environmental values.
- Commitment to developing a culture that reflects the EPP is communicated during the recruitment and selection process.
- Skill, knowledge, and experience requirements relative to the responsibilities of the job must be assessed and verified prior to performing any activities unassisted.
- Appropriate to their function, location and activities, all Project personnel must be oriented, trained, and accredited where necessary in:
    - Their roles and responsibilities in meeting requirements of the EPP, including work and emergency response procedures appropriate to the risks to which they are exposed, or which they may create.

- The significant risks associated with their activities and the benefits of working in an environmentally responsible manner.
- The potential consequences of deviation from plans and procedures.

### 3.3.2 Training Records

Records of environmental training will need to be available on-site. Training attendance shall be recorded for all internal and external training and awareness sessions.

### 3.3.3 Licenses and Certificates of Competency

All Project personnel performing activities or tasks on Project sites that require statutory licenses or certificates of competency (e.g. Transportation of Dangerous Goods [TDG]) shall submit a current copy of the appropriate license or certificate to the HSE Manager prior to starting work on the site.

Details of all licenses and certificates of competency will be held in the person's file at site by the individual's employer. Statutory records are jointly held, as required, by both the HSE Manager and contractors.

Verification of competency will be demonstrated, as required.

## 3.4 Mechanisms for Implementation

The effectiveness of this EPP relies heavily on good communication between all Project personnel and contractors, as represented by CFI's General Manager, Mine and Mill Superintendents, and the HSE Manager. Mechanisms to be used to ensure compliance with this EPP include: annual environmental performance reviews, and weekly environmental and toolbox meetings.

### 3.4.1 Annual Environmental Performance Review

At the end of each operation year, CFI's managers and site contractors will gather for an environmental performance meeting to review all work activities that relate to environmental concerns, issues and / or mitigation. The review process will provide all parties a chance to evaluate overall environmental performance and compliance with government regulations, permits, and the EPP.

### 3.4.2 Weekly Environmental Meetings

Weekly environmental meetings involving CFI's HSE Manager, HSE technician, Mine, Mill, and Maintenance Superintendents, and contractors will be held to review any environmental issues and/or EPP implementation items. These meetings serve to anticipate and resolve environmental concerns before they arise, or to effectively deal with them should they occur. Non-compliance items identified during routine monitoring activities are tabled for discussion and resolution. In addition, the meetings provide an opportunity to keep all onsite Project personnel and contractors informed of upcoming work activities.

### 3.4.3 Toolbox Meetings

Toolbox meetings are short, informal meetings that are held with field crews and supervisors at the beginning of each work shift. Discussion involves the work task assignment for the day and any associated safety concerns or hazards. These meetings also provide the opportunity to discuss environmental concerns and applicable mitigation measures.

## 3.5 Training

The site orientation training of all Project personnel, contractors, and vendors that require access to the site will include discussion on environmental policies and familiarization with protection measures as detailed in the EPP. Project personnel and contractors will undergo regular training and refreshers to ensure they are familiar with potential environmental issues, roles and responsibilities, mitigation requirements, communication of concerns, and emergency response procedures.

Records of all employees trained and the dates will be maintained by the HSE department.

### 3.5.1 Site Orientation

A site orientation is developed and presented to all Project personnel involved in operation activities on the site. New workers at the Project site are presented with general information and rules and procedures to assist them in performing their work safely and with minimal adverse effect on the environment. This site orientation includes elements of the EPP such as: spill response and reporting, environmental protection procedures, proper storage and handling of materials, encounters with wildlife and listed species, waste management, and emergency response.

### 3.5.2 Visitor Orientation

A visitor orientation is provided to those persons who have arrived at the Project site but will not be completing any field work (e.g. meetings, office work, deliveries). The visitor orientation will cover relevant environmental protection measures, Project emergency procedures, environmental incident reporting requirements, and other general Project environmental requirements.

Any person who has not taken the full orientation program shall be supervised by a designated, oriented Project person at all times, and shall abide by the EPP.

### 3.5.3 Contractor Orientation

Contractors may develop and deliver additional environmental orientations to their workforces, visitors, consultants, and inspectors on the details of the EPP, and / or corporate requirements. The Contractor orientations are subject to review and acceptance by CFI's HSE Manager.

## 3.6 Environmental Monitoring

Environmental monitoring is an essential component of Project site activities. This monitoring occurs on a daily basis by the HSE technician. Every aspect of the operation is subject to inspection.

The basis for environmental monitoring at the Project site is embodied in the EPP. As an important component of the EPP, conditions of regulatory permits and approvals also define the scope of monitoring activities. The EEMP should also be used in conjunction with the EPP to ensure all monitoring requirements are achieved.

Non-conformance, defined as a deviation from the EPP, other CFI policies, or legislative requirements, shall be documented and addressed during weekly meetings with the HSE team. Non-conformance environmental issues will also be reported to the appropriate regulatory authority.

Corrective action shall be identified to prevent the non-conformance from reoccurring, target dates shall be agreed upon, and responsibilities shall be assigned to appropriate personnel. This documentation shall be distributed to the General Manager and Department Superintendents, and written notice of agreed corrective action will be forwarded to responsible parties so that issues are appropriately resolved. If serious non-conformance items (as

defined by CFI) are noted that require immediate attention, the HSE Manager and HSE technician, will have authority to temporarily halt Project activities, until such time as corrective actions can be implemented.

If serious non-conformance items are noted that require immediate attention and resources are not immediately available, or if agreed corrective action is not implemented in a timely and effective manner, then appropriate resources shall be contracted by the Department Superintendents to immediately undertake the required action.

# 4.0 REFERENCE INFORMATION

This section summarizes relevant legislation, regulatory requirements, authorizations, permits, and approvals required for the operations phase of the Project.

## 4.1 Relevant Legislation, Permits, Approvals, and Authorizations

Work within the Project site will be initiated only after the required regulatory approvals have been obtained. The location of Project components and other features discussed in the following sections can be found on Figure 1 in Section 6.0. A registry of all permits required for the Project is located in a separate CFI database. This registry will be updated as permit requirements change over the course of the Project.

### 4.1.1 Federal

Federal approvals and authorizations that have been acquired or may later be required are outlined in Table 2.

**Table 2: Potentially Applicable Federal Permits, Approvals and Authorizations**

| Agency | Permit, Authorization, Approval | Act / Regulation |
|---|---|---|
| Transport Canada | Transportation of Dangerous Goods – Explosives | *Canada Transportation Act* |
| Natural Resources Canada | Magazine Licence Application | *Explosives Act* |
| | Application for Permit to Transport using a Flatbed Trailer | *Explosives Act* |
| | Application for Authorization of Explosives | *Explosives Act* |
| Fisheries and Oceans Canada | Request for Project Review | *Fisheries Act* |
| | Application for Authorization | *Fisheries Act* |
| Environment and Climate Change Canada | Compliance to *Canadian Environmental Protection Act* | *Canadian Environmental Protection Act* |
| | Compliance with the *Wastewater Systems Effluent Regulations* | *Fisheries Act* |
| | Compliance with Section 36 (3) of the *Fisheries Act* | *Fisheries Act* |
| Canadian Wildlife Service | Scientific Permit | *Migratory Birds Convention Act* |
| Industry Canada | Communications Licence | *Radiocommunication Act* |
| | Radio Station Licence | *Radiocommunication Act* |
| Canadian Nuclear Safety Commission | Nuclear Substances and Radiation Devices License | *Nuclear Substances and Radiation Devices Regulations* |

### 4.1.2 Provincial

Provincial permits and approvals that have been acquired or may later be required are listed in Table 3.

**Table 3: Potentially Applicable Provincial Permits and Approvals**

| Agency | Permit, Authorization, Approval | Act / Regulation |
|---|---|---|
| NL Department of Municipal Affairs and Environment (NL DMAE) - Water Resources Division | Alteration to a Body of Water | *Water Resources Act* |
| | Application for Permit for Constructing a Non-Domestic Well | *Water Resources Act* |
| | Water and Sewage Works | *Water Resources Act* |
| | Application for Water Use Licence | *Water Resources Act* |
| NL DMAE - Pollution Prevention Division | Certificate of Approval for Construction | *Environmental Protection Act* |
| NL DMAE - Pollution Prevention Division | Certificate of Approval for Operation | *Environmental Protection Act* |
| NL Fisheries & Land Resources - Wildlife Division | Permit to destroy potential problem animals | *Wildlife Act* |
| | Compliance standard | *Endangered Species Act* |
| NL Department of Natural Resources (NL DNR) - Forestry Resources Branch | Commercial Cutting / Operating Permit | *Forestry Act* |
| NL Department of Natural Resources (NL DNR) - Mineral Lands Division | Approval for Development Plan, Closure Plan and Financial Assurance | *Mining Act* |
| | Surface Lease | *Mining Act* |
| | Mining Lease | *Mining Act* |
| | Quarry Permit | *Quarry Materials Act* |
| NL Municipal and Intergovernmental Affairs | License to Occupy Crown Lands | *Crown Lands Act* |
| Service NL | Certificate of Approval- Storage and Handling of Gasoline and associated products | *Environmental Protection Act* |
| | Permit for Flammable and Combustible Liquid Storing and Dispensing (Above or Below Ground) and for Bulk Storage (Above Ground Only) | *Environmental Protection Act* |
| | Storage Tank System | *Environmental Protection Act* |
| | Building Accessibility Exemption | *Buildings Accessibility Act* |
| | Statutory Declaration for Registration of Boiler and pressure Vessel Fittings Fabricated in NL | *Public Safety Act* |

| | | |
|---|---|---|
| | Certificate of Plant Registration for Power, Heat, Refrigeration, Compressed Gas or Combined Plant | *Public Safety Act* |
| | Contractor's Licence- Pressure Piping System | *Public Safety Act* |
| | Examination and Certification of Propane System Installers | *Public Safety Act* |
| NL Transportation and Works | Compliance Standard- Storing, handling and transporting dangerous goods | *Dangerous Goods Transportation Act* |
| Service NL | Notice of Project<br>The Occupational Health & Safety Act and Regulations | *Occupational Health and Safety Regulations* |
| NL Tourism, Culture and Recreation | Compliance Standard- *Historic Resources Act* | *Historic Resources Act* |

### 4.1.3 Municipal

The Project is located within the municipal boundaries of the Town of St. Lawrence and as such will abide by all the bylaws and regulations of the town. The Project site is within land use zones reserved for mining, as outlined in the Town of St. Lawrence Municipal Plan (Town of St. Lawrence 2012).

CFI will comply with the following municipal regulations, and any other applicable bylaws and regulations:

- Schedule C - Mixed Development Zone - Town of St. Lawrence Development Regulations 2012.
- Schedule C - Mining - Town of St. Lawrence Development Regulations 2012.

## 4.2 Reference Documents

Information and documents referenced in this EPP can be found with the HSE Manager at the Project site or in CFI's Project office in St. Lawrence. Guidance Documents are included in Appendix B of this EPP, and a list of NL DMAE Species at Risk Information Sheets and Environmental Guidelines are provided in Appendices C and E. A list of the key reference material is provided in the following subsections.

### 4.2.1 Relevant Provincial / Federal Government Publications

*Appendix B – Guidance:*

- *Measures to Avoid Causing Harm to Fish and Fish Habitat* Fisheries and Oceans Canada [DFO] 2013; http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html
- *Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador*. Fisheries and Oceans Canada, St. John's, NF, Gosse et al. 1998; http://www.dfo-mpo.gc.ca/Library/240270.pdf.
- *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters*, Wright and Hopky 1998; http://www.dfo-mpo.gc.ca/Library/232046.pdf.

*Appendix E – Environmental Guidelines:*

- *Environmental Guidelines for Watercourse Crossings*, Water Resources Division, NL DOEC 1992a; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter3_2.pdf.

- *Environmental Guidelines for Stream Crossings by All-Terrain Vehicles*, Water Resources Division, NL DOEC 1994; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter3a_2.pdf.
- *Environmental Guidelines for Bridges*, Water Resources Division, NL DOEC 1989; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter4.pdf.
- *Environmental Guidelines for Culverts*, Water Resources Division, NL DOEC 1992b; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter5.pdf.
- *Environmental Guidelines for Fording*, Water Resources Division, NL DOEC 1988; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter6.pdf.
- *Environmental Guidelines for Diversions, New Channels, Major Alterations*, Water Resources Division, NL DOEC 1997a; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter7_2.pdf.
- *Environmental Guidelines for Pipe Crossings*, Water Resources Division, NL DOEC 1997b; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter9_2.pdf.
- *Environmental Guidelines for General Construction Practices*, Water Resources Division, NL DOEC 1997c; http://www.env.gov.nl.ca/env/waterres/regulations/appforms/chapter13_2.pdf.

*Other:*

- *Freshwater Intake End-of-Pipe Fish Screen Guidelines*, DFO 1995; http://www.dfo-mpo.gc.ca/Library/223669.pdf.
- *Forestry Guidelines for the Protection of Fish Habitat in Newfoundland and Labrador*, Scruton et al. 1997.
- *Standard Methods Guide for the Classification / Quantification of Lacustrine Habitat in Newfoundland and Labrador*, Bradbury et al. 2001; http://www.dfo-mpo.gc.ca/Library/263764.pdf.
- *Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador Rivers & Streams*, Sooley et al.1998; http://www.dfo-mpo.gc.ca/Library/242052.pdf.
- *Environmental Policy for Infilling Bodies of Water* (W.R. 91-1), NL DOEC 1991; http://www.env.gov.nl.ca/env/waterres/regulations/policies/bodies_of_water.html.
- *Environmental Guidelines for Construction and Mineral Exploration Companies*, NL DOEC and NL DNR Undated; http://www.nr.gov.nl.ca/mines&en/mqrights/environment.pdf.
- *Accredited Laboratory Policy, PD: PP2001-01.2*, Pollution Prevention Division, NL DOEC 2011; http://www.env.gov.nl.ca/env/publications/env_protection/policy_directive_pd_pp.pdf.

### 4.2.2 CFI's Technical Data Reports

Canada Fluorspar (NL) Inc.'s technical reports formed the documentation to support the Project's EA Registration and prefeasibility study. Such information is useful as a key source of information for measuring environmental performance throughout the Project's construction and operation phases. This documentation consists of:

- *Technical Report on the AGS Vein Deposit*, St. Lawrence Property, Newfoundland and Labrador (Agnerian 2015).

- *AGS Fluorspar Mine, Environmental Assessment Registration Pursuant to the Newfoundland and Labrador Environmental Protection Act* (CFI 2015a).
- *AGS Fluorspar Mine, Environmental Preview Report Pursuant to the Newfoundland and Labrador Environmental Protection Act* (CFI 2015b).
- *Phase I Hydrogeology Study*, Canada Fluorspar Inc. St. Lawrence, NL for the Proposed AGS Mine Project (Golder 2015a).
- *Geochemistry Testing Report*, Canada Fluorspar Inc. St. Lawrence, NL for the Proposed AGS Mine Project (Golder 2015b).
- *AGS Project Preliminary Water Quality Baseline Report*. Report Submitted to Canada Fluorspar (NL) Inc (Golder 2015c).
- *St. Lawrence Mine Historic Resources Impact Assessment* (Gerald Penney Associated Limited [GPA] 2015).
- *Proposed AGS Fluorspar Mine, St. Lawrence, NL Aquatic Studies Field Report* (Sikumiut Environmental Management Ltd. [SEM] 2015).

# 5.0 GENERAL ENVIRONMENTAL PROTECTION PROCEDURES

Appendix D of this EPP contains a comprehensive suite of general Environmental Protection Procedures to be used. These procedures are brief and offer clear instruction to the reader.

These Environmental Protection Procedures will be invaluable to bidders at the tender stage because they provide guidance for standard mitigation measures proposed for the Project. This EPP will be part of each tender package, and contractors must include with their tender an Environmental Plan to show how they will achieve compliance with the EPP. Given that all contractors and employees will be required by contract to comply with the EPP, this document will ensure CFI's expectations for environmental performance are communicated and met throughout all aspects of the Project operations phase.

This EPP links general Environmental Protection Procedures (Appendix D) with specific work areas (Section 6.0). The procedures in Appendix D may need to be modified in the future to address new activities, unforeseen site conditions, changes in work methods, or new environmental performance levels related to the Project.

# 6.0 AREA SPECIFIC ENVIRONMENTAL GUIDANCE

Environmental guidance specific to certain areas of the site are outlined in the following subsections. These areas include project infrastructure, stockpiling, the TMF, mine, mill, and KOS Marine terminal.

## 6.1 Project Work Scope

The Project components and operational activities are outlined in the following subsections.

### 6.1.1 Project Components

Operations activities will occur in the following general areas:

- Project Infrastructure
- Stockpiling
- TMF
- Mine
- Mill
- KOS Marine terminal

See Figure 1 for the Project site plan. For each of these areas, environmental guidance is provided for the activities anticipated during operations. This EPP will be revised, as required, to reflect the nature of the operations phase. Revisions will be reviewed and approved for issue to the EPP control copy holders prior to the start of these activities. The HSE Manager will take the lead on EPP review and revisions.

*Figure 1: Project Site Plan*

**LEGEND:**

- EXISTING BUILDINGS
- EXISTING ROAD
- PROPOSED ROAD
- PROPOSED POWERLINE
- WATER
- WETLAND
- PRE-DEVELOPMENT WATER EXTENT
- EMBANKMENT
- PIT
- MINE DUMP
- TAILINGS
- MILL

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
| 0 | 21APR'16 | ISSUED WITH TRANSMITTAL | JSP | AS | SRA |

**NOTES:**

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 21N.
2. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009). ALL RIGHTS RESERVED.
3. CONTOUR INTERVAL IS 20 METRES.
4. PLAN BASED ON INFORMATION PROVIDED BY LYCOPODIUM, DECEMBER 2, 2015. PLANT SITE, PORT LOCATIONS, PROPOSED ROADS BASED ON INFORMATION PROVIDED BY LYCOPODIUM, DECEMBER 30, 2015. DUMPS AND PITS BASED ON INFORMATION PROVIDED BY AGP JANUARY 15, 2016.

CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**OVERALL GENERAL ARRANGEMENT**

Knight Piésold CONSULTING

| P/A NO. | REF NO. |
|---|---|
| NB101-642/6 | NB16-00223 |

**FIGURE 1** REV 0

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*Figure 2: Surface Water Quality Monitoring Station Locations*

615 500 E | 616 100 E | 616 700 E | 617 300 E | 617 900 E | 618 500 E | 619 100 E

5 197 200 N | 5 196 600 N | 5 196 000 N | 5 195 400 N | 5 194 800 N

MINE COVE WATERSHED

GREBES NEST WATERSHED

NORTHWESTERN POND WATERSHED

UPPER ISLAND POND WATERSHED

SALT COVE WATERSHED

WQ-STA-6
WQ-STA-14
WQ-STA-13
WQ-STA-9
WQ-STA-22
SW-3
SW-2
WQ-STA-3
WQ-STA-15
WQ-STA-11
WQ-STA-16
RTM2
WQ-STA-2
WQ-STA-25
WQ-STA-17
WQ-STA-18
RTM1
WQ-STA-23
WQ-STA-1
WQ-STA-19
SW-1
WQ-STA-7
WQ-STA-24
WQ-STA-20
WQ-STA-21
SW-4

OPEN CUT PIT
OVERBURDEN STOCKPILE
CENTER PIT
JOHN FITZPATRICK POND
LONG POND
GREBES NEST POND
GREBES NEST PIT
TAILINGS IMPOUNDMENT
SOUTH ROCK DUMP
POLISHING POND
UPPER ISLAND POND
MILL SITE

**LEGEND:**

- WATER
- FORMER POND EXTENT
- RIVER/STREAM/DRAINAGE
- PROPOSED ACCESS ROAD
- PRE-DEVELOPMENT WATERSHED
- GENERAL DIRECTION OF WATERSHED FLOW
- SURFACE WATER MONITORING LOCATION
- REAL TIME MONITORING LOCATION
- HYDROLOGY STATION (EXISTING)

**NOTES:**

1. COORDINATE GRID IS UTM NAD83 ZONE 21.
2. PLAN BASED ON INFORMATION PROVIDED BY LYCOPODIUM, NOVEMBER 4, 2015.
3. CONTOUR INTERVAL IS 2 METRES.
4. DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. COORDINATES OF SURFACE AND GROUNDWATER SAMPLING LOCATIONS PROVIDED BY CFI.

**DRAFT**

SCALE 120 60 0 200 400 600 m

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CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**ENVIRONMENTAL BASELINE AND EFFECTS SURFACE MONITORING LOCATIONS**

Knight Piésold CONSULTING

P/A NO. NB101-642/16 | REF NO. NB17-00396

**FIGURE 2** | REV A

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XREF FILE(S): V:\V-TDPO-VYC\2014-11-25_X-C\P-SH-POND_X-C-SITE-LAYO_X-V-WATERSHED-BOUNDARIES_X-C-EMBK-TAL-DAM-ALTN_X-C-ENVT-POND-DRGS-DWBL_5007_X_PP_BULK_EARTHWORKS_OP2_X-C-SH---GIS---GW---SW---HYDR-MONI-LOCA_X-C-ENVT-POND-ABLT IMAGE FILE(S):

## 6.2 Project Infrastructure

The following section provides a detailed description of the Project infrastructure. The following onsite and offsite components will be developed and/or utilized:

- Onsite components:
  - Mine haul and access roads
  - Fuel storage
  - Site buildings – including the administration office complex, and assay/metallurgical laboratory
  - Mine services buildings - mine truck shop, truck wash facility, and fuel bay
  - Long term reagents storage shed
  - Explosives storage facility
  - Power supply and distribution system
  - Raw water intake and distribution system
  - Potable water supply, pump and pipelines
  - Water filtration and potable water treatment plant
  - Sewage treatment plant
  - Water management infrastructure including, sediment basins, collection and diversion ditches
  - Waste management facilities
  - Ambient Air Monitoring Station
- Offsite components:
  - Main access road
  - Concentrate Haul Route consisting of:
    - A 5.6 km Town Bypass Road
    - Use of an existing 46.5 km section of Highway 220/210 and a 750 m paved section of Cow Head Road to access KOS's facility.
  - Fluorspar Export Facility – constructed at KOS's facility near Cow Head

### Onsite Infrastructure

**Roads**

Each road will be maintained to meet the loading and dimensional requirements of the largest design vehicle expected to use the road. Dust control will be provided for roads and operation activities, primarily by using water when required. Dry material will be moisture conditioned or covered to prevent blowing dust.

**Site Buildings**

The following buildings will be located at the AGS Mill site. To the maximum extent practical CFI will utilize portable and inflatable structures. The use of this style of structure will minimize the scope of works required for foundations, as well as the effort required for closure.

*Workshop/Warehouse Buildings*

The plant workshop, with some warehouse capability, has been added as a bay at the North end of the Mill building. A welding bay will be located on the perimeter of the workshop. The main operation warehouse is at the former Blue Beach Dry building, which has been renovated to accommodate warehousing activities.

*Administration Complex*

The mill administration building complex is located south of the main mill building area. This building complex contains offices, meeting/training room, reception area, kitchen, mill dry, change room, washroom facilities, and mine rescue station. These are modular buildings founded on wooden cribbing. Allowance for future expansion has been made for additional modular buildings.

*First Aid Room*

The first aid room will be part of the administration building complex. It will contain the treatment equipment for minor injuries. Serious injuries will be transferred to the hospital in the town of St. Lawrence.

*Security Building*

The security building will be part of the administration building complex. It will house an office and a search area.

*Laboratories*

An Assay preparation laboratory for exploration and is located at the old mill site (Clarke's Pond). This is an existing building with approximate dimensions 10.3 m X 10.3 m X 3.7 m high. A new laboratory has been constructed at the new Mill site to include the metallurgical and analytical laboratories, as well as a preparation laboratory.

*Mine Truck Shop*

The mine truck shop building is a Dynamic Air Shelter inflatable building with rig-mat floor, located southwest of the mill area. It will house heavy vehicle maintenance bays, mobile equipment bay, drill rebuild bay, and repair bays.

**Utilities**

The following is a summary of the utilities that will be developed:

- Raw Water Intake/Raw Water Supply: The majority of process water will be recycled from the AGS East TMF Polishing Pond. Additional raw water for the mill process and potable water will be drawn from John Fitzpatrick Pond. The proposed water intake point will be from a submersible pump with an appropriate fish screen intake supported from the surface.

  The fresh water will be piped overland in an HDPE pipe to the raw water tank outside the main process plant.

  The raw water tank will be equipped with two distribution pumps (one standby) that will supply the various raw water users including the process water addition, truck wash, reagent make-up, screen sprays, and dust suppression. Firewater will be drawn from a reserve at the bottom of the raw water tank.

- Fuel Storage Facility: The fuel storage facility will be located adjacent to the mine truck shop building in the mine services area. Delivery trucks will be connected via flexible hoses to the diesel unloading pumps. The diesel will be transferred to self-dyked bulk fuel storage tanks.

- Potable Water Treatment Plant: Potable water for the site will be taken from John Fitzpatrick Pond. Water will be filtered and treated as required prior to being distributed to the process plant, and various site buildings.
- Fire Water: The fire water reserve will be part of the raw water tank as a dedicated storage. The system has been designed with one diesel pump. The header system will provide firewater solely to the mill and distributed by stand-pipe.
- Sewage Treatment Plant: Sewage from the ancillary buildings will be collected and transferred to a BMS Blivet sewage treatment plant (STP). The STP has been designed for the number of employees expected on site during operations and operated in accordance with the Environmental Control Water and Sewage Regulations and the Guidelines for the Design, Construction and Operation of Water and Sewage Systems. This system has been approved for installation and use by Service NL.
- Power Supply: All power will be provided by Newfoundland Power from the provincial energy grid. There will be an overhead, single pole distribution system established by NL Power to the various facilities throughout the site. In the event of a power outage, an emergency generator will supply power to critical areas.

**Water Management Infrastructure**

Water will be managed in accordance to the Water Management Plan (WMP). During the operation phase, the water management will focus on surface and groundwater flows into the open pits, water removed from the underground mine, storm water runoff, and water required for mineral processing and mining, as well as satisfying CFI's environmental commitments. Water management during operations will be undertaken utilizing the following:

- Clean water diversion channels
- Erosion control measures
- Interceptor ditches to collect contact water from the south dump and Mill site
- Mine sumps and pumping systems
- Sediment control measures including sediment basins, which will be designed to settle suspended solids without the use of flocculants, to the greatest extent practical.
- Event pond (Figure 2)

**Waste Management Facilities**

Wastes will be managed in accordance to the Waste Management Plan (CFI, 2016d). Wastes generated during the operation and closure of the Project will be temporarily placed in suitable refuse containers located at logical areas around the site. Waste will be picked up by a licenced contractor and disposed of at a facility that is permitted to receive the same.

**Ambient Air Monitoring Station**

There is one sampling station installed downwind of the Project operations activities, which will assess the Project's contribution to local air quality. This station is equipped with two beta attenuation monitors (BAMs) to measure TPM and $PM_{2.5}$, and an API Teledyne T200 to measure $NO_x$. This sampling arrangement will assist in determining the general effects of the operation activities on the ambient air quality.

## Offsite Infrastructure

**Main Access Road / Town Bypass Road**

Access to the site from St. Lawrence is provided by an existing narrow paved road (Director Drive) (+/- 3.5 km) followed by a hard packed gravel road (Figure 1). The site access will be upgraded with a 5.6 km gravel Town Bypass Road which will connect the project to Highway 220, as well as by upgrading existing roads. Maintenance of the road will be required throughout the mine life.

**Concentrate Transportation Route**

Fluorspar concentrate will be transported 350 days a year, 20 loads per day in 30 tonne highway trucks from the ASG Mill site to KOS's Mobile Offshore Drilling Unit Wharf (Quay No. 1) at Cow Head in Mortier Bay via the proposed concentrate haul route. The proposed 45 km concentrate transportation route is highlighted in Figure 1.

A fleet of covered haul trucks will transport the concentrate to KOS's facility via the proposed concentrate transportation route.

The Town Bypass Road will link the main access road to Highway 220 as illustrated on Figure 1. The road will have a designated speed limit and will be approximately 9.6 m wide. An application for a Highway Access Permit has been submitted to the Department of Transportation and Works for the new entrance to Highway 220.

**Fluorspar Export Facility**

CFI is pursuing the option of developing a Fluorspar Export Facility that utilizes existing marine infrastructure at KOS's Mobile Offshore Drilling Unit (MODU) Wharf (Quay No.1) at Cow Head in Mortier Bay.

### 6.2.1 Operation Activities

Key activities associated with project infrastructure include:

- equipment mobilization
- waste management
- water management
- energy consumption
- air quality monitoring
- water monitoring
- transportation
- staging and storage of operation-related equipment and materials
- maintaining watercourse crossings (e.g. culverts, modular bridges, permanent bridges) along the road route
- dewatering and erosion and sediment control and,
- fuel and other hazardous material storage and handling

### 6.2.2 Environmental Issues

#### General

General environmental issues associated with project infrastructure may include:

- sedimentation of waterbodies
- loss or disturbance of wildlife
- noise, dust, and emissions
- potential leakage or spills of fuel or other hazardous materials
- incidental events

#### Sensitive Areas / Periods

*Freshwater*: Stream crossings will generally be across existing roadways with existing culverts and bridges.

*Terrestrial:* Bird breeding season occurs from April 1 to September 1 in the region (Environment Canada 2014a). Any sightings or indications of nesting migratory birds will be reported immediately to the Canadian Wildlife Service (CWS), and work within an appropriate species-specific buffer of active nests will be halted until the HSE Manager advises otherwise.

### 6.2.3 Environmental Protection Procedures

#### General Measures

General Environmental Protection Procedures relevant to project infrastructure are listed in Table 4, and presented in detail in Appendix D.

**Table 4: Relevant Environmental Protection Procedures – Project Infrastructure**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Project Infrastructure |
|---|---|---|
| D.1 | Clearing of Vegetation | • |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | • |
| D.3 | Storage, Handling, and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | • |
| D.5 | Solid Waste Disposal | • |
| D.6 | Buffer Zones | • |
| D.7 | Erosion Prevention | • |
| D.8 | Excavations, Embankment and Grading | • |
| D.9 | Stream Crossings | • |
| D.10 | Dust Control | • |
| D.11 | Trenching | • |
| D.12 | Dewatering – Work Areas | • |
| D.13 | Marine Vessels | |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |
| D.16 | Blasting | • |
| D.17 | Drilling – Geotechnical | • |
| D.18 | Vehicular Traffic | • |

| General Environmental Protection Procedures (Appendix D) | | Relevance to Project Infrastructure |
|---|---|---|
| D.19 | Works Around Marine Environment | |
| D.20 | Surveying | • |
| D.21 | Equipment Operations | • |
| D.22 | Historic Resources | • |

Sections 5.0, 6.0, and 7.0 and Appendices B, C, D, and E of this EPP provide further information for preventing pollution, and avoid or reduce potential adverse effects on the environment during the operation of project infrastructure.

### 6.2.4 Area Specific Measures

In addition to the Environmental Protection Procedures listed above, the following will be required during the operation of project infrastructure:

- Requirements listed in all government permits, approvals, and authorizations.
- Proper maintenance or upgrading of culverts and / or bridges across a number of watercourses in the various watersheds. CFI will apply to NL DMAE for approvals for Alteration of a Body of Water pursuant to the provincial *Water Resources Act* for the maintenance of new structures. These activities will comply with terms and conditions of approval and guidance materials provided by NL DMAE with respect to the design, construction, and maintenance of the crossing structures to avoid or minimize the potential adverse effects on water quality and fish habitat.

### 6.2.5 Monitoring Requirements

Monitoring during the operation of project infrastructure includes:

- Water quality and quantity monitoring will be undertaken in accordance with the EEMP, and conditions of approval. All sampling sites developed for construction will be carried over for operations.
- Noise, dust, and emissions monitoring will also be undertaken in accordance with the EEMP and conditions of approval.
- Environmental monitoring to reduce potential adverse effects on federally or provincially protected species that may occur in, or in close proximity to, the Project footprint.

Detailed monitoring requirements during the Project operation phase are outlined in the EEMP (CFI, 2017). Other monitoring requirements may be added as determined by regulatory conditions of approval.

## 6.3 Stockpiling

Stockpiling activities are required following subsequent mining activities. The general areas requiring stockpiling during the operations phase include the South waste dump, overburden stockpile, and topsoil stockpiles. Erosion control techniques and devices will be used to stabilize erosion prone areas. Runoff of sediment-laden water from disturbed areas will be minimized by using measures such as sediment basins, check dams, interception ditches, mulches, erosion control blankets, seeding, and/or silt fence, as appropriate.

The bulk of the waste rock from open pit mining and the DMS plant floats material will be stored in the South Waste Dump. The DMS floats material will be backhauled from the Mill and deposited with the waste rock within the South Waste Dump. The dump has been designed to ensure long-term physical stability.

There will be multiple overburden stockpiles constructed to manage the overburden originating from the footprints of the open pits, and AGS East TMF. The overburden will be stockpiled for use later in the mine life for reclamation activities. Organic topsoil would be salvaged from the infrastructure footprints to the greatest extent practical. The topsoil will be stockpiled separately from the underlying overburden materials for later use in rehabilitation.

Excavation will be required at the stockpiling sites. Standard earthmoving procedures will be employed at the site, including mechanical excavation. A large portion of the material to be moved on the site consists of rock. There are lesser amounts of till that also need to be excavated. Hard, sound, rock, which typically lies beneath the till overburden, will require blasting and mechanical force to free it for excavation. Till is typically excavated using conventional mechanical means including excavators, loaders, and dozers.

### 6.3.1 Operation Activities

- Topsoil salvage and stockpiling
- Overburden salvage and stockpiling
- Waste rock stockpiling
- Equipment mobilization
- Site grading (i.e. cut and fill)
- Excavation
- Erosion and sediment control

### 6.3.2 Environmental Issues

#### General

General environmental issues associated with stockpiling activities include:

- Soil erosion and sedimentation of waterbodies
- Alteration or loss of terrestrial habitat
- Loss or disturbance of wildlife
- Noise, dust, and emissions of air pollutants
- Potential leakage or spills of fuel or other hazardous materials

#### Sensitive Areas/Periods

Clearing activities may disturb migratory birds during the bird breeding season, which occurs from May 1 to September 1 in the region (Environment Canada 2014a). CFI has prepared and implemented an Avifauna Management Plan for operations in consultation with the Canadian Wildlife Service (CWS), to maintain

compliance with the *Migratory Birds Convention Act*. The plan will include nest/breeding bird surveys by trained/experienced personnel prior to any vegetation clearing and/or disturbance to identify any areas with active nesting. Any sightings or indications of nesting migratory birds will be identified and recorded. An appropriate species-specific buffer of active nests will be delineated and project activities halted within the buffer until the HSE Manager advises otherwise. CFI plans to conduct the majority of the required clearing activities outside of the bird breeding season (May 1 to September 1 for most bird species) in order to reduce potential adverse effects on nesting birds.

### 6.3.3 Environmental Protection Procedures

#### General Measures

General Environmental Protection Procedures relevant to stockpiling activities are listed in Table 5, and presented in detail in Appendix D.

**Table 5: Relevant Environmental Protection Procedures – Stockpiling**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Stockpiling |
|---|---|---|
| D.1 | Clearing of Vegetation | • |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | • |
| D.3 | Storage, Handling and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | |
| D.5 | Solid Waste Disposal | |
| D.6 | Buffer Zones | • |
| D.7 | Erosion Prevention | • |
| D.8 | Excavations, Embankment and Grading | • |
| D.9 | Stream Crossings | • |
| D.10 | Dust Control | • |
| D.11 | Trenching | • |
| D.12 | Dewatering – Work Areas | • |
| D.13 | Marine Vessels | |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |
| D.16 | Blasting | • |
| D.17 | Drilling – Geotechnical | |
| D.18 | Vehicular Traffic | • |
| D.19 | Works Around Marine Environments | |
| D.20 | Surveying | • |
| D.21 | Equipment Operations | • |
| D.22 | Historic Resources | • |

Sections 5.0, 6.0, and 7.0 and Appendices B, C, D, and E of this EPP provide further information for preventing pollution, and avoid or reduce potential adverse effects on the environment during the operation of project infrastructure.

### 6.3.4 Area Specific Measures

In addition to the Environmental Protection Procedures listed above, the following may also be required prior to or during stockpiling:

- Requirements listed in government permits, approvals, and authorizations
- Environmental monitoring to reduce potential adverse effects on federally and provincially protected species that may occur in, or in close proximity to, the Project footprint

### 6.3.5 Monitoring Requirements

Monitoring applicable to general stockpiling activities include:

- Environmental monitoring to reduce potential adverse effects on federally and provincially protected species that may occur in, or in close proximity to, the Project footprint.
- Water quality and quantity monitoring will be undertaken in accordance with the EEMP, and conditions of approval. All sampling sites developed for construction will be carried over for operations.
- Noise, dust and emissions monitoring will also be undertaken in accordance with the EEMP, and conditions of approval.

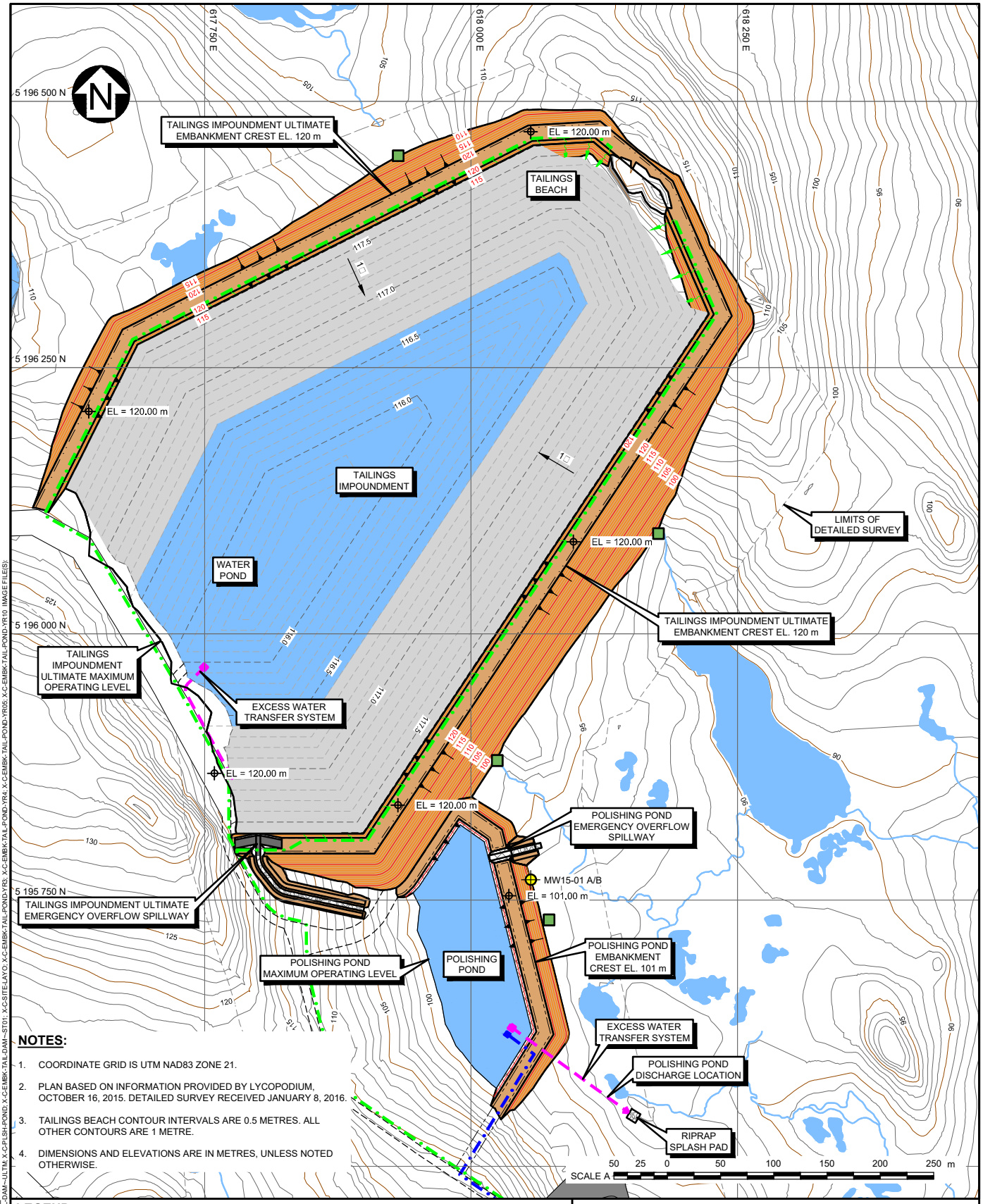
Detailed monitoring requirements during the Project operations phase are outlined in the EEMP (CFI, 2017). Other monitoring requirements may be added as determined by regulatory conditions of approval.

## 6.4 AGS East Tailings Management Facility (TMF)

The general layout of the TMF is shown on Figure 2.

The AGS East TMF will comprise a Tailings Impoundment and downstream Polishing Pond. The Tailings Impoundment will contain and settle tailings solids and temporarily store process water from slurry tailings deposition. The Polishing Pond will provide final clarification of the supernatant pond water from the Tailings Impoundment prior to recycle into the mill. At the end of the mining operations, the main dam will have reached its full design height to accommodate 2.0 million $m^3$ of tailings.

*Figure 3: Tailings Management Facility*




**NOTES:**

1. COORDINATE GRID IS UTM NAD83 ZONE 21.
2. PLAN BASED ON INFORMATION PROVIDED BY LYCOPODIUM, OCTOBER 16, 2015. DETAILED SURVEY RECEIVED JANUARY 8, 2016.
3. TAILINGS BEACH CONTOUR INTERVALS ARE 0.5 METRES. ALL OTHER CONTOURS ARE 1 METRE.
4. DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.

**LEGEND:**

- WATER
- TAILINGS
- EMBANKMENT FILL
- MILL (BY OTHERS)
- RIVER/STREAM/DRAINAGE
- PROPOSED ACCESS ROAD
- PROPOSED INFRASTRUCTURE
- SAFETY BERM
- TAILINGS DISCHARGE PIPELINE
- EXCESS WATER TRANSFER SYSTEM
- MILL WATER RECLAIM SYSTEM
- FOUNDATION DRAIN OUTLET LOCATION
- MONITORING WELL LOCATION

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CANADA FLUORSPAR (NL) INC.

ST. LAWRENCE FLUORSPAR PROJECT

**AGS EAST TAILINGS MANAGEMENT FACILIT□**
**□RO□ECTED FILLING**
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Knight Piésold CONSULTING

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XREF FILE(S): X-V-TOPO-LYCO-2014-11-25; X-C-EMBK-TAIL-DAM--ULTM; X-C-PLSH-POND; X-C-EMBK-TAIL-DAM--ST01; X-C-SITE-LAYO; X-C-EMBK-TAIL-POND-YR3; X-C-EMBK-TAIL-POND-YR4; X-C-EMBK-TAIL-POND-YR05; X-C-EMBK-TAIL-POND-YR10 IMAGE FILE(S):

### 6.4.1 Operation Activities

Important activities in the TMF area during operations include:

- water management
- water sampling and regular monitoring and inspection
- tailings deposition
- dewatering and erosion and sediment control
- fuel and other hazardous material storage and handling

### 6.4.2 Environmental Issues

#### General

General environmental issues that may be associated with developing and working within the TMF area during operations include:

- Erosion of soils and sedimentation of waterbodies
- loss or disturbance of wildlife
- noise, dust and emissions
- potential leakage or spills of fuel or other hazardous materials
- incidental events

#### Sensitive Areas / Periods

*Terrestrial*: Operation of the TMF is unlikely to disturb migratory birds during the bird breeding season, which occurs from May 1 to September 1 in the region (Environment Canada 2014a). However, any sightings or indications of nesting migratory birds will be reported immediately to the CWS, and work within an appropriate species-specific buffer of active nests will be halted until the HSE Manager advises otherwise. Additionally, to reduce potential adverse effects on pond landing birds, deterrents will be installed as an aid to prevent water fowl from landing in the TMF.

### 6.4.3 Environmental Protection Procedures

#### General Measures

Environmental Protection Procedures relevant to the operation of the TMF are listed in Table  and presented in detail in Appendix D.

**Table 6: Relevant Environmental Protection Procedures – Tailings Management Facility**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Tailings Management Facility (TMF) Operation |
|---|---|---|
| D.1 | Clearing of Vegetation | |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | |
| D.3 | Storage, Handling, and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | |
| D.5 | Solid Waste Disposal | |
| D.6 | Buffer Zones | • |
| D.7 | Erosion Prevention | • |
| D.8 | Excavations, Embankment and Grading | • |
| D.9 | Stream Crossings | |
| D.10 | Dust Control | • |
| D.11 | Trenching | • |
| D.12 | Dewatering – Work Areas | • |
| D.13 | Marine Vessels | |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |
| D.16 | Blasting | |
| D.17 | Drilling – Geotechnical | |
| D.18 | Vehicular Traffic | • |
| D.19 | Works Around Marine Environment | |
| D.20 | Surveying | |
| D.21 | Equipment Operations | • |
| D.22 | Historic Resources | • |

Sections 5.0, 6.0, and 7.0 and Appendices B, C, D, and E of this EPP provide information to be used to prevent pollution, and avoid or reduce potential adverse environmental effects during operation of the TMF.

### 6.4.4 Area Specific Measures

In addition to the Environmental Protection Procedures listed above, the following will or may be required during TMF operation:

- Requirements listed in all government permits, approvals, and authorisations.
- Environmental monitoring to reduce potential adverse effects on federally and provincially protected species that may occur in, or in close proximity to, the Project footprint
- A Water Management Plan has been prepared for the Project, in consultation with the provincial Water Resources Management Division (WRMD) of NL DMAE, that describes the use and flow of water through and around the Mine during all Project phases, and the mitigation measures to be implemented to maintain water quality and quantity within each watershed.

### 6.4.5 Monitoring Requirements

Monitoring applicable to the TMF operation includes:

- Environmental monitoring to reduce potential adverse effects on federally or provincially protected species that may occur in, or in close proximity to, the Project footprint.
- Water quality and quantity monitoring will be undertaken in accordance with the EEMP, and conditions of approval. All sampling sites developed for construction will be carried over for operations.
- Noise, dust and emissions monitoring will also be undertaken in accordance with the EEMP, and conditions of approval.
- A real-time water quantity / quality station labeled "Outflow of Unnamed Pond South of Long Pond" is established downstream of the TMF. This station will provide near real-time water quality and quantity data to ensure emerging issues associated with the TMF are detected, to allow the appropriate mitigation measures to be implemented in a timely manner, thus reducing any adverse effect on the downstream systems.

Detailed monitoring requirements during the Project operation phase are outlined in the EEMP (CFI, 2017). Other monitoring requirements may be added as determined by regulatory conditions of approval.

## 6.5 Mining Process

The St. Lawrence Fluorspar Project is currently envisaged as an open pit and underground operation. Open pit mining will precede the development of the underground mine starting in Year 4 of the currently designed 10-year life. The underground mine will take advantage of the open pits for early access later in the mine life to minimize development costs.

Open pit mining will occur in three pit areas; Grebes Nest, Center Pit, and Open Cut pit. Grebes Nest will be mined first with the material from this pit being used to construct mine roads and supply material for the tailings dam construction. Grebes Nest will be completed at the end of Year 2. Center pit will be mined as Grebes Nest is completed. The Open Cut pit will be mined in Year 6, the last year of mining of the open pits. Underground will be mining the material below the open pits.

### 6.5.1 Operation Activities

Key activities associated with development of the Mine includes:

- excavation and blasting
- operation activities and equipment mobilization
- hauling of waste rock
- aggregate production and hauling
- waste management
- water management
- transportation

- staging and storage of operation-related equipment and materials
- dewatering and erosion and sediment control
- fuel and other hazardous material storage and handling

### 6.5.2 Environmental Issues

#### General

General environmental issues that may be associated with operation of the Project at the mine site includes:

- soil erosion and sedimentation of waterbodies
- surface and groundwater quality or quantity
- alteration or loss of terrestrial habitat
- loss or disturbance of wildlife
- noise, dust, and emissions
- potential leakage or spills of fuel or other hazardous materials
- incidental events

#### Sensitive Areas / Periods

*Terrestrial*: Operation of the mine sites may disturb migratory birds during the bird breeding season, which occurs from April 1 to September 1 in the region (Environment Canada 2014a). Any sightings or indications of nesting migratory birds will be reported immediately to the CWS, and work within an appropriate species-specific buffer of active nests will be halted until the HSE Manager advises otherwise.

### 6.5.3 Environmental Protection Procedures

#### General Measures

General environmental protection procedures relevant to the development of the Mine are listed in Table 7, and presented in detail in Appendix D.

**Table 7: Relevant Environmental Protection Procedures - Mine Site Operation**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Mine Site Operation |
|---|---|---|
| D.1 | Clearing of Vegetation | • |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | • |
| D.3 | Storage, Handling and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | |
| D.5 | Solid Waste Disposal | • |
| D.6 | Buffer Zones | • |
| D.7 | Erosion Prevention | • |
| D.8 | Excavations, Embankment and Grading | • |
| D.9 | Stream Crossings | • |
| D.10 | Dust Control | • |

| General Environmental Protection Procedures (Appendix D) | | Relevance to Mine Site Operation |
|---|---|---|
| D.11 | Trenching | • |
| D.12 | Dewatering – Work Areas | • |
| D.13 | Marine Vessels | |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |
| D.16 | Blasting | • |
| D.17 | Drilling – Geotechnical | • |
| D.18 | Vehicular Traffic | • |
| D.19 | Works Around Marine Environment | |
| D.20 | Surveying | • |
| D.21 | Equipment Operations | • |
| D.22 | Historic Resources | • |

Sections 5.0, 6.0, and 7.0 and Appendices B, C, D, and E of this EPP provide information to be used to prevent pollution, and avoid or reduce potential adverse environmental effects during mining operations.

### 6.5.4 Area Specific Measures

In addition to the general environmental protection measures listed above, the following specific measures will be implemented during mine operations:

- Requirements listed in government permits, approvals, and authorizations
- Environmental monitoring to reduce potential adverse effects on federally and provincially protected species that may occur in, or in close proximity to, the Project footprint
- A Water Management Plan has been prepared for the Project, in consultation with the provincial WRMD of NL DMAE that will describe the use and flow of water through and around the Mine during all Project phases, and the mitigation measures to be implemented to maintain water quality and quantity within each watershed.

### 6.5.5 Monitoring Requirements

Monitoring applicable to the Mine operation includes:

- Environmental monitoring to reduce potential adverse effects on federally or provincially protected species that may occur in, or in close proximity to, the Project footprint.
- A real-time water quantity / quality station labeled “Outflow Grebes Nest Pond” is established downstream of the pit dewatering effluent outfall upstream of John Fitzpatrick Pond. This station will provide real-time water quality and quantity data to ensure emerging issues associated with the open pit (from both the construction and operational phases) are detected, to allow the appropriate mitigation measures to be implemented in a timely manner, thus reducing any adverse effect on the downstream systems.
- Water quality and quantity monitoring will be undertaken in accordance with the EEMP and conditions of approval. All sampling sites developed for construction will be carried over for initial operations.
- Noise, dust and emissions monitoring will be undertaken in accordance with the EEMP and conditions of approval.

Detailed monitoring requirements during the Project operations phase are outlined in the EEMP (CFI, 2017). Other monitoring requirements may be added as determined by regulatory conditions of approval.

## 6.6 Mill Process

A new mill and milling infrastructure has been constructed to process the ore from the AGS open pit and underground mines. The mill will have a nominal feed rate of 750,000 tonnes per year and produce a nominal 200,000 tonnes of acid-grade Fluorspar concentrate per year.

### 6.6.1 Operation Activities

Key activities associated with Mill processing include:

- Crushing to nominal -12 mm
- Fine Ore Storage
- Dense Medium Separation
- Grinding to 80% passing 100 um
- Sulphide Flotation
- Pulp Thickening
- Fluorite Flotation
- Concentrate Thickening and Filtration
- Tailings Thickening
- Reagents make-up and handling
- Process, Raw, Fire, and Potable Water Management Systems
- Air Services

### 6.6.2 Environmental Issues

#### General

General environmental issues associated with mining process include:

- Noise, dust, and emission of air pollutants
- Potential leakage or spills of fuel or other hazardous materials

### 6.6.3 Environmental Protection Procedures

#### General Measures

General environmental protection procedures relevant to the development of the Mill are listed in Table 8, and presented in detail in Appendix D.

**Table 8: Relevant Environmental Protection Procedures - Mill Site Operation**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Mill Site Operation |
|---|---|---|
| D.1 | Clearing of Vegetation | |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | |
| D.3 | Storage, Handling and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | |
| D.5 | Solid Waste Disposal | • |
| D.6 | Buffer Zones | |
| D.7 | Erosion Prevention | |
| D.8 | Excavations, Embankment and Grading | |
| D.9 | Stream Crossings | |
| D.10 | Dust Control | • |
| D.11 | Trenching | |
| D.12 | Dewatering – Work Areas | |
| D.13 | Marine Vessels | |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |
| D.16 | Blasting | |
| D.17 | Drilling – Geotechnical | |
| D.18 | Vehicular Traffic | • |
| D.19 | Works Around Marine Environment | |
| D.20 | Surveying | |
| D.21 | Equipment Operations | • |
| D.22 | Historic Resources | • |

Sections 5.0, 6.0, and 7.0 and Appendices B, C, D, and E of this EPP provide information to be used to prevent pollution, and avoid or reduce potential adverse environmental effects during Mill operations.

### 6.6.4 Area Specific Measures

In addition to the general environmental protection measures listed above, the following specific measures will be implemented during operations:

- Additional specific conditions of approval will be implemented as per regulatory requirements
- Use of manufacturer-recommended dust control equipment in the crushing plant, as defined in the best available control technology (BACT).
- Covered-conveyor systems will be used to deliver crushed ore from the crushing plant to the fine-ore stockpile and from the stockpile to the DMS. Where trucks are used to transport concentrate, covers will be used on the trucks.
- Proper building ventilation systems, complete with appropriate filters, will be used to reduce exhaust emissions.
- Indoor storage of fine Acid-Grade concentrate to reduce dust dispersion by wind and over-drying in the storage building.

### 6.6.5 Monitoring Requirements

Monitoring during Mill process operations includes:

- Water quality and quantity monitoring will be undertaken in accordance with the EEMP and conditions of approval. All sampling sites developed for construction will be carried over for initial operations.
- Noise, dust, and emissions monitoring will also be undertaken in accordance with the EEMP and conditions of approval.
- Environmental monitoring to reduce potential adverse effects on federally or provincially protected species that may occur in, or in close proximity to, the Project footprint.

Detailed monitoring requirements during the Project operation phase are outlined in the EEMP (CFI, 2017). Other monitoring requirements may be added as determined by regulatory conditions of approval.

## 6.7 KOS Marine Terminal

### 6.7.1 Construction/Operation Activities

The KOS marine terminal is an existing port facility at which CFI is erecting a temporary Dynamic Air Shelter inflatable building. As such, environmental impacts of construction are minimal. Activities in the Marine Terminal area during construction and subsequent operation include:

- construction activities and equipment mobilization
- transportation
- staging and storage of Fluorspar concentrate

### 6.7.2 Environmental Issues

#### General

General environmental issues that may be associated with the construction and operation of the Marine Terminal include:

- potential leakage or spills of fuel or other hazardous materials
- incidental events including vessel collisions

#### Sensitive Areas / Periods

*Marine*: As the marine terminal is an existing facility, no in-water construction will occur.

*Terrestrial:* As the marine terminal is an existing facility, existing infrastructure (including access roads) will be utilised.

*Historic / Archaeological Resources*: The Project will have no effect on historic / archaeological resources in the area as the facility is pre-existing.

### 6.7.3 Environmental Protection Procedures

#### General Measures

Environmental Protection Procedures relevant to the construction and operation of the Marine Terminal are listed in Table , and presented in detail in Appendix D.

**Table 9: Relevant Environmental Protection Procedures - Marine Terminal**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Marine Terminal Construction |
|---|---|---|
| D.1 | Clearing of Vegetation | |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | |
| D.3 | Storage, Handling and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | |
| D.5 | Solid Waste Disposal | • |
| D.6 | Buffer Zones | |
| D.7 | Erosion Prevention | |
| D.8 | Excavations, Embankment and Grading | |
| D.9 | Stream Crossings | |
| D.10 | Dust Control | • |
| D.11 | Trenching | |
| D.12 | Dewatering – Work Areas | |
| D.13 | Marine Vessels | • |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |
| D.16 | Blasting | |
| D.17 | Drilling – Geotechnical | |
| D.18 | Vehicular Traffic | • |
| D.19 | Works Around Marine Environment | • |
| D.20 | Surveying | • |
| D.21 | Equipment Operations | • |
| D.22 | Historic Resources | |

Sections 5.0, 6.0, and 7.0 and Appendices B, C, D, and E of this EPP provide information to be used to prevent pollution, and avoid or reduce potential adverse environmental effects during Marine Terminal construction and operation.

### 6.7.4 Area Specific Measures

In addition to the Environmental Protection Procedures listed in Table 5 the following will be required during Marine Terminal construction and operation:

- Requirements listed in all government permits, approvals, and authorizations.
- Construction Safety Zone demarcation and management in the marine environment.

- Construction debris will not become waterborne. During construction, all floating debris will be contained in the immediate area and removed from the water in a timely manner.
- The management of marine traffic is the responsibility of the Canadian Coast Guard. It is mandatory for large vessels to report to the Coast Guard at specified points and take local pilots on board. The potential for collisions will be minimized by; controlling vessel speed, scheduling and coordinating activities with other marine users, as well as Transport Canada and the Coast Guard, and posting Notices to Mariners, as necessary.
- The Marine Terminal will use existing navigational aids to provide early warning of collision hazards (e.g., flashing white and red strobe lights) in accordance with Transport Canada and Canadian Coast Guard regulations. Solid red warning lights will be avoided. Weather reports and wind speed information will also be used to monitor changing weather conditions that could increase the risk of collisions during vessel navigation to or from the Marine Terminal.
- CFI will transmit the exact geographical coordinates of the Marine Terminal construction area to the Canadian Coast Guard to help them manage marine traffic in the Harbour.

### 6.7.5 Monitoring Requirements

Monitoring applicable to the Marine Terminal construction and operation includes:

- Marine water quality monitoring, as required in accordance with applicable permits and approvals.

Other monitoring requirements may be added as determined by regulatory conditions of approval.

# 7.0 CONTINGENCY PLANS

CFI has established an OHS Plan (including radon and radon monitoring) and an Emergency Response Plan (ERP) that includes procedures focuses on avoiding workplace incidents. In the event of workplace emergency events, CFI will initiate the required response as outlined in the ERP. CFI is committed to providing the safest possible workplace for its employees through the strict enforcement of all safety related policies. It is the expectation of CFI that Employees will maintain constant vigilance, undergo regular safety training, and follow the procedures outlined in work execution plans to prevent and avoid workplace incidents.

## 7.1 Fuel and Hazardous Material Spills

Fuel and hazardous materials can be damaging to vegetation, soil, water (freshwater or marine), groundwater, wildlife, aquatic organisms, historic resources, and human health and safety. In the event of a fuel or hazardous material spill, the HSE Manager will be notified immediately. It is the responsibility of the supervisor / HSE technician to contact the appropriate agencies, if required.

An Emergency Response Team Coordinator (ERTC) will be identified at site. The ERTC will be trained in spill response procedures and how to mobilize the response equipment. The overall responsibility of co-ordinating a response and maintaining the contingency plan to ensure it is current and up-to-date will be the ERTC's responsibility. The ERTC has full authority to take necessary and appropriate action without unnecessary delay. The ERTC will act in consultation with the HSE Manager and regulatory authorities.

Immediate action will be taken to stop any leak and contain the spilled material. All contaminated material will be collected and stored in an appropriate manner so as to not re-release to the environment until such time that it can be transported to an approved treatment/disposal facility.

The ERTC will be responsible for preparing a written report which will be submitted (as soon as possible and no later than 30 days after the spill) to the HSE Manager. It will be the responsibility of the HSE Manager to distribute the report to relevant government agencies, if required

Canada Fluorspar (NL) Inc.'s ERP will address fuel and hazardous materials spills.

## 7.2 Wildlife Encounters

Wildlife encounters pose a risk for stress and/or injury to both the wildlife and site personnel. Control measures and environmental protection procedures have been put in place to minimize the risk to wildlife and humans resulting from the Project. As a protection measure, hunting, trapping, and fishing by Project personnel and members of the public is not permitted on site.

The HSE technician is responsible to ensure the site and working areas are kept clean of food scraps and garbage, waste is collected regularly, and inspections are carried out to ensure cleanliness in accordance with the Waste Management Plan. No attempts to catch, chase or divert, follow, or otherwise harass any wildlife will be made by any Project personnel. Any encounters with wildlife shall be immediately reported to the HSE Manager.

To adequately document all worker / wildlife encounters, a wildlife encounter form shall be provided to all site personnel and completed when encounters are of a threatening nature or are of species at risk. These forms must be submitted to the HSE Manager.

The ERP will address wildlife encounters.

## 7.3 Forest Fires

Project Operations may involve activities that increase the risk of fire in the natural environment. To minimize the potential risk of fire, the HSE Manager will ensure contractors and employees take all precautions necessary to prevent fire hazards when working at the site. All waste materials of a flammable nature shall be disposed of in an appropriate manner, in the appropriate container. Personnel will be trained in fire prevention and response, and appropriate firefighting equipment will be readily available.

The Town of St. Lawrence has a dedicated emergency response team with fire-fighting equipment and emergency response vehicles equipped with fire-fighting equipment; it will be notified immediately. Evacuation of personnel from the area will be the highest priority. Muster points for site workers are established and headcounts taken to account for all personnel. The appropriate Forest Fire Protection Centre and RCMP office will also be notified immediately, and in the unlikely event of a large fire, local emergency response and fire-fighting capability will be called to respond, reducing the severity and extent of damage and to protect the safety of workers, visitors and the general public.

The ERP will address forest fires.

## 7.4 Vessel Accidents

There exists the potential that vessels involved in concentrate transport activities may run aground, become involved in collisions with other vessels, or sink due to inclement weather conditions or other unforeseen circumstances. Additional problems may result if oil products or chemicals are released during vessel accidents. However, the priority concern will be the safety of all crew members.

There is already extensive use of the waters of Mortier Bay and Placentia Bay by large ocean going vessels and smaller vessels. The bay supports a healthy commercial fishery, aquaculture, oil tanker traffic associated with the refinery and trans-shipment terminal, cargo vessels, passenger ferries and recreational craft.

Vessel crews of ships providing service to the Project shall have emergency response procedures for both life threatening and potentially polluting situations. These emergency response procedures shall be communicated to all crew members and made available to CFI upon request.

The ERP will address Vessel Accidents. Emergency response in the event of a vessel collision is coordinated by the Canadian Coast Guard with support from local land based emergency responders, as needed. The Coast Guard will be advised of the timing and type of activity associated with the Project and will be informed of the shipping schedule by CFI. The ERP will contain a section regarding response to incidents at sea; however, the ship’s Master is ultimately responsible for the safe operation and emergency response in the event of an accident.

# 8.0 COMMUNICATIONS PROTOCOL

Communication with various stakeholder groups is essential during the various Project phases to inform, engage, and obtain feedback. It is important during operations for CFI to be responsive to complaints and to provide timely, useful, and relevant information to local residents and other stakeholders to build positive relationships based on mutual respect. The Communications Protocol is outlined in the following subsections.

## 8.1 Objectives

The key objectives of the Communications Protocol for the Project are to:

- Provide timely and accurate Project information and updates, as required.
- Deliver information in a format that is clear and easy to understand.
- Identify issues of concern and respond in a timely and responsible manner.
- Improve the consultation process and the Project by incorporating stakeholder feedback and input, as well as public ideas and opinions.
- Adjust operations activities where possible, to avoid or mitigate adverse environmental effects.
- Create and improve relationships with local organisations and municipal governments.
- Increase company profile and remove barriers to employment for gender minorities, persons with disabilities, visible minorities, and indigenous individuals.

## 8.2 Key Components of Communications Protocol

Under the direction of CFI, the following mechanisms and tools will be used to engage with stakeholder groups and the local community:

- open houses
- social media
- external and internal newsletters
- stakeholder meetings (one on one meetings)
- project website
- traditional media (newspaper and radio)
- project phone number and email address

Communication requirements and procedures will be incorporated into orientation training for all Project personnel and will include the following topics:

- emergency response / critical incident communications procedures
- project activity notification procedures
- complaints response procedures

- stakeholder strategy awareness for employees and contractors
- monitoring, documenting and reporting requirements
- confidentiality agreement
- social media policy

During operations, communications material that may be used to provide updates and information to stakeholders could include:

- activity notices
- Project information sheets and brochures
- Project newsletters
- local employment / business information
- Project website updates
- Bulletins and notices through CFI and municipal social media channels
- Radio and newspaper announcements
- press releases and advertisements

## 8.3 Project Personnel External Communication

It is important that all Project personnel understand they represent the Project at all times, whether on or off the Project site. All personnel must conduct themselves appropriately and use the appropriate communication procedures when communicating with other parties, such as regulatory agencies, inspectors, the media and the public.

### 8.3.1 Communication with Environmental Regulatory Agencies

All communication, verbal and written, to outside agencies regarding environmental issues shall require co-ordination through CFI's Department Superintendents.

The Department Superintendents will act as primary contact for federal, provincial and local regulatory agencies that require compliance records and access to the Project site unless circumstances dictate otherwise. Submission of environmental reports to these agencies shall also be controlled by CFI's Department Superintendents.

### 8.3.2 Regulatory Inspectors

Provincial or federal regulatory officials may require access to the Project site to conduct an investigation or to complete an inspection. All visits, whether planned or unannounced, will be directed to the appropriate Department Superintendents. The overall responsibility for co-ordinating these visits will be that of the appropriate Department Superintendents. Where the inspection is environment-related, the HSE Manager, or designate, must be contacted immediately and must be in attendance for any tours or meetings.

During site visits, regulatory officials will be requested to attend a pre-inspection meeting and a post-inspection meeting with the Department Superintendents, HSE Manager, and other personnel, as designated. The HSE Manager will prepare a report summarizing the environment-related visit, findings, and the actions required. Corrective action will be completed promptly, regulatory officials will be kept informed, and copies of the report will be issued to the General Manager and CFI's Department Superintendents.

### 8.3.3 Communications with Media

No Project personnel are authorized to speak with the media. Any media requests must be sent to CFI's Community Relations Liaison who will respond to the request according to corporate policies.

### 8.3.4 Communications with Public

Only specifically authorised Project personnel may speak with the public regarding details of the Project.

In the event that Project personnel are approached by a visitor on-site, the visitor should be directed to the main office. In the event that the main office is not practical, the visitor should be directed to the closest of either a Department Superintendents or HSE Manager. These representatives will direct the visitor appropriately.

## 8.4 Complaints Management

An effective and well-functioning complaints mechanism is an essential part of managing community relations. For local communities, Project effects such as noise, dust, traffic, and influx of workers associated with operation can result in disturbances.

A procedure has been implemented for managing complaints from stakeholders. The objectives of the procedure will be to:

- Provide affected people with straightforward and accessible ways for making a complaint.
- Ensure appropriate and mutually acceptable corrective actions are identified and implemented.
- Verify that complainants are appropriately addressed with outcomes of corrective actions.

CFI will respond to inquiries and complaints received from the public. When a complaint is made, all contractors and employees will immediately communicate it to an appropriate CFI representative. The Community Relations Coordinator will be responsible for managing responses to complaints and will establish a defined timeline for responding to complaints. All complaints received will be communicated to the Coordinator, who will be responsible for logging, tracking, and responding to inquiries within a defined timeline.

A register of complaints and responses will be maintained by CFI to document how issues have been resolved. The register of inquiries will include:

- source
- time and nature of the complaint
- work activities being conducted at the time of the complaint
- weather conditions at the time of the complaint
- complainant's name, address and contact number

An investigation of each complaint will be completed. Where required, corrective action(s) will be implemented, as appropriate, including the possible modification of operations techniques and / or equipment to avoid recurrence, or reduce adverse effects. Canada Fluorspar (NL) Inc. will inform the stakeholder of the response to their complaint, including details on implementation of corrective action(s), if applicable. Follow-up monitoring will be implemented, if necessary, to evaluate the effectiveness of the corrective action(s).

All Department Supervisors will be required to be familiar with, and abide by the complaints procedure. This will include:

- Providing Project schedule and activity updates to CFI to allow sufficient time for any potential effects to the local community to be included in Project updates and notifications.
- Ensuring contractor and Project personnel participate in orientation training, including code of conduct and communications training, and abide by the procedures and expectations outlined in the training.
- Participating in investigations of complaints or other incidents that could lead to complaints.
- Making resources available to undertake immediate and appropriate corrective action to resolve issues.
- Providing follow-up monitoring and reporting as necessary.

# 9.0 FORMS

## 9.1 Environmental Meeting Record Form

Date and Time: _____ Project:_____
Location: _____ Weather:_____

Type of Environmental Meeting:

Brief Description of Job / Task:

| Step 1: Identify the Task | Step 2: Identify the Hazards | Step 3: Evaluate the Risks | Step 4: Plan to Control and / or Eliminate Hazards |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Special EPP Measures for the Job / Task:

Other Issues:

Resolutions:

HSE Manager Comments:

**Signatures of Project Personnel**

_____ _____ _____

[Signatures] [Signatures] [Signatures]

## 9.2 Spill Report Form

Date: _____

Project: _____

Substance Spilled: _____

Time of Spill: _____

Time Personnel Learned of Spill: _____

Time Clean-up Commenced: _____

Approximate Volume of Spill: _____

Spill Location: _____

Description of Source / Cause: _____

Nature, Extent, Duration and Environmental Effect:

| |
|---|
| |

Remediation Plan and Follow-up:

| |
|---|
| |

[OPTIONAL – COMPLETE PORTION BELOW IF SPILL WAS AN EMERGENCY]

Time Environmental Emergencies Notification: _____

Name of Emergency Personnel: _____

Any Resulting Injuries? ☐ Yes / ☐ No [If yes, please describe]

| |
|---|
| |

**Signatures:**

HSE Manager: _____
[Signature]

General Manager: _____
[Signature]

Others: _____
[Signatures]

## 9.3 Non-Compliance Form

Name of Personnel: _____

Role or Title: _____

Date of Non-Compliance: _____

Location of Non-Compliance: _____

Weather: _____

Ground Conditions: _____

Photos Attached? ☐ Yes / ☐ No Photo Numbers: _____

Issues of Non-Compliance:

| |
|---|
| |

Resolution:

| |
|---|
| |

Follow-up Required:

| |
|---|
| |

**Signatures**

Project Personnel: _____
[Signature]

HSE Manager: _____
[Signature]

General Manager: _____
[Signature]

## 9.4 EPP Revision Request Initiation Form

Section to be revised:

| Section | Page # |
|---|---|
| | |
| | |
| | |

Nature of Revision:

| |
|---|
| |

Rationale for Revision:

| |
|---|
| |

Submission Date: _____

**Signatures**

Project Personnel: _____
[Signature]

HSE Manager: _____
[Signature]

General Manager: _____
[Signature]

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# APPENDIX A

## Contacts

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# APPENDIX B

## Guidance Documents

| Document # | Title |
|---|---|
| 1 | DFO. 2013. *Measures to Avoid Causing Harm to Fish and Fish Habitat*. Available at: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html. Accessed: September 2015. |
| 2 | Gosse, M.M., Power, A.S., Hyslop, D. E. and S.L. Pierce. 1998. *Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador*. Fisheries and Oceans Canada, St. John's, NF. Available at: http://www.dfo-mpo.gc.ca/Library/240270.pdf. Accessed: September 2015. |
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# APPENDIX C

## Department of Fisheries and Land Resources Newfoundland and Labrador Species at Risk Data Sheets

| Data Sheet # | Title |
|---|---|
| 1 | **Barrow's Goldeneye** |
| 2 | **Bobolink** |
| 3 | **Chimney Swift** |
| 4 | **Common Nighthawk** |
| 5 | **Eskimo Curlew** |
| 6 | **Harlequin Duck** |
| 7 | **Ivory Gull** |
| 8 | **Newfoundland Gray-cheeked Thrush** |
| 9 | **Olive-sided Flycatcher** |
| 10 | **Peregrine Falcon** |
| 11 | **Piping Plover** |
| 12 | **Red Crossbill** |
| 13 | **Red Knot** |
| 14 | **Rusty Blackbird** |
| 15 | **Short-eared Owl** |
| 16 | **American Eel** |
| 17 | **Banded Killifish** |

# APPENDIX D

## Environmental Protection Procedures

# D.1 - CLEARING OF VEGETATION

## Environmental Concerns

Vegetation clearing (e.g. trees and shrubs) may be required during Project operations. Environmental concerns include alteration or loss of habitat, sedimentation of waterbodies, and disturbance or destruction of historic resources.

## Environmental Protection Procedures

Measures will be implemented to reduce the potential effects of vegetation removal. Clearing activities will be limited to those areas that are required for operations and will comply with the requirements of all applicable permits, including the Commercial Cutting Permit and the Operating Permit. Wherever practical, previously disturbed areas will be used for staging and stockpiling, and existing access roads used where possible.

- Where possible, vegetation clearing, and grubbing and stripping activities (Appendix D.2) will be avoided during the bird breeding season, which occurs from April 1 to September 1 in the region (Environment Canada 2014a). If some clearing, grubbing or stripping is necessary during the bird breeding season, CFI will assess if the work can be conducted without contravention of the *Migratory Birds Convention Act* and a contingency plan (e.g. nest surveys prior to clearing) will be developed in consultation with the CWS to maintain compliance with the Act.
- If a nest is identified on the site, a species-specific buffer will be established around the nest, and potentially disruptive activities within the buffer will be halted to protect nests until chicks have fledged (Environment Canada 2014b).
- If a nest is identified on the site, consult with CWS for further advice.
- Implement a 1 km buffer from breeding seabird colonies as recommended by Environment Canada for high-disturbance activities (Environment Canada 2013, 2014c).
- A cutting permit shall be obtained prior to the start of any site clearing. Clearing and tree removal shall be restricted to the minimum areas needed for the site and stockpiles. Under no circumstances will any merchantable timber be bulldozed.
- Clearing shall consist of cutting to within 15 centimetres (cm) of the ground and disposing of all standing trees; as well as the removal of all shrubs, debris and other perishable materials from the area. All residual slash shall be stockpiled in windrows for subsequent disposal.
- Limits of clearing will be shown on all drawings issued for operations. Only those areas designated on drawings shall be cleared. Trees shall be blazed at intervals in advance of clearing to demarcate the limits of the work. Blazed trees shall not be felled. Clearing activities shall not remove any trees outside the authorized clearing areas.
- All trees in the cutting area that are greater than 9 cm diameter-at-breast-height (dbh) must be felled and removed from the cutting area. All trees must be utilized to a top diameter of 8 cm.
- All merchantable or forest product timber within the specified clearing limits shall be located so as not to obstruct the access or work of others. All merchantable or forest product timber shall be salvaged. It shall be cut into standard harvesting lengths (i.e. 2.5 to 3.5 m lengths), trimmed, and stored adjacent to the road so that it is easily located during winter. The timber will be available for local residents to recover and use as firewood or saw logs.
- Slash and any other material or debris shall not be permitted to enter any watercourse or water body and shall be piled above spring flood levels.

- Chain saws or other hand-held equipment shall be used in clearing vegetation except where alternative methods or equipment are approved by the HSE Manager through consultation with the HSE technician. Mechanical clearing by heavy equipment shall not occur except where it can be demonstrated that there is no merchantable timber, and where the resulting terrain disturbance and erosion will not result in the loss of topsoil or the sedimentation of watercourses and water bodies.
- All chainsaw operators shall be equipped with an adequate fire extinguisher during the fire season, as well as shovels and axes.
- Mobile mechanical equipment will not be used for timber removal within 15 m of a stream or water body. Manual methods or a mechanical long lead choker system may be used in these instances. Activities will be monitored and if necessary this buffer may be increased where necessary.
- A buffer zone of undisturbed vegetation shall be maintained between construction areas and all water bodies, watercourses (Appendix D.6), and ecologically sensitive areas (e.g. wetlands). Buffer zones of features will be key elements of the environmental review of drawings prior to construction.
- Where possible, timber shall be felled inward toward the work area to avoid damaging any standing trees within the immediate work area.
- Burning of vegetation and debris will not be permitted.
- Workers shall not destroy or disturb any features that are indicative of a historical or archaeological site. Any such findings shall be reported to the HSE Manager and an appropriate buffer zone established (Appendix D.6) in consultation with NL Business, Tourism, Culture and Rural Development.

## D.2 – GRUBBING, STRIPPING, AND DISPOSAL OF RELATED DEBRIS

### Environmental Concerns

The principal concerns associated with grubbing, stripping and disposal of related debris are the potential effects of erosion on marine and freshwater ecosystems, and water quality.

### Environmental Protection Procedures

All grubbing, stripping, and disposal of related debris near watercourses shall adhere to relevant regulatory requirements, including the permits and conditions of approval from NL DMAE and DFO.

Other specific measures to be undertaken to minimize potential effects on aquatic habitat and resources are as follows:

- Grubbing of the organic vegetation mat and / or the upper soil horizons shall be minimized. These shall be left in place where possible.
- The organic vegetation mat and / or upper soil horizon material, which has been grubbed, shall be spread in a manner that attempts to cover exposed areas. Any surplus material shall be stored or stockpiled for site rehabilitation and revegetation purposes elsewhere in the Project area. Any material unsuitable for construction purposes will be placed in an approved stockpile.
- Organics / topsoil shall not be contaminated with underlying overburden, subsoil or other unsuitable material during grubbing and stripping. It shall be kept separate to be used for reclamation purposes.

- Topsoil shall be stockpiled separately from the overburden and separated by a buffer zone (Appendix D.6) from any water bodies, watercourse or ecologically sensitive areas where possible. The location of the stockpiles shall be shown on drawings issued for construction and accessible for future rehabilitation purposes. Wherever practical, make use of previously disturbed areas for staging and stockpiling.
- A minimum of 5 m should separate stockpiles of grubbed material from standing timber.
- Grubbed material and / or topsoil should be stored in low piles to decrease the effect of compaction on soil structure. Stockpiles should be seeded or otherwise protected to prevent erosion and loss of nutrients. This is especially important if stockpiles are to remain in place for periods of a year or more.
- Discourage ground- and burrow-nesting species from nesting on denuded soil (e.g. by covering unattended soil piles).
- Silt fences, check dams, settling ponds, ditch blocks, interception ditches, and filter fabrics shall be installed to minimize and control runoff of sediment laden water during grubbing, and the re-spreading and stockpiling of grubbed materials. Where grubbed materials are re-spread or stockpiled, as many stumps and roots as possible shall be left on the ground surface to maintain soil cohesion, to dissipate the energy of runoff, and promote natural revegetation. Erosion control measures shall be implemented in areas prone to soil loss; these measures can include brush cover, stone riprap, filter fabrics, wire mesh, settling ponds, drainage channels and gravel or wood chip mulches. Refer to Appendices B and E for specific guidance and Environmental Guidelines.
- The length of time that grubbed areas are left exposed to the natural elements shall be minimized to limit the potential for erosion. These areas will be monitored for erosion and such findings shall be reported to the HSE Manager.
- During grubbing, care shall be taken to ensure that grubbed material will not be pushed into areas that are to be left undisturbed.
- Grubbing shall be avoided on steep slopes near watercourses. A buffer zone shall be maintained between grubbed areas and watercourses, water bodies and ecologically sensitive areas (Appendix D.6). Grubbing limits adjacent to watercourses will be flagged in the field prior to undertaking grubbing / stripping activities.

## D.3 – STORAGE, HANDLING, AND TRANSFER OF FUEL AND OTHER HAZARDOUS MATERIALS

A variety of fuels and potentially hazardous materials will be used during Project operation activities. Gasoline, diesel fuel, grease, motor oil, and hydraulic fluids are all needed for equipment. Other potentially hazardous materials, which may be routinely used, include:

- propane
- explosives
- acetylene
- paints
- epoxies

- concrete additives
- antifreeze
- cleaners and solvents

## Environmental Concerns

The primary concern regarding the use of fuel and hazardous materials is their uncontrolled release to the environment through spillage, and the subsequent adverse effects on human health and safety, terrestrial, aquatic and marine habitat and species, soil and groundwater quality.

## Environmental Protection Procedures

The following protection procedures will be implemented in accordance with the Waste Management Plan:

*Transport of Fuel and Other Hazardous Materials*

The *Transportation of Dangerous Goods Act* applies when dangerous goods are being transported to and from site. The transport of fuel and other hazardous materials to and from site will be undertaken in compliance with the Act. All goods entering the site will be inspected to ensure that the appropriate placards or labels and manifest are in place and the security of the product is assured. All persons handling dangerous goods must show proof of certification of training in the transportation of dangerous goods as required under the Act. Site security and the HSE Manager will be trained in the requirements of the Act.

*Storage of Fuel and Other Hazardous Materials*

Bulk storage of fuel products and other hazardous materials on land will be stored and handled in compliance with the Storage and Handling of Gasoline and Associated Products Regulations (2003), the Heating Oil Storage Tank System Regulations (2003), or other applicable regulations.

The following conditions shall apply to the storage of fuels and other hazardous materials:

- Before installing fuel storage tanks, the necessary approvals under the Storage and Handling of Gasoline and Associated Products Regulations shall be obtained from the NL Department of Government Services.
- Only trained, qualified persons will handle fuels and other hazardous materials. The Workplace Hazardous Materials Information System (WHMIS) will be implemented to ensure proper handling and storage is achieved.
- Oils, grease, gasoline, diesel, or other fuels or any material deemed to be hazardous shall be stored at least 100 m from any surface water.
- Fuels shall be stored inside dykes or self-dyked units and will be clearly marked to ensure they are not damaged due to moving vehicles. The markers will be visible under all weather conditions.
- Any aboveground fuel tank shall be positioned over an impervious mat and shall be surrounded by an impervious dyke of sufficient height (minimum height 0.6 m) to contain:
    - Where a dyked area contains only one storage tank, the dyked area shall retain not less than 110% of the capacity of the tank.
    - Where a dyked area contains more than one storage tank, the dyked area shall retain not less than 110% of the capacity of the largest tank or 100% of the capacity of the largest tank plus 10% of the aggregate

capacity of all the other tanks, whichever is greater. Otherwise approved self-dyked storage tanks shall be used where required.

- Dyked areas are to be dewatered on an as needed basis. The water shall be decontaminated prior to release into the environment.

- Any dykes of earthwork construction shall have a flat top not less than 0.6 m wide, and be constructed and maintained to be liquid tight to a permeability of 25 L/m²/day. The distance between a storage tank shell and the centre line of a dyke shall be at least one half the tank height. Dykes shall be fenced.
- Fuel storage areas and non-portable transfer lines shall be clearly marked or barricaded to ensure that they are not damaged by moving vehicles. The markers will be visible under all weather conditions. Barriers will be constructed in compliance with the provincial Storage and Handling of Gasoline and Associated Product Regulations (2003).
- Waste oils, lubricants, and other used oil shall be reused, recycled or disposed of at an approved, licensed waste management facility or eliminated using controlled burning methods (i.e. incineration or burner) in accordance with the Policy Directive PPD05-01: Management of Impacted sites, Guidance Document for the Management of Impacted sites, and Guidance Document GD-PPD-045: Protocol for the Management of Soils Excavated on Impacted sites and the Air Pollution Control Regulations (2004). Controlled burning of used oil products shall not proceed without approval from the NL DMAE.
- Storage areas will be equipped with suitable firefighting equipment.
- All storage tank systems shall be inspected on a regular basis as per Sections 20 and 21 of the Storage and Handling of Gasoline and Associated Products Regulations (2003). This involves, but is not limited to, gauging or dipping and the keeping of reconciliation records for the duration of the program.
- Contracted fuel suppliers must comply with the *EPP for the Operation Phase* and before transporting or positioning fuel at the site, have on file at the CFI office a copy of the Emergency Response Plan (ERP).
- Smoking shall be prohibited within 10 m of a fuel storage area.
- Hot Work Permits shall be required before undertaking welding or torch cutting at a fuel storage area.
- Temporary fuelling or servicing of mobile equipment in areas other than the main fuel storage site shall not be allowed within 30 m of a watercourse. Gasoline or lubricant depots must be placed 100 m from the nearest water body.
- Within 30 days of known decommissioning of a storage tank system, empty the system of all products, remove the tank and associated piping from the ground, remove any contaminated soil, clean the area and reclaim the site.
- Any soil contaminated by small leaks of fuel, oil or grease from equipment shall be disposed of in accordance with the provincial *Environmental Protection Act* and Used Oil Control Regulation. The Used Oil Control Regulation will be used as a guideline to the NL DMAE requirements for such disposal.
- A fuel and other hazardous materials spill Contingency Plan, ERP, and appropriate emergency spill equipment shall be in place on site (see Section 7.0 of this *EPP for the Operation Phase*, in addition to contingency plans required by fuel suppliers).

- Bulk fuel storage facilities shall be dipped on a weekly basis to accurately gauge fuel consumption. These consumption rates shall allow for visually undetectable sources of contamination to be identified and corrected.
- Outdoor storage of gasoline or diesel in portable containers is acceptable only in designated areas for that purpose.

### *Fuel Transfer*

The following procedures shall apply to the transfer of fuel or hazardous material:

- In all cases, a qualified person shall attend transfer to storage tanks, for the duration of the operation. This person shall be trained in proper fuel handling procedures to minimize the risk of an unattended spill. The attendant shall be trained in the requirements of the Contingency Plan (Section 7.0), and WHMIS.
- Hoses or pipes used for fuel transfer shall be equipped with properly functioning and approved check valves, spaced to prevent backflow of fuel in the case of failures.
- Exposed pipelines shall be protected from vehicular collision damage by the installation of guardrails.
- Fuel transfers between ships shall be conducted in accordance with the *Canada Shipping Act*, Oil Pollution Prevention Regulations.
- Bulk fuel transfers between ships shall only take place during daylight hours.

### *Equipment Fuelling*

The following procedures shall apply to the fuelling of heavy equipment:

- Fuelling and lubrication of equipment shall occur in such a manner as to minimize the possibility of contamination to soil or water.
- When refuelling equipment, operators shall:
  - Use leak free containers and reinforced rip and puncture proof hoses and nozzles.
  - Be in attendance for the duration of the procedure.
  - Seal all storage container outlets except the outlet currently in use.
- Regular inspections shall be performed on the hydraulic and fuel systems of machinery. Leaks shall be repaired immediately.
- Fuelling or servicing of mobile equipment on land shall occur in designated areas (i.e. low permeability) and not be allowed within 30 m of watercourses, water bodies or ecologically sensitive areas. Gasoline or lubricant depots must be placed 100 m from the water body.
- Fuelling attendants shall be trained in the requirements under the Spill Contingency Plan and ERP.

### *Hazardous Materials*

The following procedures shall apply to the use of hazardous materials:

- Hazardous materials shall be used only by personnel who are trained and qualified in the handling of these materials and only in accordance with manufacturers' instructions and government regulations. WHMIS and the provisions of the *Transportation of Dangerous Goods Act* (Transport Canada) shall be implemented throughout the job site. All employees involved with hazardous materials shall be appropriately trained.

- All hazardous materials shall be removed and disposed of in an acceptable manner in accordance with government regulations and requirements.
- Material Safety Data Sheets (MSDS) must be available on-site prior to receipt of any hazardous materials.
- A hazardous waste storage area shall be constructed and properly marked.

### *Spills of Fuel and Hazardous Materials*

The following procedures shall apply to spills of fuel and hazardous materials:

- All necessary precautions shall be implemented to prevent the spillage of fuels and other hazardous materials used during the operations phase.
- There shall be appropriate emergency spill response equipment on-site for all phases of the Project.
- A complete list of the emergency spill response equipment shall be available on-site and kept up to date.
- All emergency response equipment should be kept in good working condition suitable for required use. To ensure working condition of equipment, periodic practice deployments will be conducted under the supervision of the HSE Manager.
- Regular inspections of all spill response supplies and equipment will be conducted and documented to ensure adequate supply and condition.
- The use of chemical dispersants to treat oil slicks shall take place only under the authorization of Environment Canada, Environmental Protection Branch (Newfoundland and Labrador Region).
- All spills of fuel and hazardous materials shall be reported immediately to the HSE Manager, HSE technician and the contractor. Any spill to the marine or freshwater environments and spills of 70 L or more on land shall be reported immediately to the Canadian Coast Guard at 1-800-563-9089 as outlined in CFI's ERP.
- Every effort shall be made to immediately control the source of the leak or spill and clean-up the contaminated area as long as it is safe to do so.
- All material and equipment used during spill clean-up must be stored properly until it can either be disposed of or cleaned to avoid further contamination. Disposal of clean-up materials must be in accordance with this *EPP for the Operations Phase*, the Waste Management Plan and all government regulations and requirements.

## D.4 – SEWAGE DISPOSAL

### Environmental Concerns

The incidental release of untreated sewage is a concern to human health, drinking water quality, and freshwater and marine ecosystems.

### Environmental Protection Procedures

Sewage generated during site operations will be collected and treated by a BMS Blivet Package Sewage Treatment System. This permanent sewage system has been installed, and will be maintained to prevent the release of hazardous substances, pathogens, and excess nutrients to the environment. The Blivet incorporates primary/final settlement and sewage treatment which eradicates the need for separate settlement, screens, or septic tanks. Treated effluent will be discharged to the Event Pond in accordance with ECWSR regulations.

# D.5 – SOLID WASTE DISPOSAL

## Environmental Concerns

Solid waste (e.g. domestic waste, paper, cardboard, and wood), if not properly controlled and disposed of, will be unsightly, may cause human safety and health concerns, and could adversely affect wildlife. Refer to the Waste Management Plan.

## Environmental Protection Procedures

- A Waste Management Plan is in place to address waste generation, handling, and disposal during operations. Any procedures or strategies for management of solid waste will be in accordance with the provincial Waste Management Strategy (Government of NL 2002).
- All contractors will be required to submit detailed waste management plans which adhere to the Waste Management Plan.
- The minimum qualifications of the temporary Waste Management Station Operator include:
  - WHMIS certification;
  - TDG certification; and,
  - Working knowledge of applicable provincial and federal waste management legislation (e.g. Newfoundland and Labrador *Environmental Protection Act*, Used Oil Control Regulations, Air Pollution Control Regulations, Storage and Handling of Gasoline and Associated Products Regulations).
- Waste accumulated on-site prior to disposal shall be confined so it does not pose an environmental or health hazard or cause conflict with wildlife. Storage of waste shall be in proven bear proof containers; this can be done in consultation with the Wildlife Division of the NL DMAE.
- Workers are instructed to maintain good housekeeping practices and not leave any food or garbage at the Project site to avoid attracting wildlife, including omnivorous predators which may disturb or cause direct mortality or injury to other wildlife (including birds).
- All non-recyclable, non-hazardous solid domestic wastes will be transported for off-site disposal at an approved waste disposal site.
- To reduce the amount of waste being generated and land filled, all site personnel will abide by the Reduce, Reuse, Recycle Program outlined in the Waste Management Plan.
- Waste that is not approved for landfill shall be transported off-site to an approved disposal location.
- No waste material will be deposited in a body of water.

# D.6 – BUFFER ZONES

## Environmental Concerns

The potential for erosion / sedimentation and resulting effects on water quality, fish and fish habitat is a key environmental concern associated with operations activities. In addition, sensitive and listed environmental receptors require protection from activities associated with operations.

Buffer zones of natural vegetation or undisturbed areas that separate these environmental receptors from operations activities are needed to mitigate environmental effects. These undisturbed areas may also provide wildlife habitat or travel corridors near work areas and Project features.

Due to the many buffer zones referenced in various government documents and others that may be stated in regulatory permits yet to be obtained, the appropriate buffer zone to use in a specific area may be a source of confusion. Therefore, the HSE Manager, and his / her designate, shall be the only site-based personnel to determine which buffer is applicable, and contractors shall be required to consult with these individuals prior to establishing buffers. For general guidance, however, the following procedures shall define the minimum requirements during operations.

## Environmental Protection Procedures

- A minimum buffer zone of natural vegetation of 30 m from the high water mark of water bodies and watercourses shall be maintained around work areas where available space poses a constraint. For ecologically sensitive areas (e.g. migratory bird nests) a minimum buffer zone of natural vegetation of 50 m will be maintained around work areas where available space poses a constraint. If the available space allows, then wider buffer zones of 100 m shall be maintained between operation areas and watercourses, water bodies and ecologically sensitive areas.
- A buffer of at least 25 m will be maintained between all natural water bodies and waste rock, overburden, and topsoil piles to minimize the risk of sedimentation.
- DFO recommends buffer zones to separate resource roads running adjacent to water bodies be calculated by the following formula:
  - buffer width (m) = 20 m + 1.5 x slope (%); however, a minimum buffer zone of 30 m and where possible a 100 m buffer zone shall be maintained at all times, except where specified otherwise, e.g. ecologically sensitive areas.
- Sediment runoff control fences shall be constructed at the toe of all slopes outside the buffer zones, as required by the HSE Manager or his / her designate.

  This is required to control runoff from areas of exposed soils and prevent transport of sediments towards water bodies. Silt fences and buffer strips shall be inspected on a regular basis. Any accumulations of sediment observed shall be removed and disposed of in an area where it will not re-enter any water body. Also, repairs and replacement of damaged silt fences shall be addressed immediately.
- CFI will comply with DFO guidance which stipulates that, for large blasts, in the order of 100 kg per hole, a setback of 150 m is required from water bodies (Wright and Hopky 1998).
- Implement 1 km buffer from breeding seabird colonies recommended by Environment Canada for high-disturbance activities (Environment Canada 2013, 2014c).
- If a nest is identified on the site, establish a species-specific buffer around the nest, halt potentially disruptive activities within the buffer area and protect nests until chicks have fledged (Environment Canada 2014b).
- A minimum buffer zone of 20 m shall be maintained around any archaeological site within which no operation activities will take place. Where available space poses constraints, this width may be reduced and supplemented by other protective measures. Site specific mitigation measures for known historic resources in the Project area will be addressed within the ERP.

**Recommended Buffer Strips for Various Activities**

| Activity | Environmental Receptor | Recommended Width (m) of Buffer Strip | Reference |
|---|---|---|---|
| Clearing, Grubbing, and Stripping | Water body | 30 m | NL DOEC. 1999. Policy for Land and Water Related Developments in Protected Public Water Supply Areas. Land and Water Developments. Prepared by Haseen Khan. Issue Date: April 7, 1995. Re-Issue Date: March 10, 1999.<br>NL DOEC and NL DNR (Newfoundland and Labrador Department of Natural Resources). Undated. Environmental Guidelines for Construction and Mineral Exploration Companies Available at: http://www.nr.gov.nl.ca/mines&en/mqrights/environment.pdf Accessed: September 2015. |
| Stockpiles (waste rock, overburden, and topsoil piles) | Water body | 25 m | CFI 2015. |
| Roads | Water body | 20 m +1.5 x slope (%) | Gosse, M.M., A.S. Power, D.E. Hyslop, and S.L. Pierce. 1998. Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador. Fisheries and Oceans, St. John's, NF. x + 105 pp., 2 appendices. |
| Fuelling / Vehicle Servicing | Water body | 100 m | NL DOEC and NL DNR (Newfoundland and Labrador Department of Natural Resources). Undated. Environmental Guidelines for Construction and Mineral Exploration Companies Available at: http://www.nr.gov.nl.ca/mines&en/mqrights/environment.pdf. Accessed: September 2015. |
| Fuel Storage | Water body | 100 m | Gosse, M.M., A.S. Power, D.E. Hyslop, and S.L. Pierce. 1998. Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador. Fisheries and Oceans, St. John's, NF. x + 105 pp., 2 appendices. |
| Blasting (large blasts in the order of 100 kg per hole) | Water body | 150 m | Wright and Hopky 1998. |
| High disturbance activities | Breeding seabird colonies | 1 km | Environment Canada 2014c. |

| | | | |
|---|---|---|---|
| Potentially disruptive activities | Nest | Species-specific | Environment Canada 2014b. |
| Construction | Historic Resource | 20 m (buffer implementation will minimize potential to disturb historic resource before the area is assessed as per the regulations) | Work should cease immediately upon discovery of historic resources in accordance with:<br>Government of NL. 1990. Historic Resources Act. RSNL1990 CHAPTER H-4. Amended: RSN1990 cR-8 s44; 1993 cD-19.1 s21; 2001 c31; 2001 cN-3.1 s2; 2004 cL-3.1 s39; 2005 cR-15.1 s38; 2007 c17; 2008 c59 s18. Available at: http://www.assembly.nl.ca/legislation/sr/statutes/h04.htm#13_. Accessed: August 2015.<br>In the case of an incidental discovery of Historic Resources, a Stage 1 Historic Resources Overview Assessment (HROA) to assess the potential sensitivity of the study area is required in accordance with:<br>NL Business, Tourism, Culture and Rural Development. 2015. HRIA Summary Stage 1. Available at: http://www.btcrd.gov.nl.ca/pao/hria_summary/hria_summary_stage1.html. Accessed: August 2015. |

# D.7 – EROSION PREVENTION

## Environmental Concerns

The potential for erosion and resulting effects on water quality and fish and fish habitat is a key environmental concern associated with operations activities.

## Environmental Protection Procedures

Erosion prevention shall be a main objective in all work areas where soil may be transported by water, wind, or ice. The application of erosion control measures is found throughout Appendix D but reiterated here to provide a more thorough evaluation of site specific activities required by Project personnel.

### *General*

The primary way to control erosion is to avoid activities that contribute to it. All areas of exposed soil are to be stabilized by back blading or grading to meet engineered slope requirements. Where erosion along an exposed slope is of concern, and a sufficient natural vegetation buffer (Appendix D.6) does not exist between the high water mark of the nearby water body and the exposed soil, a silt fence shall be constructed to control sediment runoff. Engineering requirements will vary depending on the locations of the silt fence and will take such factors into consideration as drainage / surface area of exposed soils and time of year the silt fence is employed.

Specific erosion and sedimentation control measures may be designed for the site to minimize the effects of operations activities on the environment. They may include; site drainage and ditching systems in accordance with the Site Grading and Drainage Plan and the Water Management Plan, including culverts and risers, installation of piped outlet sedimentation control ponds, temporary run-off interceptor ditches, and check sediment dam traps which will provide both energy dissipation and sedimentation control. However, regardless of these protection measures, if an environmental inspection reveals that sediment is entering a watercourse, additional mitigation measures shall be implemented.

Contractors will use erosion and sedimentation control measures to ensure water control on-site. Any water discharged into a water body, watercourse or ecologically sensitive area due to operations activities, shall comply with applicable discharge guidelines as presented in the Newfoundland and Labrador Environmental Control Water and Sewer Regulations under the *Environmental Protection Act* for applicable analysis parameters which include, but may not be limited to, pH and TSS. The analyses and frequency of monitoring may be altered to satisfy regulatory requirements.

Exposed surfaces that are at risk of erosion will be protected by using appropriate slopes and by diverting surface runoff away from disturbed areas. After precipitation events, slopes will be inspected and corrective measures will be implemented to prevent soil erosion. Slopes for finished-grade surfaces will be built in accordance with best engineering practices and will be surface-finished / stabilized to provide long-term stability. Final grading will be undertaken immediately after completion of an activity rather than at the end of operations. Revegetation will also be considered for areas adjacent to existing roads where erodible soil has been exposed.

RipRap is used to stabilize slopes prior to the natural stabilization post-construction. General design criteria will be implemented by contractors:

- Should not be used where the bank exceeds 3 m high and the grade is greater than 2:1.
- The rock used should be clean and large enough to withstand being displaced by peak flood events.
- Rock material should consist of a mixed gradation and be blocky and angular.

### *Streams*

All stream banks that contain loose or erodible materials shall be stabilized. No material shall be deposited within the watercourse. Sloping shall be accomplished by back blading and the material removed is to be deposited above the high water mark of any watercourse. A buffer of at least 25 m will be maintained between all natural water bodies and waste rock, overburden, and topsoil piles to minimize the risk sedimentation (Appendix D.6).

## D.8 – EXCAVATIONS, EMBANKMENT, AND GRADING

Excavation, embankment, and grading of common rock and other materials may be required at various locations within the Project site.

### Environmental Concerns

The principal environmental concerns associated with excavation, embankment and grading are potential effects on water quality, fish and fish habitat, terrestrial habitat and historic resources due to ground disturbance.

### Environmental Protection Procedures

All work shall be conducted in a manner that controls potential sedimentation of watercourses and water bodies in or adjacent to the work areas as outlined in the following procedures.

Excavation, embankment and grading shall be done only when grubbing and stripping is completed. Where engineering requirements do not require grubbing and stripping (e.g. within the buffer zone of a stream crossing), filling shall occur without any disturbance of the vegetation mat and / or the upper soil horizons. Avoid leaving excavations open for long periods and compaction / covering loose materials. Compact soils as soon as excavations, filling or levelling activities are complete.

Excavation, embankment and grading in the vicinity of stream crossings shall be done in a manner that minimizes erosion and sedimentation of watercourses and water bodies.

A buffer zone of undisturbed vegetation shall be maintained between construction areas and all watercourses, water bodies and ecologically sensitive areas (Appendix D.6).

## D.9 – STREAM CROSSINGS

### Environmental Concerns

The environmental concerns associated with stream crossings, culvert installations, bridge construction, and maintenance include direct disturbance to, or mortality of fish, disturbance to birds, loss of fish habitat caused by sedimentation and removal of substrate, and stream bank vegetation.

### Environmental Protection Procedures

Erosion stabilization methods and effective sedimentation control practices shall be implemented when required, and these shall conform to requirements, guidelines, and principles contained in Appendix B (Guidance), NL DOEC Environmental Guidelines (Appendix E), and the Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013). CFI will also comply with specific requirements of regulatory permits and approvals, including NL DMAE approvals for Alteration of a Body of Water pursuant the provincial *Water Resources Act*, as well as guidance materials provided by NL DMAE with respect to the design, construction, and maintenance of the crossing structures to avoid or minimize the potential adverse effects on water quality and fish habitat. Culvert installation shall comply with permits issued by NL DMAE and DFO.

The following measures shall be implemented to minimize adverse effects of stream crossings:

- Stream crossing construction activities, in areas of fish habitat, will be undertaken under the direct guidance of the HSE Manager and / or HSE technician.
- Work shall be performed in such a way as to ensure that materials such as sediment, fuel and oil do not enter watercourses and waterbodies.
- The banks and flood plains of watercourses must be adequately protected from erosion by seeding, sodding or placing of riprap.
- A suitable buffer (Appendix D.6) of undisturbed natural vegetation shall be left between the access road and the bank of any adjacent watercourse, unless otherwise specified. The buffer width shall be determined through the formula:
  - Buffer width (m) = 20 m + 1.5 x slope (%).
- In those locations where culverts are required, permit applications shall be made to NL DMAE and DFO. The culverts used shall be sized to handle the 1-in-25 year return period flood and will be constructed in accordance with the Environmental Guidelines for Culverts from the NL DOEC (WRMD 1992b). The following measures shall also be implemented:
  - Install culvert(s) in accordance with good engineering and environmental practice.
  - Unless otherwise indicated, all work shall take place in dry conditions, either by the use of cofferdams or by diverting the stream with pumps and hoses. All work involving major alterations to stream channels must be carried out at a time of low flow, in a manner that prevents downstream sedimentation.
  - Cylindrical culverts shall be counter sunk only where necessary to protect fish habitat such that the culvert bottom is one-third the diameter below the streambed in the case of culverts less than 750 mm outside diameter; for culverts greater than 750 mm outside diameter, the culvert bottom shall be installed a minimum of 300 mm below the streambed.
  - In multiple (gang) culvert installations, install one culvert at an elevation lower than the others.
  - Ensure that the natural low flow regime of the watercourse is not altered; culverts must not disrupt flow of water or cause ponding at the upstream side of the installation.
  - A culvert shall not be installed before site specific information such as localized stream gradient, fish habitat type and species present have been evaluated.
  - Inlet and outlet areas will be adequately protected from erosion by placing riprap, filter stone, or concrete headwalls.
  - Use culverts of sufficient length to extend a short distance beyond the toe of the fill material.
  - Use backfill material which is of texture that shall support the culvert and limit seepage and subsequent washing out.
  - Align culverts such that the original direction of stream flow is not substantially altered and the gradient at the culvert follows the stream channel gradient to the extent possible. Infilling or reduction of the natural cross sectional area of the watercourse is not permitted.
  - Remove fill and construction debris from the culvert area to a location above the peak flow level to prevent its entry into the stream.
  - Confine construction activity to the immediate area of the culvert.

- Fill material shall not be removed from streambeds or banks except when removal of material is necessary to ensure a flat foundation for installing a culvert.
- The use of heavy equipment in streams or bodies of water is not permitted (see NL DOEC - Environmental Guidelines for Watercourse Crossings; Environmental Guidelines for Bridges; Environmental Guidelines for Culverts; Environmental Guidelines for Fording (Appendix E), Fisheries and Oceans Canada - Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador [Gosse et al. 1998], and other documents in Appendix B (Guidance).
- As required, cofferdams of non-erodible material shall be installed above and below work areas to separate them from the watercourse when excavating for culverts and footings. All sandbags used in construction must be accounted for and removed after work is completed. Where pumping is used to bypass flow, pumps must have sufficient capacity to prevent washout of the cofferdams (refer to Appendices B and Edurin for specific guidance and Environmental Guidelines).
- Cofferdams shall be removed upon completion of construction and the streambed returned as closely as possible to its original condition.
- Water pumped from work areas or other runoff must have sediment and turbidity removed by settling ponds, filtration, or other suitable means before discharging to a water body.
- The release of sediment laden water into a water body, watercourse or ecologically sensitive areas, due to construction activities, shall comply with applicable discharge guidelines as presented in the NL Environmental Control Water and Sewer Regulations under the *Environmental Protection Act* for applicable analysis parameters which include, but may not be limited to, pH and TSS. The analyses and frequency of monitoring may be altered to satisfy regulatory requirements.

- When fording any watercourse, the Environmental Guidelines for Fording from the NL DMAE, WRMD and the guidelines outlined in the Appendix B (Guidance) shall be followed in conjunction with the following:
  - Areas of spawning habitat shall be avoided.
  - Where feasible crossings shall be restricted to a single location and made at right angles to the watercourse.
  - Equipment activity within the watercourse shall be minimized by limiting the number of crossings.
  - All equipment shall be clean and mechanically sound to avoid the introduction of oil, gasoline, and hydraulic fluids to water bodies.
  - No servicing or washing of heavy equipment shall occur adjacent to a watercourse, water body, or ecologically sensitive area unless it is at a location approved by the HSE technician.
  - Temporary fuelling services or washing of equipment in areas other than the main fuel storage site shall not be allowed within 30 m of a watercourse, water body, or ecologically sensitive area except, within a refuelling site approved by the HSE technician, where conditions allow for containment of accidentally spilled fuels. All waste oil, filters, containers or other such debris shall be removed from the work area and disposed of in an approved waste disposal site.
  - Where the ford area is not natural bedrock or is easily disturbed by fording, the entire ford area shall be stabilized using vegetation mats, corduroy roads or coarse material (125 mm diameter or greater) when such material is available from a reasonably close location within the right-of-way; when the substrate of the ford area is not subject to easy disturbance by fording or coarse material is not easily available within the right-of-way, fording under existing substrate conditions may occur under the guidance of the HSE Manager and the HSE technician.

- Fording activities shall not decrease the depth of the watercourses to less than 20 cm. Where the existing depth is less than 20 cm, that depth shall be maintained.
- Water bodies shall not be forded during high flow periods.
- All bank sections which contain loose or erodible materials shall be stabilized or avoided if possible; if banks must be sloped for stabilization, no material shall be deposited within the watercourse; sloping shall be accomplished by back blading and the material removed shall be deposited above the high water mark of the watercourse.

- Environmental protection measures outlined above which are applicable to bridge construction and maintenance will be adhered to.
- During bridge construction all applicable guidelines are outlined in the Appendix E (Guidance).
- To safely convey peak flows, bridges will be designed for a 100 year return period stream flow.
- Bridge abutments will be set back above the high water mark, in accordance with the engineering design. However, each installation will take into consideration site specific conditions and additional set back may be required.
- The upstream and downstream sides of abutments will be protected with riprap, concrete or heavy timber to prevent erosion and scouring.
- Roadside embankments near the watercourse will be adequately protected from erosion by sodding, seeding or placing of riprap.
- Adequate erosion protection will be provided where roadside ditches discharge into the watercourse near the bridge.
- Abutments and piers will be constructed in the dry and during times of low flow.
- During construction of concrete components, formwork will be constructed to prevent any fresh concrete from entering bodies of water. Dumping of concrete or washing of tools and equipment in any body of water is prohibited.
- Wood preservatives such as pentachlorophenol (PCP) or ammoniacal copper arsenate (ACA) or creosote or treated wood products will not be used for bridgework.
- Periodic maintenance such as painting, resurfacing, clearing of debris, or minor repairs, will be carried out without causing any physical disruption of the watercourse. Care will be taken to prevent spillage of pollutants into the water.
- All waste materials will be disposed of in accordance with the Waste Management Plan.
- All areas affected will be returned to a state that resembles local natural conditions.

## D.10 – DUST CONTROL

### Environmental Concerns

The environmental concerns associated with dust include effects on human health and aquatic ecosystems, wildlife, and vegetation.

### Environmental Protection Procedures

The following measures shall be taken to mitigate potential effects of dust:

- Dust from operations activities and on unpaved roads shall be controlled where possible by using frequent applications of water or Calcium Chloride (CaCl). Any other application for dust control other than water or CaCl, shall require approval from the Director of the NL DMAE.
- Dust control agents (wood chips, matting, etc.) shall be stored at suitable distances from all watercourse, water body, or ecologically sensitive areas using proper buffer zones (see Section D.6).
- Perform regular and adequate maintenance of the unpaved roads.
- Reduce drop heights during material transfers.
- Size trucks appropriately to reduce the number of vehicle trips.
- Properly design haul and access roads, to minimize distance travelled.
- Consider the use of fogging systems and wind barriers to reduce wind erosion.
- Implement a speed limit on the access and haul roads.
- Implement a no-idling policy to reduce combustion emissions.
- Promote the use of block heaters during winter months as part of the no-idling policy.
- Implement an awareness program to promote fuel consumption reduction.

## D.11 – TRENCHING

### Environmental Concerns

Where excavation for the construction of trenches for water management is undertaken, potential runoff of sediment laden water could result in effects on terrestrial habitat, marine or freshwater fish and fish habitat, water quality, and historic resources.

### Environmental Protection Procedures

The following measures shall be implemented to minimize the potential adverse effects of trenching:

- Topsoil and excavated overburden and bedrock shall be stored in separate stockpiles for later use during rehabilitation.
- Any unsuitable material shall be stockpiled in designated areas for use at closure.
- Dewatering of trenches shall make use of measures to minimize and control the release of sediment laden water through the use of filtration, erosion control devices, settling ponds, straw bales, geotextiles or other devices.

## D.12 – DEWATERING – WORK AREAS

### Environmental Concerns

The main concerns associated with dewatering are sedimentation, direct fish mortality, and / or habitat alteration or loss for freshwater and marine fish species.

### Environmental Protection Procedures

The following measures shall be implemented to minimize the potential adverse effects of dewatering:

- Filtration or other suitable measures, such as settling ponds, silt fences and dykes, shall be implemented for sediment removal and turbidity reduction in water pumped from work areas before discharging (Appendix D.8).
- Where possible, clean water shall be discharged to vegetated areas to further reduce any potential adverse effects on watercourses. Additionally, mechanisms for energy dissipation shall be implemented to prevent scouring and erosion of the discharge location (e.g. impervious geotextile mats, perforated end of pipe, discharge to small settling sump).
- The size of sedimentation ponds shall be designed to accommodate the anticipated volume of collected water and meet discharge criteria for water quality.
- Discharged water shall be encouraged to follow natural surface drainage patterns in accordance with the Water Management Plan and Site Drainage and Grading Plan.
- Water pumped from excavations or work areas, or any runoff or effluent directed out of the Project site shall have sediment removed by settling ponds, filtration or other suitable treatment before discharging to the environment.

  In addition, any effluent directed out of the Project site shall be tested for TSS and hydrocarbons (if there are any indications of hydrocarbon contamination, such as a sheen or odour) before being discharged to the environment. Effluent discharge shall comply with the effluent discharge criteria set by NL DMAE through the issuance of a Certificate of Authorization prior to start of operations and effluent quality limits established in Schedule A of the Environmental Control Water and Sewage Regulations, 2003.
- Contingency measures shall be implemented to deal with storm events and high runoff to minimize adverse environmental effects resulting from these events. Erosion prevention and sediment containment materials such as silt fence material, riprap, straw bales, filter fabric and designated equipment shall be available to address contingency / emergency situations.
- In the unlikely event that runoff exceeds acceptable ranges for TSS as determined through monitoring, contingency measures may include pumping of sediment laden water to vegetated areas (away from down gradient water systems) or through filter bags for additional filtration and / or the implementation of additional settling ponds or erosion and sedimentation control structures. Remedial action will be taken as quickly as practical, and as necessary. In the event of a failure, Project operations will be shut down until appropriate controls are restored.

All contractors on-site shall follow the above environmental protection procedures to ensure water control at site in accordance with the Water Management Plan developed for the Project. Any water discharged into a water body, watercourse or ecologically sensitive area, due to operations activities, shall comply with applicable discharge guidelines as presented in the NL Environmental Control Water and Sewer Regulations under the *Environmental Protection Act* for applicable analysis parameters. These parameters include, but may not be limited to, pH and TSS, as well as the monitoring/treatment program (Environmental Effects Monitoring Plan) that will comprehensively address all regulatory requirements to ensure that permitted limits are not exceeded. The analyses and frequency of monitoring may be altered to satisfy regulatory requirements.

## D.13 – MARINE VESSELS

Vessel traffic during operations will consist of ships for the transport of Fluorspar concentrate. All vessels will meet Transport Canada regulations and standards, under the *Canada Shipping Act*, as well as international regulations established by the International Maritime Organization (IMO).

## Environmental Concerns

Project vessel traffic will increase the density of vessel traffic in the Mortier Bay / Placentia Bay shipping lanes. There is a small risk due to increase in vessel traffic for vessels to collide, run aground, and / or sink. Such events may lead to the accidental release of fuel and other hazardous materials to the marine environment. The release of non-compliant ballast could introduce non-indigenous species or deleterious substances into Placentia Bay and / or Mortier Bay.

## Environmental Protection Procedures

The following measures shall be implemented to minimize the potential effects of marine vessels

All vessel activities will be governed in accordance with Pollutant Discharge Reporting Regulations, Regulations for Prevention of Pollution from Ships and for Dangerous Chemicals and Vessel Traffic Service Zones Regulations as required by the *Canada Shipping Act*.

Ships will arrive ballasted and ballast water will be discharged during loading in accordance with the Canadian Ballast Water Control and Management Regulations (SOR2011-237; Government of Canada 2011) and the IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO 2004).

Vessels will not be refueled at the Marine Terminal.

At any given time, there would likely be no more than one vessel operating concurrently in the vicinity of the Marine Terminal.

The HSE Manager, HSE technician, and the local public will be advised of all particulars with regard to incoming / outgoing vessel traffic on a timely basis including updates regarding the estimated time of arrival / estimated time of departure (ETA / ETD) as advised by vessel masters.

Project vessel masters will observe the following basic rules:

Demonstrate they have a set of safety and emergency procedures on board

Advise the CFI site office of their time of departure from their port of origin and their estimated time of arrival at Mortier Bay.

Notify the CFI site office of their progress at sea or, if stopping at other ports *en-route*, update their ETA.

Relevant Canadian Hydrographic Charts or electronic charting systems must be on board prior to leaving their port of origin; these charts must be kept on board at all times.

Implement BMPs designed to achieve zero discharge of oily waste while at the site and along the Project shipping route.

All Project related vessels shall have onboard adequate oil spill response equipment to handle an accidental release of product into the environment.

Notify the Canadian Coast Guard and the CFI site office of any releases or spills of substances (emergencies) immediately and identify the location.

No Project-related vessels will discharge wastes into surrounding waters. The discharge of garbage from ships into Canadian waters and the waters of the Fishing Zones of Canada is prohibited.

Storage areas for deleterious substances onboard vessels will have secondary containment to prevent discharges onto decks and into the marine environment. Emergency response and contingency plans for incidents scenarios will be in place by the vessel contractors to contain any spilled material.

All crewmembers will be familiar with emergency procedures for both life threatening and potentially polluting situations.

All stationary hazards, such as moored platforms or vessels, will be clearly marked according to the *Navigation Protection Act* approvals and / or Collision Regulations under the *Canada Shipping Act*.

Vessel traffic speed will be a maximum of 9 knots within 300 m of the shoreline, wharves, moored vessels etc. In addition, sufficient distance will be kept between Project vessels and whales, whenever possible.

Tug and pilot assist may be required for docking at the Marine Terminal. Adequate lighting is required.

## D.14 – PUMPS AND GENERATORS

### Environmental Concerns

A variety of water pumps, hoses and generators will be in frequent use in many areas of the Project. Environmental concerns are associated with any incidental spills or chronic leaks contaminating soil or water bodies. There may also be concerns with air emissions from generators on the site.

### Environmental Protection Procedures

The following measures shall be implemented to minimize the potential adverse effects of pumps and generators:

- Oils, grease, gasoline, diesel, or other fuels shall be stored at least 100 m from any surface water.
- Drip pans shall be placed underneath pumps and generators. Absorbent material will be kept at all sites where pumps and generators are in use.
- Hoses and connections on equipment located near water bodies shall be inspected routinely for leaks and drips.
- All leaks shall be reported immediately to the HSE Manager, who will then inform the HSE technician. Upon detection of a leak, the equipment (e.g. pump, generator) should be shut down immediately and corrective action taken to repair the leak and clean-up any contaminated soil and / or water in accordance with Contingency Plans and the ERP.
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## D.15 – NOISE CONTROL

### Environmental Concerns

A variety of noises associated with operations activity can adversely affect wildlife distribution and abundance. Noises associated with blasting are temporary in nature and noises associated with drilling are considered medium-term, but localized.

### Environmental Protection Procedures

Measures shall be implemented wherever possible to minimize potential adverse effects arising from a variety of noise sources, including:

- Adherence to all applicable permits and approvals. In the event that applicable noise levels would be exceeded, implement additional engineering mitigation and control measures (e.g. perform the activities during favorable wind conditions, install an acoustic berm, barriers, or equipment enclosures) to reduce noise to an acceptable level.
- Consider evaluating the use of newer technologies associated with back-up alarms to reduce to amount of noise from equipment operation.
- All equipment shall have exhaust systems regularly inspected and mufflers will be operating properly.

- Reduce travel speeds around potentially sensitive habitats and reschedule high disturbance activities during ecologically sensitive time periods where applicable.
- Reduce vehicle traffic during night-time.
- No blasting is to be carried out in the marine environment.
- Implement a complaints management mechanism to record, address and resolve complaints related to Project activities and phases.

# D.16 – BLASTING

## Environmental Concerns

The general environmental concerns associated with on-land blasting include:

- destruction of vegetation outside excavation limits;
- noise disturbances to wildlife;
- disturbance of archaeological resources; and,
- dust generation.

Blasting in or near water bodies can affect organisms with swim bladders (fish) but may also affect a variety of aquatic animals including shellfish, marine mammals, otters, seabirds and waterfowl. The introduction of sediment into the water column is also a concern for marine / freshwater water quality and related effects on aquatic life.

## Environmental Protection Procedures

The handling, transportation, storage and use of explosives and all other hazardous materials shall be conducted in compliance with all applicable laws, regulations, orders of the NL DMAE and the NL Department of Government Services, the *Explosives Act*, the TDG Act, CFI OH&S standards, and in compliance with the operation permits. Blasting will be undertaken by licensed contractors.

The following measures shall be implemented to minimize the potential adverse effects of blasting:

- Explosives shall be used in a manner that will minimize damage or defacement of landscape features, trees, ecologically sensitive areas such as wetlands, and other surrounding objects by controlling these effects through the best methods possible (including precisely calculated explosive loads and adequate stemming) the scatter of blasted material beyond the limits of activity. Outside of cleared areas, inadvertently damaged trees shall be cut, removed, and salvaged if merchantable.

  Fly rock that inadvertently enters a water body, watercourse or any ecologically sensitive area, and that can be recovered without further damage to the environment shall be removed. Instances where larger fly rock (i.e. boulders) enters these areas or deep water bodies, recovery of this shall be discussed with the HSE Manager, who will decide whether or not it is practical to proceed.
- Blasting activities will be co-ordinated and scheduled to minimize the number of blasts required per week.
- Perform blasting during day time only at a regular scheduled time.
- Blasting patterns and procedures shall be used which minimize shock or instantaneous peak noise levels.
- Time delay blasting cycles or blasting mats shall be used, if necessary, to control the scatter of blasted material.

- Blasting shall not occur in the vicinity of fuel storage facilities.
- Blasters' Safety Certificates and the Temporary Magazine License shall be obtained prior to drilling and blasting.
- Use of explosives shall be restricted to authorized personnel who have been trained in their use.
- There shall be separate magazines on site for explosives and for dynamite blasting caps. All temporary magazines for explosive storage shall have appropriate approvals.
- The immediate area of the blast site shall be surveyed to identify the presence of any wildlife within one hour prior to a blast and operations will be curtailed if wildlife is observed within 500 m. Environmental personnel and the HSE technician shall conduct pre-blast monitoring where knowledge and competency is required to see and identify species of concern. Additionally, any individual animal sightings by other personnel shall be reported to the HSE Manager and the HSE technician.
- All blasting associated debris, such as explosive boxes and used blasting wire, will be collected for proper disposal as soon as possible following blasting activity.
- If blasting is necessary within the vicinity of an archaeological site, precautions shall be taken to ensure that blasted material and shock waves do not disturb any part of the site. If necessary, protective covering shall be applied to the site under the supervision of an approved archaeologist and in consultation with NL Business, Tourism, Culture and Rural Development. Blasting shall not be undertaken in these areas without first notifying the HSE Manager and the HSE technician.

### *Blasting in Close Proximity to Water Bodies*

If blasting is necessary within a water body, it shall be undertaken in compliance with the required Water Resources permits from the NL DMAE and DFO guidelines (Appendix E). Reference may also be made to the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998). A copy of this reference shall be kept at the CFI HSE office at the Project site and made available to all contractors.

- Drilling and blasting activities shall be undertaken in a manner that ensures the magnitude of explosions is limited to that which is absolutely necessary. A blasting plan shall be reviewed with the local DFO Fisheries Officer in advance of work in close proximity to water bodies.
- CFI will comply with DFO guidance which stipulates that, for large blasts, in the order of 100 kg per hole, a setback of 150 m is required (Wright and Hopky 1998).
- For multiple charges, time delay detonators should be used to reduce the overall detonation to a series of single explosions separated by minimum delay.
- Large charges should be subdivided into a series of smaller charges with minimum delay detonation.
- The on-land set back distance from the blast site to the water body or the setback distance around the blast site in the water body are based on the maximum weight of charge to be detonated at one instant in time and the type of fish or fish habitat in the area of the blast. Refer to Appendices B and E for specific guidance and Environmental Guidelines.
- Blast holes must be stemmed with sand or gravel to grade or to streambed / water interface to confine the blast.
- Ammonium nitrite based explosives shall not be used in or near water due to the production of toxic by-products.

- If fish or marine mammals are detected in the area described, blasting may proceed only when the fish or marine mammals have left the area. Blasting activities shall not be carried out in the marine environment.

## D.17 – DRILLING – GEOTECHNICAL

Drilling may be required on land during geotechnical investigations to determine foundation conditions - assess stability, and underlying geology for the Project.

### Environmental Concerns

The environmental concerns associated with drilling on land are surface disturbances, disposal of drilling fluids and cuttings, generation of dust, noise, and the potential adverse effects on terrestrial habitats, historic resources, air quality, and aquatic ecosystems.

### Environmental Protection Procedures

Potential drilling sites in sensitive areas shall be inspected by the HSE Manager and the HSE technician.

The following measures shall be implemented to minimize the potential adverse effects of drilling:

- Disposal of all drilling materials and associated solid wastes shall be undertaken in accordance with the procedures in Appendix D.5.
- Fuel shall be stored, handled and transported according to Appendix D.3.
- Water or water-based dust suppressant applications shall be used to control dust, where necessary and the source of water shall be approved for use. The use of water for dust control or coring / wash boring shall be undertaken in a manner which ensures that runoff does not enter watercourses.
- Drilling equipment shall have muffled exhaust to minimize generated noise.
- Drilling of water wells shall be conducted in compliance with the *Water Resources Act* and the Well Drilling Regulations.

## D.18 – VEHICULAR TRAFFIC

### Environmental Concerns

Direct physical disturbances from vehicular movements can adversely affect both terrestrial and aquatic environments as well as historic resources (e.g. collisions with wildlife). During operations, the level of activity involving equipment movement, types of equipment and supply requires various infrastructure such as roads, to conduct the work efficiently and in an environmentally acceptable manner. Typically, vehicles ranging in size from all-terrain vehicles (ATVs) to heavy equipment, all of which can result in ground disturbance, may be used during access road use. Canada Fluorspar (NL) Inc. shall ensure roads are developed properly to minimize environmental damage resulting from equipment movement.

### Environmental Protection Procedures

The following measures shall be implemented to minimize the potential adverse effects of vehicular traffic:

- All-Terrain Vehicles shall not be allowed on the site except as required by field personnel in the performance of the work.
- Where possible, the use of ATVs shall be restricted to designated trails, thus minimizing ground disturbance. ATV use shall comply with, *Motorized Snow Vehicles and All-Terrain Vehicles Act*.

- Vehicle movements shall be restricted to developed areas and roadways.
- Appropriate speed limits and road signage shall be established and enforced to minimize environmental disturbance and incidents.
- During winter when the ground is covered with snow, snowmobiles and heavy equipment, whether equipped with low-impact tread or not, shall not be used for equipment movement and supply outside of established roadways, pathways or trailways.
- Equipment and vehicles will yield the right-of–way to wildlife. Any attempt to interfere with the natural movement of wildlife shall be considered harassment and dealt with accordingly.
- All Project vehicles, including ATVs, will be properly inspected and maintained in good working order including all exhaust systems, mufflers and any other pollution control devices.
- Implement a no-idling policy to reduce combustion emissions.
- Promote the use of block heaters during winter months as part of the no-idling policy.
- Implement an awareness program to promote fuel consumption reduction.

## D.19 – WORKS AROUND MARINE ENVIRONMENT

### Environmental Concern

Works required to take place around the marine environment will include erecting of structures associated with the Marine Terminal, and ship loading. The principal environmental concerns from marine operations include the release of hazardous liquids and toxic substances into the water and substrate. Marine construction and operation activities can also disturb nearshore terrestrial habitat and cause birds and marine mammals to avoid the area.

### Environmental Protection Procedures

The following measures shall be implemented to minimize the potential adverse effects of works around the marine environment:

The operation of heavy equipment will be confined to dry, stable areas on shore.

All equipment will have muffled exhausts to minimize noise.

All equipment will be serviced and fuelled on land at least 30 m from the marine environment or in designated areas designed for spill containment.

All vehicles must be clean and in good repairs. Regular mechanical inspections for leaks on all equipment will be made and repairs undertaken immediately.

Project personnel will not approach concentrations of seabirds, sea ducks, or shorebirds.

Food scraps and other garbage will not be left in coastal areas by Project personnel and / or contractors.

A Fuel and Other Hazardous Material Spill Contingency Plan (Section 7.0) and ERP will be in place and appropriate emergency spill equipment available on site.

# D.20 – SURVEYING

## Environmental Concerns

Surveying activities may include: vegetation removal; traversing; and establishing targets, permanent benchmarks and transponder stations. Surveying activities may disturb vegetation, wildlife, and historic resources.

## Environmental Protection Procedures

The following measures shall be implemented to minimize the potential adverse effects of surveying:

### *Vegetation Removal*

- Width of survey lines will be limited to that which is absolutely necessary for line-of-sight and safe, unobstructed passage.
- Whenever possible, cutting lines to the edge of open areas will be avoided.
- Trees and shrubs will be cut flush with the ground wherever possible, with stumps not to exceed 15 cm in height.
- Cutting of survey lines will be kept to a minimum.
- All trees not exactly on transit lines shall be left standing and trees partly on-line should be notched (notch not to exceed 1/3 tree's diameter) instead of removed, to allow sighting.
- Discretion should be used when large trees are encountered. For example, trees 30 cm dbh or larger should, whenever possible, not be cut. On grid lines, trees of 30 cm diameter or larger shall be left intact and shall be traversed to continue the line.
- No attempt to harass or disturb wildlife will be made by any person.
- Vehicles will yield the right-of-way to wildlife.
- There will be no cutting in areas designated as sensitive without notification and written approval of the HSE Manager and consultation with the HSE technician.
- Archaeological sites and features will not be disturbed during survey work. Any historic resource discoveries will be reported to the HSE Manager.

### *Traversing*

- No attempt to harass or disturb wildlife will be made by any person.
- No motorized vehicles will enter the areas designated as sensitive without notification and approval of the HSE Manager, in consultation with the HSE technician.
- The extent of activities in sensitive areas will be minimized.
- Walking in sensitive areas will be restricted to established walking paths, where available.

### *Establishing Targets, Permanent Benchmarks and Transponder Locations*

- A driven T-bar, well embedded to readily identify each benchmark location, will be used.
- No attempt to harass or disturb wildlife will be made by any person.
- Access to sensitive areas is to be approved in writing by the HSE Manager.

- Standard iron bars and sledgehammers are to be used to establish benchmarks.
- Heavy equipment will not be used to access sensitive areas.

## D.21 – EQUIPMENT OPERATIONS

A variety of equipment will be used on-site during operations, which is potential sources of noise, air emissions, and potential leaks or spills.

### Environmental Concerns

Noises associated with operation activity may adversely affect wildlife. Air emissions may have air quality implications. Accidental leaks or spills of fuel or other hazardous materials may affect soils, water, fish, vegetation and wildlife.

### Environmental Protection Procedures

The following measures shall be implemented to minimize the potential adverse effects of equipment operations:

- All approvals, authorizations and permits for Project activities will be followed.
- Noise control procedures will be put in place during operations.
- Avoid any off-site equipment and vehicle movement.
- Vehicles accessing the site will be required to check-in at the security gate.
- Access and haul roads will be sufficiently wide to allow safe passage of two vehicles side by side.
- There will be adequate line-of-sight around corners and at road junctions.
- Speed limits will be posted and enforced.
- All equipment will have exhaust systems regularly inspected and mufflers will be operating properly.
- All equipment (e.g. diesel generators) will meet the requirements of the provincial Air Pollution Control Regulations under the *Environmental Protection Act*.
- All equipment used during operations will follow the environmental protection procedures outlined in this EPP. In the case of an accidental event resulting from the use of equipment (e.g. a fuel spill), the appropriate contingency plans (Section 7.0) and the ERP will be implemented.
- Regular maintenance inspections for leaks (i.e. pre-shift inspections) will be made on all equipment. If problems are identified the equipment will be taken out of service and repaired to prevent release of hydrocarbons into the environment (e.g. drip tray, spill pan, absorbent material). Necessary critical spares will be maintained in the event that a change out of parts or equipment is required.

## D.22 – HISTORIC RESOURCES

Sites of historic or archaeological significance have been identified in the general area of St. Lawrence. There is a registered archaeological site in Blue Beach Cove; the wreck of the tug Rio Sama from 1946. No Project operations activities will occur in this area and the Project will have no adverse effect on historic / archaeological resources in the area.

## Environmental Concerns

Incidental discovery of historic resources on-site during operations activities is an environmental concern.

## Environmental Protection Procedures

All field personnel shall be informed of the historic resources potential of the area, of their responsibility to report any unusual findings, and to leave such findings undisturbed.

In the event of the discovery of an archaeological site or artifact, the following procedures will apply:

- Under the provincial *Historic Resources Act* (1990), all archaeological sites and artifacts are considered the property of the Crown, and must not be disturbed. CFI and their contractors will take all reasonable precautions to prevent employees or other persons from removing or damaging any such articles or sites and may be held liable for prosecution under Section 35.1 and 35.2 of the provincial *Historic Resources Act* (1990) for any contravention.
- Personnel working in the vicinity will be advised of the find, including the HSE Manager and the HSE technician. The site area will be flagged for protection and avoidance. All work will cease within 20 m of the discovery until CFI advises NL Business, Tourism, Culture and Rural Development of the discovery. Newfoundland Business, Tourism, Culture and Rural Development, in consultation with CFI will provide direction regarding the discovery and may authorize a resumption of the work. If required, a Stage 1 Historic Resources Overview Assessment (HROA) will be conducted of the site and immediate area (NL Business, Tourism, Culture and Rural Development 2015). Archaeological materials encountered will be reported initially to the HSE Manager, and immediately thereafter by the HSE Manager to the provincial Archaeologist at NL Business, Tourism, Culture and Rural Development with the following information:
    - nature of activity
    - nature of the material discovered
    - precise location of the find

Newfoundland Business, Tourism, Culture and Rural Development will assess the significance of the discovery and determine if mitigation is required. NL Business, Tourism, Culture and Rural Development will develop mitigation measures and advise CFI of their decisions.

Regular monitoring will be conducted by the HSE technician to ensure that site protection measures are adequate and that the terms and intent of the EPP commitments are being met.

# APPENDIX E

## Newfoundland and Labrador Department of Municipal Affairs and Environment Water Resources Management Division - Environmental Guidelines

| Chapter # | Title |
|---|---|
| 3 | Environmental Guidelines for Watercourse Crossings |
| 3A | Environmental Guidelines for Stream Crossings by ATVs |
| 4 | Environmental Guidelines for Bridges |
| 5 | Environmental Guidelines for Culverts |
| 6 | Environmental Guidelines for Fording |
| 7 | Environmental Guidelines for Diversions, New Channels, Major Alterations |
| 9 | Environmental Guidelines for Pipe Crossings |
| 13 | Environmental Guidelines for General Construction Practices |

# Appendix 2-7: Canada Fluorspar Inc. (CFI) Environmental Protection Plan Addendum.

APRIL 2020

ST. LAWRENCE
FLUORSPAR PROJECT

# Environmental Protection Plan:

## Addendum for the

## Blue Beach Marine Terminal Construction Project

**Submitted to:**
Newfoundland and Labrador
Department of Municipal Affairs and
Environment

**Submitted by:**
Canada Fluorspar (NL) Inc.

CFI
CANADA FLUORSPAR INC.

## 1.0 INTRODUCTION

Canada Fluorspar (NL) Inc St. Lawrence AGS Vein Fluorspar Mine Project was released from further Provincial Environmental Assessment on November 5, 2015. Construction of the Project commenced in the 2nd quarter of 2016. Since then, all major components of the approved Project including the Mill, Mine Development, Tailings Management Facility and Ancillary Infrastructure have been completed with the exception being the St. Lawrence Marine Shipping Facility at Blue Beach. Now that the project is up and running, it is CFI's intention to commence the construction phase of a marine shipping facility in St. Lawrence (see Figure 1).

The addendum to CFI's current ***Environmental Protection Plan – Operations*** **REV 0**, which received Ministerial approval in October 2017, is meant to include additional Construction and Operation activities for the:

- Port Access Road
- Blue Beach Marine Terminal

Given the expected timeline for project approval, and the efforts to maintain the overall project schedule during the construction season, CFI is including these additional activities as a separate addendum in advance to the full EPP revision. These activities will be incorporated into the actual plan in short order, and a detailed revision to the plan will be completed and resubmitted.

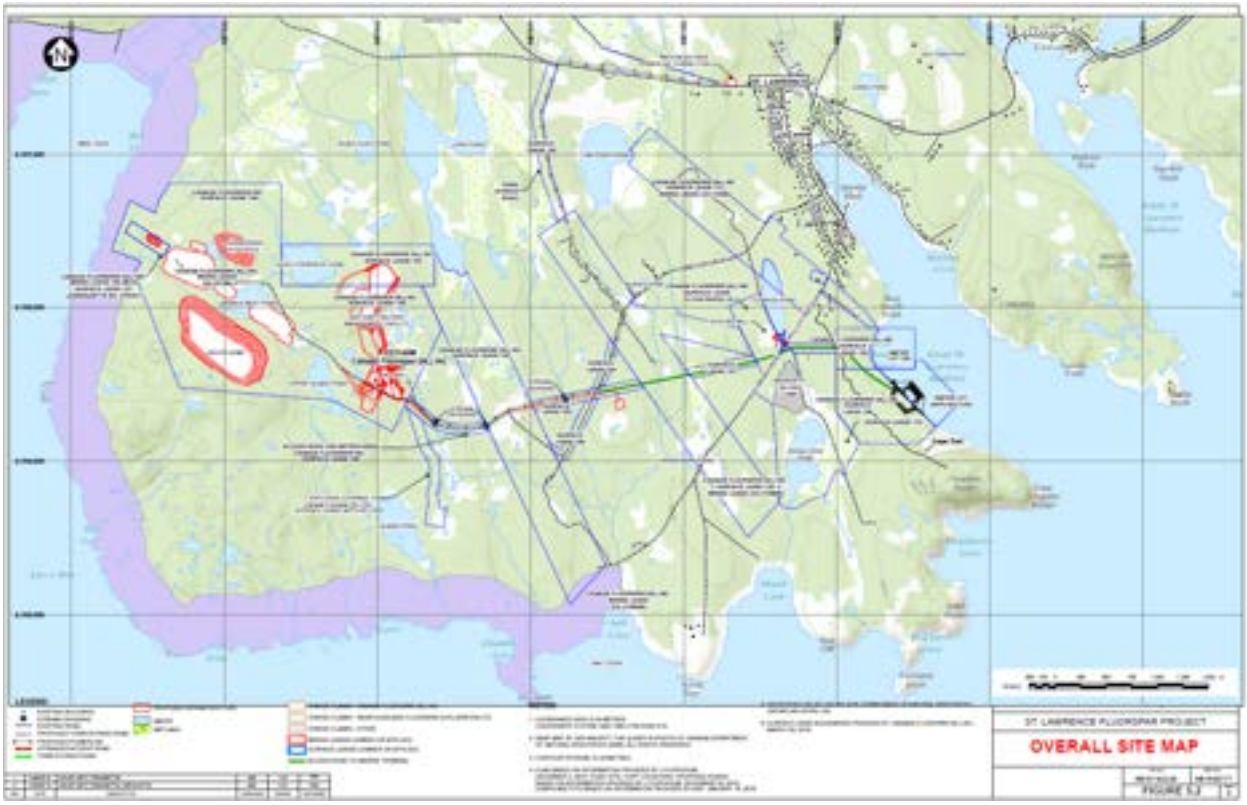
All other activities such as stripping and grubbing, dust control, blasting etc. will be followed as they are already mentioned in "Appendix D – Environmental Protection Procedures" of the existing EPP (CFI,2017a).

## 2.0 PORT ACCESS ROAD

A new port access road will be constructed from an existing site access road to the Blue Beach Marine Terminal that will accommodate the trucks that will be used to transport the fluorspar concentrate product, and DMS floats by-product from the mill site to the marine shipping terminal. The new port access road is approximately 5 km long. Please refer to Figure 1. "Overall Site Plan". The Port Access Road is the solid green line.

Dust control will be provided for the roads during construction and operation, primarily by using water and applied with water trucks when required. Fish bearing stream crossings will be designed and constructed to allow fish passage and to preserve aquatic habitat. All bridge and culvert installations will be sized to meet design flood conditions. Watercourse crossings (by bridge or culvert) will be in accordance with permit requirements. Fish bearing streams will be crossed in accordance with DFO guidelines and standards.

Figure 1: Overall Site Plan




## 2.1 Construction Activities

Key activities associated with road and transmission line development include:

- stripping along the road and transmission line rights-of-way
- excavation and blasting
- construction activities and equipment mobilization
- waste management
- water management
- energy consumption
- transportation
- staging and storage of construction-related equipment and materials
- installing watercourse crossings (e.g. culverts, modular bridges, permanent bridges) along the road route
- bridge and culvert maintenance
- dewatering and erosion and sediment control

- fuel and other hazardous material storage and handling

## 2.2 Environmental Issues

### General

General environmental issues associated with road construction may include:

- sedimentation of waterbodies
- alteration or loss of terrestrial habitat
- loss or disturbance of wildlife
- noise, dust and emissions
- potential leakage or spills of fuel or other hazardous materials
- incidental events

### Sensitive Areas / Periods

*Freshwater*: Stream crossings will generally be across existing roadways with existing culverts and bridges.
New stream crossings may be required when constructing new access roads and Project infrastructure. All such stream crossings will be constructed in accordance with the procedures outlined in the EPP and will meet requirements of NL DMAE, DFO and any other applicable legislation.

*Terrestrial:* Construction of linear Project components may disturb migratory birds during the bird breeding season, which occurs from May 1 to August 15 in the region (AMEC, 2016). Any sightings or indications of nesting migratory birds will be reported immediately to the CWS, and work within an appropriate species-specific buffer of active nests will be halted until the HSE Manager advises otherwise. Additionally, to reduce potential adverse effects on nesting birds, clearing activities will take place outside of the bird breeding season for most bird species (May 1 to August 15), to the extent practical.

## 2.3 Environmental Protection Procedures

### General Measures

General Environmental Protection Procedures relevant to linear developments are listed in Table , and presented in detail in Appendix D of the original EPP.

**Table 1: Relevant Environmental Protection Procedures - Linear Development**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Linear Developments |
|---|---|---|
| D.1 | Clearing of Vegetation | • |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | • |
| D.3 | Storage, Handling and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | • |
| D.5 | Solid Waste Disposal | • |
| D.6 | Buffer Zones | • |

| General Environmental Protection Procedures (Appendix D) | | Relevance to Linear Developments |
|---|---|---|
| D.7 | Erosion Prevention | • |
| D.8 | Excavations, Embankment and Grading | • |
| D.9 | Stream Crossings | • |
| D.10 | Dust Control | • |
| D.11 | Trenching | • |
| D.12 | Dewatering – Work Areas | • |
| D.13 | Marine Vessels | |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |
| D.16 | Blasting | • |
| D.17 | Drilling – Geotechnical | |
| D.18 | Linear Developments | • |
| D.19 | Vehicular Traffic | • |
| D.20 | Works In/Around Marine Environment | |
| D.21 | Surveying | • |
| D.22 | Equipment Operations | • |
| D.23 | Fish Relocation | |
| D.24 | Historic Resources | • |

### Area Specific Measures

In addition to the Environmental Protection Procedures listed in Table 4 the following will be required during the Port Access Road construction:

- Requirements listed in all government permits, approvals, and authorizations.
- Proper installation or upgrading of culverts and / or bridges across a number of watercourses in the various watersheds. CFI will apply to NL DMAE for approvals for Alteration of a Body of Water pursuant to the provincial *Water Resources Act* for the installation of new structures and upgrading of existing structures. These activities will comply with terms and conditions of approval and guidance materials provided by NL DMAE with respect to the design, construction, and maintenance of the crossing structures to avoid or minimize the potential adverse effects on water quality and fish habitat.

### Monitoring Requirements

Monitoring during the Port Access Road construction includes:

- Water quality and quantity monitoring will be undertaken in accordance with conditions of approval. In addition, water quality monitoring at other locations will be undertaken at the discretion of the HSE Manager and the HSE technician to ensure that natural freshwater bodies are not adversely affected by construction activity.
- Environmental monitoring to reduce potential adverse effects on federally or provincially protected species that may occur in, or in close proximity to, the Project footprint.

Detailed monitoring requirements during the Project construction/operation phase are outlined in the EEMP. Other monitoring requirements may be added as determined by regulatory conditions of approval.

## 3.0 BLUE BEACH MARINE TERMINAL

CFI plans to construct a new deep-water Marine Terminal at Blue Beach Cove for the export of fluorspar concentrate product and DMS floats by-product. The Marine Terminal will consist of a laydown area approximately 140m x 90m constructed of rockfill and capped with class B material. The rockfill will be cut from the hillside directly behind the laydown area. On the waterside of the laydown area, three timber cribs of approximate size 12m x 8m x 9m will be constructed. These cribs will act as berthing dolphins for the barge. A 122m x 36m barge will be moored to the timber cribs and serve as a working platform for the various equipment types required for ship loading, and as a berthing structure for the various ocean-going bulk carriers that will visit the Marine Terminal.

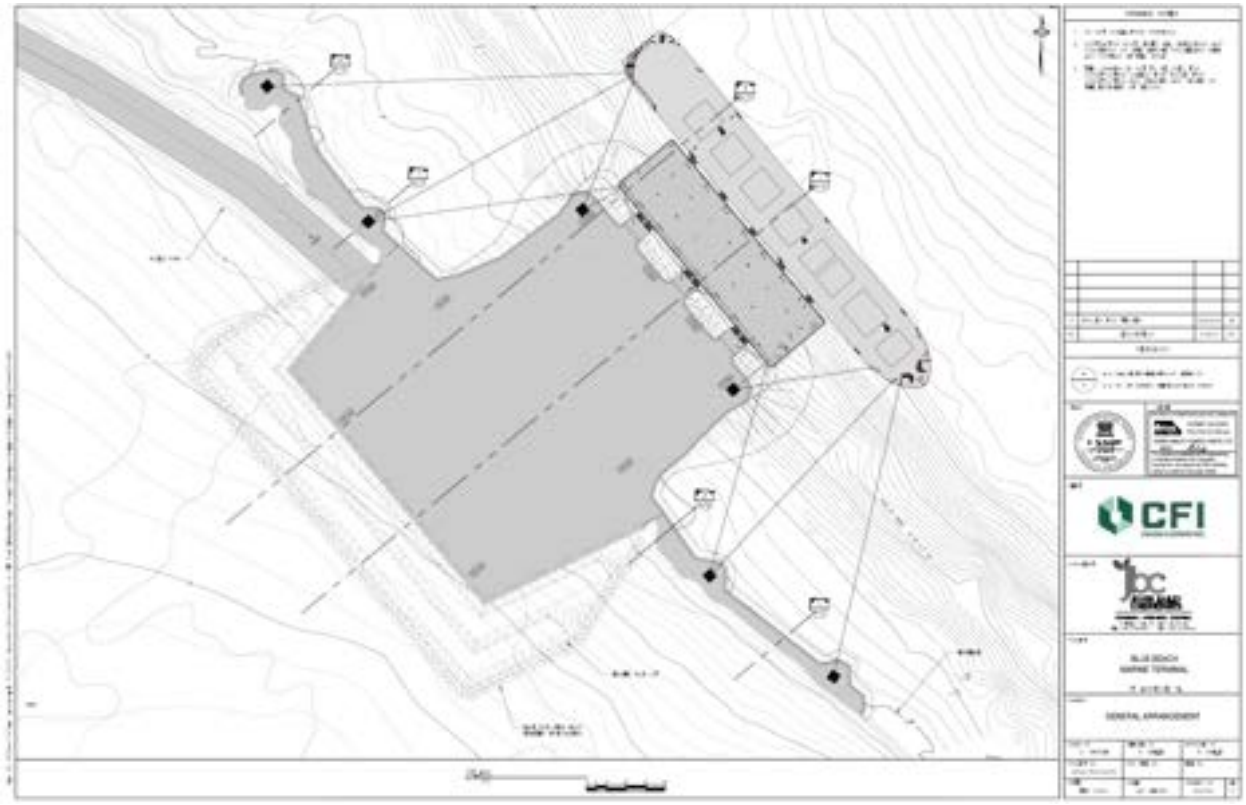
Engagement with DFO has been made regarding a Fisheries Authorization at the marine location of the terminal. A Request for Review has been submitted to DFO and has been decided that a Fisheries Authorization will be required. CFI has completed a Fisheries Authorization application and is pending its submission to DFO.

The onshore portion of the Marine Terminal will consist of a storage / laydown area and access roadways. Fluorspar concentrate and DMS floats by-product will be delivered from the storage facilities to the feeder system via direct dumping from trucks to final loading onboard the marine vessel. The Marine Terminal will be capable of handling vessels from 10,000 deadweight tonnage (DWT) to 65,000 DWT.

There will be no new power plants required for this Project; all power will be provided by Newfoundland Power from the provincial energy grid. There will be an overhead, single pole distribution system established by NL Power to the various facilities throughout the site.

The general layout of the Marine Terminal is shown in Figure 2.

Figure 2: General Arrangement of Marine Terminal



## 3.1 Construction/Operation Activities

Activities in the Marine Terminal area during construction and operation include:

- Excavation and blasting
- construction activities and equipment mobilization
- transportation
- staging and storage of fluorspar concentrate and DMS floats by-product

## 3.2 Environmental Issues

**General**

General environmental issues that may be associated with the construction and operation of the Marine Terminal include:

- increased volume and peak rate of runoff
- increased suspended sediments in runoff
- alteration or loss of marine habitat
- disturbance or behavioural changes of marine species
- potential leakage or spills of fuel or other hazardous materials

- incidental events including vessel collisions and archaeological discovery

### Sensitive Areas / Periods

*Marine*: Engagement with DFO has been made regarding a Fisheries Authorization at the marine location of the terminal. A Request for Review has been submitted to DFO and has been decided that a Fisheries Authorization will be required. CFI has completed a Fisheries Authorization application and is pending its submission to DFO.

*Terrestrial:* The construction of the Marine Terminal may disturb migratory birds during the bird breeding season, which occurs from May 1 to August 15 in the region (AMEC, 2016).
Any sightings or indications of nesting migratory birds will be reported immediately to the CWS, and work within an appropriate species-specific buffer of active nests will be halted until the HSE Manager advises otherwise. Additionally, to reduce potential adverse effects on nesting birds, Project related clearing activities will take place outside of the bird breeding season for most bird species (May 1 to August 15), where possible.

*Historic / Archaeological Resources*: There is a registered archaeological site in the marine waters of Blue Beach Cove; the wreck of the tug Rio Sama from 1946. However, the preferred location for the Marine Terminal will not disturb this area and thus, the Project will have no effect on historic / archaeological resources in the area.

## 3.3 Environmental Protection Procedures

### General Measures

Environmental Protection Procedures relevant to the construction and operation of the Marine Terminal are listed in Table , and presented in detail in Appendix D of the original EPP.

**Table 9: Relevant Environmental Protection Procedures - Marine Terminal**

| General Environmental Protection Procedures (Appendix D) | | Relevance to Marine Terminal Construction |
|---|---|---|
| D.1 | Clearing of Vegetation | • |
| D.2 | Grubbing, Stripping and Disposal of Related Debris | • |
| D.3 | Storage, Handling and Transfer of Fuel and Other Hazardous Materials | • |
| D.4 | Sewage Disposal | • |
| D.5 | Solid Waste Disposal | • |
| D.6 | Buffer Zones | • |
| D.7 | Erosion Prevention | • |
| D.8 | Excavations, Embankment and Grading | • |
| D.9 | Stream Crossings | • |
| D.10 | Dust Control | • |
| D.11 | Trenching | • |
| D.12 | Dewatering – Work Areas | • |
| D.13 | Marine Vessels | • |
| D.14 | Pumps and Generators | • |
| D.15 | Noise Control | • |

| General Environmental Protection Procedures (Appendix D) | | Relevance to Marine Terminal Construction |
|---|---|---|
| D.16 | Blasting | • |
| D.17 | Drilling – Geotechnical | • |
| D.18 | Vehicular Traffic | • |
| D.19 | Works Around Marine Environment | • |
| D.20 | Surveying | • |
| D.21 | Equipment Operations | • |
| D.22 | Historic Resources | • |

### Area Specific Measures

In addition to the Environmental Protection Procedures listed in Table 5 the following will be required during Marine Terminal construction and operation:

- Requirements listed in all government permits, approvals, and authorizations.
- Construction Safety Zone demarcation and management in the marine environment.
- Armour stone and filter stone will create new marine habitat that is suitable for colonization by a variety of marine invertebrates, such as lobster, which supports local commercial fisheries.

  A Marine Fish Offset Plan will be approved by DFO for the habitat alterations resulting from construction activities at the Marine Terminal. The alteration of this habitat for the Project is anticipated to result in a net increase of suitable available habitat for commercial, recreational or aboriginal (CRA) or other marine species.
- Consideration will be given to the use of silt curtains or other similar methods in the marine environment during construction to limit the extent of the effects of suspended sediments.
- Any cables, equipment or temporary hazards resulting from the construction activities will be clearly marked so they are visible to vessels operating in the area.
- Any barges and equipment used in the construction will be visible at all times and be marked in accordance with the Collision Regulations of the *Canada Shipping Act.*
- Construction debris will not become waterborne. During construction, all floating debris will be contained in the immediate area and removed from the water in a timely manner.
- A temporary 0.6 m yellow cautionary buoy equipped with a yellow flashing light will be placed 20 m seaward of construction activity and continually moved seaward as construction advances.
- The management of marine traffic is the responsibility of the Canadian Coast Guard. It is mandatory for large vessels to report to the Coast Guard at specified points and take local pilots on board. The potential for collisions will be minimized by; controlling vessel speed, scheduling and coordinating activities with other marine users, as well as Transport Canada and the Coast Guard, and posting Notices to Mariners, as necessary.
- The Marine Terminal will have navigational aids to provide early warning of collision hazards (e.g., flashing white and red strobe lights) in accordance with Transport Canada and Canadian Coast Guard regulations. Solid red warning lights will be avoided. Weather reports and wind speed information

will also be used to monitor changing weather conditions that could increase the risk of collisions during vessel navigation to or from the Marine Terminal.

- CFI will transmit the exact geographical coordinates of the Marine Terminal construction area to the Canadian Coast Guard to help them manage marine traffic in the Harbour.
- Blue Beach is the only registered archaeological site in the area and consists of a shipwreck dating back to 1946. There have also been recordings of onshore shipwreck remains at Blue Beach (Gerald Penney Associates Limited [GPA] 2015).

**Monitoring Requirements**

Monitoring applicable to the Marine Terminal construction and operation includes:

- Environmental monitoring during initial on-land construction to ensure no evidence or materials of historic / archaeological significance are discovered or lost.
- Environmental monitoring to reduce potential adverse effects on federally or provincially protected species that may occur in, or in close proximity to, the Project footprint.
- Marine water quality monitoring, as required in accordance with applicable permits and approvals.

Detailed monitoring requirements during the Project construction/ operation phase are outlined in the EEMP. Other monitoring requirements may be added as determined by regulatory conditions of approval.

## 4.0 REFERENCES

CFI (Canada Fluorspar (NL) Inc.) 2015a. AGS Fluorspar Project, Environmental Assessment Registration Pursuant to the Newfoundland and Labrador *Environmental Protection Act.* Submitted to the Newfoundland and Labrador Department of Environment and Conservation, 230 pp.

CFI (Canada Fluorspar (NL) Inc.) 2017a. *Environmental Effects Monitoring Plan for Project Operation Phase, St. Lawrence Fluorspar Project*. June 2017.

CFI (Canada Fluorspar (NL) Inc.) 2017b. *Environmental Protection Plan for Project Operation Phase, St. Lawrence Fluorspar Project*. June 2017.

# Appendix 2-8: Waste Management Plan

# WASTE MANAGEMENT PLAN

St. Lawrence Fluorspar Operation

April 2025

REV 2 - WMP

CFI
CANADA FLUORSPAR INC.

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# 1.0 Introduction

Canada Fluorspar (NL) Inc. (CFI) is committed to taking all necessary steps to ensure the collection, storage, transportation, and disposal of all wastes generated by project construction and operation will be conducted in a safe, efficient, and environmentally compliant manner. One of the first essential steps toward achieving these goals is the preparation of a Waste Management Plan (WMP) to identify potential wastes generated onsite during construction and operation. The WMP establishes consistent and efficient roles and responsibilities to be undertaken by various site personnel and site contractors. The WMP sets guidelines for collecting, storing, and processing wastes generated on site within the goals and objectives of CFI and the Provincial Waste Management Strategy. The intent is to achieve and maintain a high degree of control over the handling of waste to minimize adverse environmental effects.

The fundamental basis of the plan is the practical and positive management of wastes by implementation of a sound waste minimization program. The ideals of the three R's (reduction, recovery/reuse and recycling of wastes) are fundamental parts of this Waste Management Plan. The main objectives of the plan are the creation of a framework for the proper handling and disposal of wastes, minimization of potentially adverse impacts on the environment, and to comply with the regulatory requirements for waste management.

Hazardous waste generation is a "Cradle to Grave" responsibility by the generator. Therefore, it is primarily the site personnel and site contractors who will implement the plan as outlined, in accordance with their contractual and legal obligations, under the direction and supervision of CFI's Environmental Department.

This WMP applies to construction and operation at the St. Lawrence Fluorspar mine and mill in St. Lawrence, NL and shall be updated as necessary to accommodate the dynamics of the operation as it progresses.

# 2.0 Scope and Objectives

The Waste Management Plan outlines the waste management strategy for the project site. This WMP outlines the various waste streams associated with the operation, the various roles and responsibilities for managing wastes, and adhering to the requirements of properly disposing waste. The WMP has been prepared in accordance with the Provincial Waste Management Strategy (Government of Newfoundland and Labrador 2002).

The objectives of the Waste Management Plan are:

- Identify potential waste generation sources
- Classify generated waste
- Providing guidelines for proper:
    - Segregation and temporary storage of the waste
    - Collection and transport for final disposal
    - Tracking and reporting
- Minimize waste through a commitment to "Reduce, Reuse and Recycle"
- Prevent and reduce adverse impacts on the environment, including wildlife and fish habitat
- Protect the health and safety of site personnel

## 4.0 Governing Authorities and Reference Documents

This plan will be compliant with Federal and Provincial regulations, including appropriate sections of the following Acts, Regulations and Guidelines:

- Canadian Environmental Protection Act – Federal
- Water Resources Act – Provincial
- Storage and Handling of Gasoline and Associated Products Regulations – Provincial
- Used Oil Control Regulations – Provincial
- Dangerous Goods Transportation Act and Regulations – Provincial
- Environmental Protection Act – Provincial
- Waste Management Regulations – Provincial
- Environmental Control Water and Sewage Regulations – Provincial
- Guidance Document, Storage of Waste Dangerous goods/Hazardous Waste 2015 - Provincial
- Provincial Waste Management Strategy
- Burin Peninsula Waste Management Strategy

## 5.0 Provincial Waste Management Strategy

The Province of Newfoundland and Labrador released the "Newfoundland and Labrador Waste Management Strategy" in 2002 with the aim of province-wide modern waste management. The primary goals of the strategy, current to February 2018, are:

- Diversion of solid waste by 50%
- Reduction in the number of waste disposal sites by 80%
- Elimination of open burning and incineration
- Phase out of unlined landfills
- Province wide implementation by 2025

These goals will be achieved through five primary actions which embody the strategy.

- Increase waste diversion
- Establish waste management regions
- Develop modern standards and technology
- Maximize economic and employment opportunities associated with waste management
- Public education

The Waste Management Strategy is an interdepartmental initiative. The Department of Environment and Climate Change is responsible for working with communities to implement the strategy and establish regional governance, as well as environmental policy and standards. Service NL has responsibility for monitoring and enforcement. The Multi-Materials Stewardship Board has responsibility for public education, research and waste diversion programs.

CFI is committed to work within the goals and objectives of the Provincial Waste Management Strategy and aims to reduce the volume of waste generated through sound and effective waste management practices, through the implementation of the WMP.

# 6.0 Organization and Management

CFI will employ the waste management principles of "reduce, reuse and recycle" for all activities at the Operations site and offices. Implementation will be undertaken by the responsible personnel for each department.

## 6.1 Responsibilities

| | |
|---|---|
| Chief Executive Officer | Overall responsibility for all operation related issues. Shall provide the necessary resources and personnel for executing this plan. |
| HSE Manager | Responsible for the environmental compliance activities for the operation, including execution, of this plan. Responsible for development and planning of new waste management system, as well as upgrading existing systems. Provides technical support, auditing, tracking of waste sorting, collection, transport, and final disposition. Oversight of all Waste Contractors. |
| Environmental Technician/Monitor | Ensuring that the overall environmental concerns or issues are identified and effectively addressed. Ensure that site inspections including the waste storage areas, are conducted and documented. |
| Supervisors, Superintendents and contractors | Responsible for coordinating waste removal from local working areas to the centralized storage areas with the assistance of the Environmental Lead, if required. Ensuring that all project containers are properly managed. |
| Third-Party Waste Sub-contractors | Licensed contractors selected by CFI to remove waste from sites. All sub-contractors will have appropriate licenses, certifications, training, and systems to remove the subject waste. Must provide the client with approved disposal documentation where required. |

## 6.2 Waste Contractor Specifics

A licensed waste contractor with adequate experience will be selected based on their competency and familiarity to the owner's requirements. Waste contractors will be needed for:

- Liquid waste disposal services
- Hazardous waste removal
- Non-hazardous waste removal

The removal of recycling material can be found under Section 9.0 "Implementing the 3 R's"

The scope of their service includes, but is not limited to the following:

- Provide requested waste advisory services. Advise the project regarding waste management alternatives for generated wastes and perform economic evaluations of these alternatives to reduce disposal/recycling costs over time, increase the use of recycling versus disposal options, and identify waste minimization options
- Provide waste containers complete with labeling consistent with project standards

- Provide waste removal services including all transportation and handling to appropriate licensed disposal sites suitable and licensed for that waste. Where reuse facilities or recycling facilities are available, options to use these facilities shall be investigated by the supplier
- Manage waste once off-site
- Interface with licensed facilities
- Support tracking, documenting and reporting activities related to waste management, including a waste tracking database consistent with regulatory requirements. Provide any of this tracking information to CFI at any given time.

# 7.0 Summary of Wastes

This Waste Management Plan addresses management of solid and liquid wastes, hazardous and non-hazardous wastes generated by the workers. Materials are considered waste when it can no longer be used for its original intended purpose. Waste generated during execution of the work site will be categorized as follows:

- Office/lunchroom waste
- Metals
- C&D waste
- Waste lumber
- Conveyor belts and tires
- Vehicles, equipment and machinery
- Sewage and human waste
- Hazardous and special waste

These categories are discussed in further detail in the sections below.

## 7.1 Solid Domestic Waste

Waste generated from the general offices and lunchrooms is expected to have similar waste composition as found in the municipal solid waste stream. This waste stream consists of food waste, recyclable containers, inert non-combustible domestic waste, packaging, corrugated cardboard, paper and paper products.

### 7.1.1 Office/Lunchroom Waste

Most of the food wastes will be generated in the lunchroom areas of the work site. All food waste will be collected and disposed of in an enclosed and covered collection bin to minimize the attraction of wildlife and the potential negative impact to wildlife. Gathering and transporting these wastes will be the responsibility of CFI or its representative. **Littering around site is strictly prohibited and consequences will be enforced.**

Bag lunch wastes generated in various work areas are to be collected from each meal in wildlife-proof bins. This material will be placed in a storage bin.

### 7.1.2 Beverage Containers

Although plastic waste will be included in the garbage stream, bulk purchases and, where possible, beverage containers should be utilized to reduce the overall generation of plastic waste.
When required, arrangements can be made to have refundable beverage containers transported to a local recycling depot for refund, with proceeds donated to a local charity. Alternatively, arrangements can be made to have beverage containers donated directly to local charities to transport for refund at a local recycling depot.

Pull tabs can be collected, recycled, and provided to a local charity for donation to the Ronald McDonald House.

### 7.1.3 Corrugated Cardboard and Paper

Fibre waste will be included in the garbage stream; however, where possible, paper reduction strategies should be exercised to reduce the overall generation of fibre waste.

Under the BPWMC waste management plan, consideration is being made to include non-hazardous fibre wastes such as clean paper, cardboard, packaging and other fibre materials as a separate waste stream. In the event this comes into effect, fibre waste will be collected and stored in a dry, protected area for scheduled periodic pickup by CFI's Environmental Department and shipped to the regional waste management facility for processing or a fibre recycling center.

Used paper is stored on site and collected by a third-party contractor for secure shredding and paper recycling.

## 7.2 Inert Solid Waste

### 7.2.1 Conveyor Belts and Tires

Conveyor belts and tires have limited life and, when no longer usable, contribute to inert solid waste generation.

CFI may pursue a tire and conveyor exchange program with the vendors, and investigation of alternative uses for old conveyor belts and tires will be ongoing on site. Some suitable alternate uses for tires are for dock protection, to protect roads in turning areas, and for materials storage in laydown areas. Where possible, old conveyor belts and tires will be utilized on site. However, for the most part, unused conveyor belts, equipment tires, and those tires not included under the MMSB tire recycling program will be transported to an approved off-site C&D landfill area or shredding facility.

### 7.2.2 Vehicles, Equipment and Machinery

Vehicles and equipment will be shipped off site for reuse/recycle when they are no longer usable. While awaiting back shipping, unusable vehicles or their metallic parts will be stored in a designated section at a metals storage area, collected by a licensed metals contractor and hauled to a metals recycling facility for processing.

All fluids will be drained/collected and properly stored. CFI's Environmental ead will be responsible for ensuring proper records are maintained for the storage and removal of vehicle fluids.

### 7.2.3 C&D Waste

The Newfoundland and Labrador Department of Environment and Climate Change (ECC) as part of their environmental protection and waste management mandate have created a guidance document that provides definitions for the Waste Management Strategy. C&D waste is defined as:

*"Materials not of a hazardous nature which are normally incorporated in the construction of, and found in the materials resulting from demolition or destruction of, buildings, structures, walls and landscaping features and includes:*

*a) Clean soil*
*b) Landscaping waste such as root balls and organic mat*
*c) Brick, mortar, concrete*
*d) Drywall, plaster, windows, doors, glass, ceramic items, cellulose, fibreglass fibres, gyproc, unsalvageable metals*
*e) Wood that has not been chemically treated*
*f) Asphalt shingles, and other roofing materials, roofing adhesives, tar or waterproof compounds*
*g) Siding, floor coverings and ceiling tiles, wire, conduit, pipes, plastic films and other building plastics or metals*
*h) Other inert materials approved by the Department*

*Materials which are portable and easily removed from a structure such as furniture, drapery, appliances, plant machinery and equipment, and other items which are not generally considered part of the real property, are not included in this definition"*

### 7.2.4 Metals

Metal waste may be generated from scrap metals produced by structural work and piping fabrication. This waste stream will consist of ferrous and non-ferrous scrap metals of various types. Bulky scrap metals such as unusable vehicles or large appliances will be shipped off site for salvaging and disposal. Reusable scrap metals such as sheeting and used drums will be reused as part of an effective waste reduction program. In a contractual agreement, recoverable/recyclable scrap metals will be sent to the recycling facilities directly by the generating contractor or placed in the metals storage area. Scrap metals that cannot be recycled will be sent to an approved landfill site.

### 7.2.5 Waste Lumber

Small pieces of broken untreated lumber will be collected and disposed of in an approved C&D landfill.

Larger pieces of untreated lumber will be stored in a laydown area for potential reuse. Site personnel will be informed to reuse this lumber material as much as possible or wherever feasible. When no longer usable, untreated wood waste may be shipped off site for reuse or as firewood.

Treated lumber shall be segregated from regular wood waste and disposed of at an approved C&D landfill.

## 7.3 Hazardous Waste

The Department of Environment and Climate Change have created a guidance document that provides definitions for the Waste Management Strategy. Hazardous, hazardous waste and special waste are defined in this guidance document as follows:

> *"Hazardous as it refers to wastes and materials are those that are corrosive, reactive, flammable, ignitable, carcinogenic, teratogenic, mutagenic, infectious, oxidizing, radioactive, explosive, poisonous/toxic, bioaccumulative, persistent, TCLP leachable toxic, and or wastes which do not meet any of the above criteria but have other properties of concern which are significant enough to consider the material to be hazardous.*
>
> *Hazardous waste is any waste which contains a hazardous substance in such a quantity liable to cause death, injury or impairment to living beings, pollution of water, air and soil, or unacceptable impact on the environment, if handled, treated or disposed of improperly. Includes 'waste dangerous goods' as defined under the Environmental Protection Act."*

### 7.3.1 Petroleum Waste Stream

Petroleum-based wastes generated at the site will primarily be:

- Used oil
- Transmission fluid
- Hydraulic fluid
- Lubricants
- Solvents
- Coolants
- Used oil filters
- Oily rags/absorbent pads
- Contaminated soils

These wastes will be segregated as necessary in order to render the individual waste streams easier to reuse for other purposes, recycle, or permit recovery of any by-products. Special precautions will be exercised when handling these materials since the improper release or disposal could adversely affect the environment. Personnel handling wastes will be required to have specific training and utilize PPE to ensure safe handling and disposal.

### 7.3.2 Chemical Waste Stream

Chemical wastes will be generated during operations. The chemical waste stream consists of:

**Processing reagent containers/bags:**
All processing reagents must be segregated as per the instructions in the Waste Handling Section.

**Laboratory chemical wastes:**
Mixed lab wastes can be disposed of with the tailings and pumped to the Tailings Management Facility.

**Waste batteries:**
All non-reusable batteries (AA, AAA, 9V) shall be stored in a plastic container located in a central area which all staff can access. The terminals on a 9V battery shall be taped as a precaution where the terminals are exposed. The hazardous waste disposer will collect a full container during a waste collection visit.

### 7.3.3 Miscellaneous Waste Stream

- Aerosol cans ( these may be punctured using an aerosol can disposal system designed for the purpose of safely draining fluids. Once punctured, aerosol cans can be disposed of in the general waste stream.)
- Biomedical wastes
- Paint
- Explosives
- Electronics

## 7.4 Other Wastes

### 7.4.1 Sewage and Human Waste

It can be expected that toilet and wash facilities will be located throughout the site. In many cases, washroom facilities will be located within site buildings and be connected to and treated by sewage treatment services, such as a septic system.

In the case of toilet facilities located underground, human waste shall be collected and brought to the surface and treated using a licensed septic removal service.

# 8.0 Waste Handling

Wastes generated at the project site will be collected, segregated, labeled, and temporarily stored until transported for reuse, recycling or disposal.

Before handling any waste, it is imperative to think safety first. It is the requirement for all site personnel to be aware of the hazards and risks associated with the chemical, material or product that they intend to use.

Waste may be temporarily stored in laydown areas, located in convenient areas in proximity to the area/activities from which the waste is being produced. These laydown areas will have transportable containers such as roll off bins for storage of the various waste streams. Waste streams will be segregated and labelled for the waste type. The laydown areas will have sufficient space for safe transport.

Hazardous waste will be stored in designated areas or storage facilities that are appropriately designed for the materials stored. The hazardous waste storage area (HWSA) will have secondary containment and be collected in appropriate leak proof containers until they are removed from site on an as needed basis by a licensed facility for disposal.

See Table 1.0 for Storage and Disposal Plan.

## 8.1 Storage on Site

Laydown areas will be located throughout the site for placement of waste, until such a time that it can be transported to the appropriate facility for final disposal. All waste streams shall be properly segregated in their designated labelled bins.

Waste Transfer Areas are centralized facilities where waste is unloaded from several collection vehicles into appropriate containers.

Roll off/on Containers or Dumpster Bins

These containers or dumpster bins will be needed on site to accept waste transferred from the small bins once they are removed from the site buildings. The roll off/on containers are meant to hold larger C&D waste, while dumpster bins such as front-loading bins are meant to hold domestic waste from office buildings/lunchrooms. The location of these bins will be placed in strategic areas around site, especially near buildings and other areas that generates more waste than others.

Recycling Bins

These containers will be required in lunchrooms or common areas in office buildings. Employees are encouraged to place their recyclable beverage containers in the provided blue bins. Once these bins are full, a larger front load bin outside will hold the bags of beverage containers until arrangements are made to take them offsite to a bottle depot or donate them to a local charity

Collection bags will be placed near each recycling bin for pull tabs which are collected and transported for recycling or charity.

**Hazardous waste**: is the most important waste stream to be properly segregated as follows:

Residual Drums – UN Rated

***In the case that any of these reagents are in drums, they can be stored as is until Disposal Services can take them offsite.***
***Drums must be properly labelled to identify the contents and drums must be free of leaks.***
***Any drum that is ready to be disposed of must be cleaned by Mill Ops, verified as cleaned by Environment Department***

- (PAX) Xanthates
- MIBC / W31
- Iron Silica
- Sodium Silicate N

Residual Totes – UN Rated

- Fatty Acid
- Emulsifier

**Segregated Hazardous Waste Tote Sac**

**Tote Sac #1**

- Quebracho
- Oily Debris (Rags, absorbent pads)
- Soda Ash Bags (bags must be folded and tied)

**Tote Sac #2**

- Regular Dextrin
- Flocculent
- Coagulant Iron
- Sulphate

**Tote Sac #3**

- Used Oil Filters

**Tote Sac #4**

- FeSi

**205L Drum – Site Storage Purpose Only (With lids and rings)**

- Aerosol cans
- Oily rags
- Crushed oil filters

<u>4,600 L Used Oil Tank and 1000L Used Tote (Labelled waste oil – located near Mill And Mobile Maintenance)</u>

- The following products **MAY** be added to the used oil storage system:
  - Crankcase oil (including synthetic oil)
  - Gear oil
  - Transmission fluid
  - Hydraulic (brake and power steering) fluid
  - Heating oil
- The following products **MAY NOT** be added to the used oil storage system:
  - Gasoline
  - Grease
  - Chemical solvents
  - Radiator coolants
  - Animal or vegetable fats
  - Pesticides
  - Polychlorinated biphenols (PCB's)

<u>1,000 L Plastic Tote</u>

Used Antifreeze

## 8.2 Inspection

Waste management inspections are necessary to gain an overall impression of the site operation with respect to proper waste handling.

Routine Inspection

Routine inspections should be carried out **weekly** as a visual check in order to confirm:

- Signage is visible
- Dumpster waste levels
- Proper waste segregation
- Number of empty reagent drums and totes

An inspection form for routine inspection is located in Appendix A-1

Waste Management Inspection

The objective of a waste management inspection is often to determine the types of waste and the locations that will be inspected. Waste management inspections should be carried out **quarterly** in order to identify:

- Areas where waste management reduction can be improved
- The effectiveness of any current waste management strategies
- The types of waste and amounts that is being generated on site

An inspection form for waste management is located in Appendix A-2

## 8.3 Collection and Disposal

For the purpose of disposing Reagent drums and containers, a triple rinse procedure has been implemented. For the mill processing reagents that are delivered in steel drums or 1000L plastic totes, it is acceptable to complete a triple rinse as per the Safe Work Procedure for this task, and dispose, recycle, or reuse the container for additional purposes. This practice is a more economical and environmentally friendly way to reduce our cost and carbon footprint for trucking them off site as a whole.

Drums must be cleaned by Mill operations and Environment department to verify before being disposed of. Site Services will crush the drums and put them in the correct bins. If it's a plastic drum it goes in general waste, if it's a metal bin, it goes in scrap metal.

It is intended that all other waste will be removed from the facility and properly disposed of in a safe and environmentally acceptable format and in accordance with the requirements of applicable regulatory agencies and authorities.

The generated waste stored at the work site shall at regular intervals be transported to locations for final treatment and disposal by a dedicated waste transport collector, who will hold all required licenses, including but not limited to licensing for collection, handling, transport, treatment and final disposal.

Table 1.0 – Storage and Disposal Plan

| Waste Type | Temporary Storage on Site | Final Disposal Strategy |
|---|---|---|
| **Domestic Wastes** | | |
| Food | Collect in garbage bags. Take directly to storage bin. Do not store outside. | Landfill / Compost at Regional Waste Management Facility or approved landfill site. |
| Paper and Cardboard | Store dry materials for collection by Site Services Contractor. Place in storage bin and ship offsite to a licensed recycling facility or Regional Waste Management Facility, when required. | Recycle / Landfill when applicable |
| Plastics | Plastics of non-toxic materials to be included with regular waste and transported to landfill. | Recycle / Landfill |
| Beverage Containers | Collect beverage containers accepted under the MMSB Beverage Container Recycling Program and make available to charitable organizations. | Recycle |
| Printer and Toner Cartridges | Store and send back to supplier or manufacturer, or ship offsite to a Regional Waste Management Facility. | Recycle / Landfill |
| **Inert Solid Wastes** | | |
| Conveyor belts and tires | Remove from site and transport to an approved tire storage area. Work within the MMSB's Used Tire Recycling Program. | Re-use / Recycle / Dispose offsite |
| Vehicles, Equipment and Machinery | Drain and collect residual fluids and store in laydown area. Ship offsite via licensed metals recycler. | Recycle |
| C&D Waste | Stockpile in designated laydown area. Reuse/Recycle where possible. Ship offsite to Regional Landfill Site | Reuse / Recycle / Dispose offsite |
| Scrap Steel, Wire, Aluminum | Store recyclable wire or aluminum in metal bins at storage area. Store bulk steel at laydown area and ship offsite. | Recycle offsite |
| Waste Lumber | Stockpile in designated laydown area. Reuse where possible. Ship offsite to Regional Landfill Site | Reuse / Dispose offsite |
| **Hazardous Waste Stream** | | |
| Used Oil | Collect in trays and drums. Transfer to ISO storage tanks. Ship offsite. | Ship Offsite to a Licensed Facility for recycling or destruction |
| Used Oil Filters | Store canisters in separate drums at the HWSA. Ship offsite. | Empty storage drums into Haz Waste Bin 1. Recovery / Landfill at Licensed Offsite Facility |
| Aerosol Cans | Collect cans with residual product in drums. Puncture cans used aerosol can puncturing kit. Ship offsite. | Reduce / Ship contents to Licensed Offsite Facility Offsite for disposal. |
| Oily Debris (rags, absorbents, PPE) | Collect and store in drums at the Hazardous Waste Storage Area (HWSA). Ship offsite. | Ship to Licensed Offsite Facility for recycling or disposal. |
| Used Antifreeze | Collect and store in drums at the Hazardous Waste Storage Area (HWSA). Ship offsite. | Ship to Licensed Offsite Facility for recycling or disposal. |
| Laboratory Liquid Wastes | Dispose with tailings. | No treatment required. Dispose with tailings. |
| Waste Batteries | Store in a designated storage container located in a central area accessible to all staff. Ship offsite by a licensed Hazardous Waste Contractor as per TDG requirements. | Ship to Licensed Offsite Facility for recycling or disposal. |
| Fluorescent Light Bulbs | Store in a designated storage container located in a central area accessible to all staff. Ship offsite by a licensed Hazardous Waste Contractor as per TDG requirements. | Ship to Licensed Offsite Facility for recycling or disposal. |

Table 1.0 – Storage and Disposal Plan

| Waste Type | Temporary Storage on Site | Final Disposal Strategy |
|---|---|---|
| Explosives | Responsibility of the blasting contractor. In accordance with all regulatory standards, protocols, good practices. | Reduce, destroy, ship offsite. |
| **Mill Reagents**<br><br>PAX (Xanthates)<br>MIBC / W31<br>Emulsifier<br>Fatty Acid | <br><br>Residual Drums<br><br>Residual Totes | Ship to Licensed Offsite Facility for recycling or disposal. |
| Quebracho<br>Regular Dextrin<br>Flocculent<br>Coagulant<br>Iron Silica<br>Copper Sulphate | Tote Sac | Ship to Licensed Offsite Facility for recycling or disposal. |
| Diluted acids<br><br>Concentrated acids<br><br>Sample envelope<br><br>Glass Bottles<br><br>Plastic acid bottles | | |

## 9.0 Implementing Three "R'S"

CFI is devoted to the notion of the successful implementation of the Three R's throughout all works during the operation.

Reduction Initiatives:

Reducing the raw material consumption is the first step to reduce waste generation. To practice this principle, all processes and material used will be evaluated based on possible reduction in raw material usage.

- Strategic material substitution: At the purchasing stage, the possibility of less hazardous material substitution will be examined for all materials that are hazardous to handle, generate hazardous wastes, or create environmental problems.

Reuse/Recovery Initiatives:

Recovery of usable material or energy as a by-product is a part of the three R's of the waste minimization process. All opportunities for onsite reuse of waste materials will be highly encouraged.

- Discarded wood generated by construction activities shall be assessed for their reusability. Re-usable wood will be segregated, and the option to donate such material shall be investigated.

Recycling Initiatives:

Recycling is the next option considered for the successful management of the waste streams. Wherever possible, implementation and facilitating recycling programs for beverage containers, pull tabs, plastic bottle caps, used oil, paper and cardboard, tires, copper and aluminum, etc. Some of these materials can be reused for other applications.

- Blue bin recycling containers are recommended for the collection of beverage containers due to their high visibility. The use of dedicated recycling containers will serve as a reminder for personnel to use the recycling containers instead of throwing containers into the general waste containers. Collection bags for pull tabs and plastic bottle caps will be in place near all beverage container recycling bins as a reminder to remove them for recycling before placing the beverage containers in the recycling bin.

Disposal:

Disposal becomes the final option when the three R's are no longer applicable or practical. Hazardous wastes will be stored onsite at a designated Temporary Waste Transfer Station while arrangements are made for transportation to a licensed facility for possible recovery, treatment, and disposal as required.

APPENDIX A-1
Routine Inspection Form

APPENDIX A-2
Waste Management Inspection

# Waste Management Inspection Form

**Date:** **Name:**

**Maintenance**

| Waste Category | Capacity |
|---|---|
| Scrap Metal Dumpster | |

**Mine Dry**

| Waste Category | Capacity |
|---|---|
| General Waste Bin | |

**Security**

| Waste Category | Capacity |
|---|---|
| Recycle Bin | |
| Scrap Wood | |

**Rusty's Lay Down**

| Waste Category | Capacity |
|---|---|
| Scrap Metal Dumpster | |
| General Waste Roll-off Dumpster 1 | |
| General Waste Roll-off Dumpster 2 | |
| Hazardous Waste Sea Can | |

**Warehouse**

| Waste Category | Capacity |
|---|---|
| General Waste Roll-off Dumpster | |

# Weekly Inspection Checklist

Waste Management – Waste Storage Areas

For the Month of: _____

| | Date | Time | Signature |
|---|---|---|---|
| **Week 1** | | | |
| **Week 2** | | | |
| **Week 3** | | | |
| **Week 4** | | | |
| **Week 5** | | | |

**Hazardous Waste Sea Can Area** (If you answer yes to any question, please explain in the comment section)

| **Answer Yes or No for each question, every week** | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** |
|---|---|---|---|---|---|
| Is the appropriate signage on or near the container labeled Hazardous Bin Sea Can? ? | | | | | |
| Is the tote sacs in good condition (any signs of damage or large rust spots)? | | | | | |
| Is there any waste on the ground near the sea can ? | | | | | |

Comments: _____

_____

_____

**Recyclable container** (If you answer yes to any question, please explain in the comment section)

| **Answer Yes or No for each question, every week** | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** |
|---|---|---|---|---|---|
| Is there signage on or near the container labeled "Recyclable Containers Only"? | | | | | |
| Is the container in good condition (any signs of damage or large rust spots)? | | | | | |
| Is there any garbage on the ground near the container? | | | | | |

Comments: _____

_____

_____

**General Waste Dumpsters** (If you answer yes to any question, please explain in the comment section)

| Answer Yes or No for each question, every week | Week 1 | | | | Week 2 | | | | Week 3 | | | | Week 4 | | | | Week 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mill 1 | Mill 2 | Maintenance | Warehouse | Mill 1 | Mill 2 | Maintenance | Warehouse | Mill 1 | Mill 2 | Maintenance | Warehouse | Mill 1 | Mill 2 | Maintenance | Warehouse | Mill 1 | Mill 2 | Maintenance | Warehouse |
| Is there signage on or near the container labeled "General Waste"? | | | | | | | | | | | | | | | | | | | | |
| Is the container in good condition (any signs of damage or large rust spots)? | | | | | | | | | | | | | | | | | | | | |
| Is there any garbage on the ground near the container? | | | | | | | | | | | | | | | | | | | | |

Comments:_____

_____

_____

**Scrap Metal Dumpsters** (If you answer yes to any question, please explain in the comment section)

| Answer Yes or No for each question, every week | Week 1 | | | Week 2 | | | Week 3 | | | Week 4 | | | Week 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mill | Maintenance | Warehouse | Mill | Maintenance | Warehouse | Mill | Maintenance | Warehouse | Mill | Maintenance | Warehouse | Mill | Maintenance | Warehouse |
| Is there signage on or near the container labeled "Scrap Metal"? | | | | | | | | | | | | | | | |
| Is the container in good condition (any signs of damage or large rust spots)? | | | | | | | | | | | | | | | |
| Is there any garbage or metal on the ground near the container? | | | | | | | | | | | | | | | |

Comments:_____

_____

_____

# Quarterly Inspection Checklist

Waste Management

| | |
|---|---|
| **Location/Dept:** | |
| **Inspection Date:** | |
| **Inspected by:** | |
| **Signature:** | |
| **Type of Inspection:** | ☐ Compliance Inspection ☐ Re-Inspection |

| Waste Category | Criteria | Compliant? YES (✔) | NO (X) | N/A | Comments/Remarks (Required if Compliance is NO or N/A) |
|---|---|---|---|---|---|
| **General Waste** | 1. Is waste sorted correctly? (i.e. do you only see general waste items) | | | | |
| | 2. Do you see the 'General Waste' signage on or near the containers? | | | | |
| | 3. Is General Waste being stored in the outside designated areas? | | | | |
| | 4. Are general waste materials being placed properly in waste bins? | | | | |
| | 5. Is there any waste on the ground (i.e. is the dumpster overfilling) | | | | |
| **Recyclable Material** | 6. Is there a recycling container designated for aluminum cans, plastic bottles etc.? | | | | |
| | 7. Is there a recycling area available for used toner cartridges? | | | | |
| | 8. Do you see the recyclable materials poster near the areas where these materials are being generated? | | | | |
| **Confidential Paper Waste** | 9. Are lockable shredding totes available for staff to place their confidential waste in to? | | | | |
| | 10. Are shredding totes locked? | | | | |
| | 11. Do you see appropriate signage for 'Shredded Paper Waste' | | | | |
| **Biomedical Waste** | 12. Are biomedical waste containers available to all employees (i.e. a yellow contaminated sharps pail) | | | | |
| | 13. Do you see appropriate signage for 'Contaminated Sharps Disposal Only' | | | | |
| | 14. Is hazardous chemical waste stored separately from other waste materials? | | | | |
| | Battery disposal containers, fluorescent tubes disposal, aerosol can disposal, used oil filter disposal, | | | | |

# Appendix 2-9: Spill Response Plan

# SPILL PREVENTION AND RESPONSE PLAN

St. Lawrence Fluorspar Project

SEPTEMBER 2020

REV 0 - SPRP

CFI
CANADA FLUORSPAR INC.

# 1.0 Introduction

Canada Fluorspar (NL) Inc. (CFI) is developing the St. Lawrence Fluorspar Mine (the Project) located in St. Lawrence, Newfoundland and Labrador (NL). The Project is located partly on a brownfield site used historically for mining. The Project includes the construction, operation, rehabilitation, and closure of a surface Mine, a Mill, a Tailings Management Facility (TMF), and ancillary infrastructure. Concentrate will be trucked to an existing ship loading facility at Kiewit Offshore Services' (KOS) Cow Head Facility in Mortier Bay until the construction of the Blue Beach Marine Terminal is completed. The surface Mine consists of three open pits: Open Cut Pit (OCP), Center Pit (CP), and Grebes Nest Pit (GNP). The operations phase is expected to last approximately ten years and will be followed by the rehabilitation and closure phase. The length of the operations phase is based on the current resource estimate and may be lengthened should additional resources be identified. The Mine will supply adequate ore to meet a production of 200,000 tonnes per year of concentrate throughout the life of the Mine.

# 2.0 Purpose and Scope

The Spill Prevention and Response Plan (SPRP) is intended to be used as a guide to prevent and respond to environmental incidents involving spills. The plan will ensure an effective, comprehensive response to prevent any adverse effects to workers, members of the public and the environment within the Canada Fluorspar site.

This plan encompasses the entire Fluorspar site, including the new Blue Beach Marine Terminal Construction and Operation Phase

Spills of pollutants, including hydrocarbons, chemicals or other materials deemed to be deleterious to the environment, shall be classified as a spill if any of the following criteria is met:

- Spill enters directly into the natural environment
- Spill is not fully contained by the secondary containment, allowing it to come into contact with the natural environment
- Spill enters either storm drainage or natural drainage system and is discharged to the natural environment before being adequately treated.

The SPRP provides information on:

- Potential sources of spills
- Training, drills and awareness
- Spill prevention and monitoring
- Spill reporting and response
- Spill containment and clean-up
- Continuous improvement

The provisions written within this plan cover all operations of the St. Lawrence Fluorspar Project. This plan will be continuously reviewed for updates throughout the duration of the project.

# 4.0 Governing and Reference Documents

The following documents shall be used for reference.

## 4.1 Governing Documents

### Federal Regulations

- Canadian Environmental Protection Act
- Canada Shipping Act
- Marine Liability Act
- Fisheries Act
- Migratory Birds Convention Act
- Transportation of Dangerous Goods Act
- Transportation of Dangerous Goods Regulations
- Environmental Response Arrangements Regulations
- Oil Pollution Prevention Regulations and Pollutant Discharge Reporting Regulations

### Provincial Regulations

- Environmental Protection Act
- Water Resources Act
- Storage and Handling of Gasoline and Associated Products Regulations
- Used Oil Control Regulations
- Environmental Control Water and Sewage Regulations

### Reference Documents

- Environmental Protection Plan (EPP)
- Environmental Effects and Monitoring Plan (EEMP)
- Certificate of Approval – Operations
- Waste Management Plan

# 5.0 Potential Sources of Spills

The extent of damage, or impact caused by a spill is proportional to the type and volume of material, the toxicity, the receiving environment, and the amount of time the contaminant is exposed to the environment. In this respect, it is crucial to respond to all spills in a timely fashion. All spills will be considered serious and will be reported. The sections below identify the main sources of potential spills.

### Equipment and Vehicle Operating Fluids

Operating fluids include hydrocarbon products such as fuels, oils, hydraulic fluids and other hydrocarbons. These materials are hazardous to fish, wildlife and sensitive environments. Spill size may vary from small quantities, such as drips from equipment leaks and loose fittings, to large volumes due to hydraulic hose leaks, or fuelling malfunction.

### Hazardous Materials or Waste

Some products used on site are considered toxic and are harmful to the environment and would have negative impacts if released to the air, soil and water. Products such as chemical additives or reagents from the mill, and slurry effluent from the Tailings Management Facility can lead to the degradation of habitats and injury or death of fish and wildlife.

### Wastewater from Equipment Washing

Wastewater from equipment washing operations could be considered a deleterious substance by Environment Canada and must not be discharged to fish-bearing waters or into drainage systems which discharge to water bodies.

### General Construction and Earthworks

All general construction and earthwork activities have the potential to generate loose soil and dust. In the event of a heavy rainfall and water movement through naturally occurring streams and ponds, sediment may be transported to a water body. As per Provincial regulations, sediment in water over a concentration of 30 mg/L is a spill.

## 6.0 Responsibility, Training and Awareness

All personnel must be advocated for Spill Prevention on site. To support this, activity-appropriate training, and responsibilities are assigned as follows:

### All Persons

- Responsible for their actions and responsible to report potential issues
- Apply the Spill Prevention and Response Plan to avoid any spills during their activities
- Attend environmental awareness training as part of the project site orientation
- Report all witnessed spills onsite to the Environment Department

### Staff Workers

#### Office Staff

- Attend additional training that puts emphasis on spill prevention planning, hazards and mitigation measures associated with reporting, clean-up and documentation of spills

### Field Staff

- Ensure that the SPRP is applied on site and report deficiencies to the Environmental Department
- Attend additional training that puts emphasis on spill prevention planning, hazards and mitigation measures associated with reporting, clean-up and documentation of spills
- Use spill reporting and spill prevention during workers training including toolbox talks

### Contractors

- Attend environmental awareness training as part of the project site orientation
- Use spill reporting and spill prevention during workers training including toolbox talks
- Responsible for their actions and cleanup costs and responsible to report potential issues
- Ensure that the SPRP is applied on site and report deficiencies to the Environmental Department

# 7.0 Spill Prevention

The risks of spills at the project site from the associated materials, chemicals and wastes will be prevented, reduced and mitigated through the implementation of the environmental protection measures by CFI as detailed below. To mitigate the effects to the natural environment from the sources of spills for the project, spill kits will be located at strategic locations around site, and on fluid-containing equipment to immediately mitigate effects. A Spill Kit Location Map can be found in Appendix C.

## Training and Competency

- CFI employees and its subcontractors are required to attend orientations, which include information on spill prevention, response and reporting
- Employees will also be required to attend an environmental overview session that provides additional and more detailed spill prevention and response requirements directly related to their scope of work
- All personnel who handle, store, use chemicals must be trained in WHMIS. Personnel involved in the transportation of dangerous goods must also be trained in this subject
- Select employees will be trained in spill response. Training may consist of internal or external training

## Equipment and Vehicle Operating Fluids

- All maintenance and operator personnel shall be trained to inspect and conduct user maintenance for their vehicles and equipment everyday. This will be recorded in the equipment/vehicle Pre-Use Inspection book for safety and environmental purposes
- Defective equipment and vehicles determined to be at risk of causing a spill shall be removed from operation and repaired before returning to service
- Hydraulic hoses and fuels lines shall be inspected, and pressure tested to ensure integrity
- Vehicles and equipment working near water shall be cleaned and serviced as necessary to prevent deposition of soils, oil, grease, coolant, fuel and other contaminants
- Land vehicles will not be permitted to be used in any water body unless given permission by the Environmental Department to do so
- Vehicles will have regularly scheduled maintenance
- Maintenance activities shall be carried out in designated areas at least 100m from any water body
    - Most maintenance operations will be conducted indoors within a maintenance garage, complete with a sealed flooring and floor drains that lead to an oil water separator
    - Based off on standards set in the Storage and Handling of Gasoline and Associated Products Regulations, 2003:
        i. With dyked or secondary containment areas that contains more than one storage tank, the area shall be capable of containing 110% of the capacity of the largest tank
- Fuel storage locations shall be at least 100m from water bodies

  - Tanks will be constructed to ULC S601
  - Double wall will be constructed to ULC S653 with 110% containment
  - Berms capable of containing 110% volume will be required to accommodate transfer
- All containment areas must have the capacity to be drained periodically of foreign matter or water
- Fuel transfer hoses will be double walled and equipped with check valves to prevent spillage in the case of equipment malfunction
- Handling of fuels shall be performed only by persons who are trained and qualified to do so and respect refuelling work instruction

## Fuelling

Fuelling activities at the work site will be in accordance with all applicable regulations and best practices. Refer to site specific procedures for further details on proper fueling practices.

The following spill prevention measures should be implemented:

- Shut the engine off
- Place a drip tray under the equipment being fuelled
- Ensure the proper type of fuel is being used
- Stay with the vehicle or equipment during fueling operations
- Fuel tanks shall not be “topped off”
- Replace nozzle only after hose is completely void of fuel
- Return hose to its proper storage position when fueling is completed

## Hazardous Materials or Waste

- Bulk hazardous material will be stored in original labeled containers in designated locations according to manufacturer’s requirements listed on the MSDS
- Reactive chemicals are not stored in close proximity to each other
- An up-to-date list including MSDS/WHMIS sheets for chemicals stored on site will be available at all times through the Shipping and Receiving department
- Spill kits will be placed in the immediate vicinity of any hazardous materials storage area
- Waste:
  - A list of currently stored waste materials will be kept at the Hazardous Waste Transfer Site
  - Transfer of chemicals to secondary containers will follow manufacturer’s recommendations for container material and all required markings will be present on all containers
  - Removal of hazardous waste from site will be carried out by a 3rd party, Terrapure Environmental

## Storage and Segregation

Classes of incompatible chemicals should be segregated from each other during storage, according to hazard class. The segregation of incompatible materials, chemicals and wastes should prevent the

mixing of any potential spills so that the response actions are simplified in that they will have to address a single material, chemical or waste rather than a mixture that may have undesired chemicals reactions.

CFI and its subcontractors are responsible for material and chemical storage at the work site in accordance with applicable regulatory requirements that include, but are not limited to:

- Flammable and Combustible Liquids Cods (NFPA 30)
- Gasoline and Associated Products Regulations
- OHS Act and Regulations
- Fire Prevention Act and Regulations
- Propane Storage and Handling Code

### Notices, Signs and Labelling

Hazardous substances and waste storage areas will be clearly labeled with notices and signs in accordance with applicable regulatory requirements.

Labelling requirements include, but are not limited to:

- All hazardous materials must be labelled as per the WHMIS requirements
- All hazardous waste must be labelled with the Project name, date and contents
- Storage areas must contain appropriate signage

### Wastewater from Equipment Washing

- A designated equipment washing location with water catchment and treatment system shall be established
- Equipment washing will not take place within 100m of water bodies or other areas identified as environmentally sensitive
- Wash water will be captured and treated for the proper handling, treatment and disposal of these contaminated substances

### General Construction and Earth Works

a) Sediment and erosion control methods shall be utilized such as rock check dams, hydro seeding, straw bales and silt fence.

## 8.0 Spill Response Equipment

Spill kits will be distributed on the site at strategic locations. A map indicating spill kit locations around site will be kept up to date and generated to the employees (Appendix C). Each kit must be only used for the intended purpose and replenished immediately after use. At no time shall these kits be used for other storage, general maintenance clean-up or other uses.

Small spill kits will be attached to or contained inside equipment. Additional kits will be distributed to locations as tasks dictate.

Contractors should provide their own spill kits, but in the event that a CFI spill kit is used during a spill, the contents will be charged back to the contractor.

Spill kits should typically include:

1 – Polyethylene storage drum w/ cover and lever lock, printer SPILL KIT
50 – Oil absorbent pads 15”x17”
5 – 4”x4’ absorbent booms
5 – 4”x8’ absorbent booms
1 – 44L of Oclansorb pellets
5 – 4mil yellow heavy duty disposal bags
1 – Spark resistant poly-shovel
1 – Pair chemical resistant gloves

## 9.0 Spill Categorization and Reporting Requirements

Spills are classified and reported by type and volume of spilled material and impacted environment.

All spills and near misses shall be reported to the Environment Department regardless of quantity.

A preliminary spill report will be provided by the Environment Department within 24 hours of the occurrence or discovery of a spill. The report must include the date, time, location, volume, material(s) involved, clean-up actions taken, and corrective actions to prevent future occurrence.

### Regulatory Reportable Spills

*Regulatory reportable spills* include, but are not limited to:

- Spills, of any volume to water
- Releasing a substance to air, land or water that has caused, or may cause adverse effects to the environment
- Releasing a deleterious substance to the water
- Releasing >70L of gasoline or associated products to land

### Spills on Land

**a) Oil spills on land**

i) Spills must contact the soil to be reportable. Exclude spills inside lined containment or collection areas where there is no contact with soil

ii) Categorization by volume; all spills under the following categorizations are considered to be recordable:

(1) **Volume <1L**: These spills are manageable by crew, only the Environmental Department or designate needs to be contacted. Only a spill notification report is required.

(2) **Volume >1L - <70L**: Clean-up operations will be led by trained crew members. The Environmental Department shall be contacted. Other crew assistance may be utilized depending on the volume of the spill.

(3) **Volume >70L**: Clean up shall be led by trained crew members in conjunction with a 3rd party spill response subcontractor, and the St. Lawrence Fire Department (if deemed

necessary by the Supervisor, with consultation of the Environmental Department). Reportable to Canada Coast Guard and the Provincial Government.

(4) **Emergency Spill**: Generally, a spill of significant quantity which cannot be controlled or remediated by the trained personnel, or equipment that CFI has at its immediate disposal.

iii) Report the total volume in litres of oil spilled to the land, regardless of the quantity contained or recovered.

**b) Chemical spills on land**

i) Includes spills of all non-petroleum derived chemicals (ex. Xanthates, Quebracho, Dextrin, Copper Sulphate, etc.).

ii) Spills must contact the soil to be reportable. Exclude spills inside lined containment or collection areas where there is no contact with soil.

iii) Categorization by volume; all spills under the following categorizations are considered to be recordable:

(1) **Volume <1L**: These spills are manageable by crew, only the Environmental Department or designate needs to be contacted. Only a spill notification report is required.

(2) **Volume >1L - <70L**: Clean-up operations will be led by trained crew members. The Environmental Department shall be contacted. Other crew assistance may be utilized depending on the volume of the spill.

(3) **Volume >70L**: Clean up shall be led by trained crew members in conjunction with a 3rd party spill response subcontractor, and the St. Lawrence Fire Department (if deemed necessary by the Supervisor, with consultation of the Environmental Department). Reportable to Canada Coast Guard and the Provincial Government.

(4) **Emergency Spill**: Generally, a spill of significant quantity which cannot be controlled or remediated by the trained personnel, or equipment that CFI has at its immediate disposal.

iv) Report the total volume in litres of chemical spilled to the land, regardless of the amount contained or recovered.

## Spills in Water

Spills in water includes both spills directly in water, or from land to water by means of surface flow or infiltration. The scope of this section includes:

a) Marine Spills: Spills that occur at the Marine Shipping Facility.
b) Fresh Water Spills: Spills that occur in freshwater systems such as lakes, ponds, streams, and creeks
c) Potable Water Source: Spills that occur within freshwater sources that are drawn for human consumption

Trained personnel shall manage spills in Marine, Freshwater and Potable water source environments.

**a) Oil spills in water**

i) Any volume of oil spilled in water is a Recordable to CFI and a Reportable to the Canada Coast Guard and Provincial Government. The Canadian Coast Guard acts as the main

dispatcher for all government reportable spills; therefore, they are the primary contact for such spills.

ii) Spills from loading/unloading operations shall be reported consistent with the cargo custody or responsibility.

iii) Spills must contact the water to be reportable. Exclude spills inside lined containment or collection areas where there is no access to water.

iv) Categorization by volume:

(1) **Volume <159L**: Clean-ups shall be led by trained crew members, clean-up designated from the marine spill team in conjunction with a 3rd party spill response subcontractor, and the St. Lawrence Fire Department (if deemed necessary by the Supervisor, with consultation of the Environmental Department). Reportable to Canada Coast Guard and the Provincial Government.

(2) **Volume >159L**: Clean-ups shall be led by trained crew members, clean-up designated from the marine spill team in conjunction with a 3rd party spill response subcontractor, and the St. Lawrence Fire Department (if deemed necessary by the Supervisor, with consultation of the Environmental Department). Reportable to Canada Coast Guard and the Provincial Government.

(3) **Emergency Spill**: Generally, a spill of significant quantity which cannot be controlled or remediated by the trained personnel, or equipment that CFI has at its immediate disposal.

v) Report the total volume in litres of oil spilled in water, regardless of the quantity contained or recovered.

**b) Chemical spills in water**

i) Any volume of chemical spilled in water is seen as a Recordable to CFI and a Reportable to Canada Coast Guard and Provincial Government. The Canadian Coast Guard acts as the main dispatcher for all government reportable spills; therefore, they are the primary contact for such spills.

ii) Includes spills of all non-petroleum derived chemicals (ex. Xanthates, Quebracho, Dextrin, Copper Sulphate, etc.).

iii) Spills must contact the water to be reportable. Exclude spills inside lined containment or collection areas where there is no access to water.

iv) Categorization by volume; all spills under the following categorizations are considered to be recordable:

(1) **Volume <159L**: Clean-ups shall be led by trained crew members, clean-up designated from the marine spill team in conjunction with a 3rd party spill response subcontractor, and the St. Lawrence Fire Department (if deemed necessary by the Supervisor, with consultation of the Environmental Department). Reportable to Canada Coast Guard and the Provincial Government.

(2) **Volume >159L**: Clean-ups shall be led by trained crew members, clean-up designated from the marine spill team in conjunction with a 3rd party spill response subcontractor, and the St. Lawrence Fire Department (if deemed necessary by the Supervisor, with

consultation of the Environmental Department). Reportable to Canada Coast Guard and the Provincial Government.

(3) **Emergency Spill**: Generally, a spill of significant quantity which cannot be controlled or remediated by the trained personnel, or equipment that CFI has at its immediate disposal.

v) Report the total volume in litres of chemical spilled in water, regardless of the quantity contained or recovered.

**c) Sediment spills in water**

i) A concentration of sediment spilled to water exceeding 30 mg/L (noticeably murky discolouration) is seen as a Recordable to CFI.

# 10.0 Spill Response

## First Response Actions

### Witness

In the event of a spill, the witness shall do the following:

b) Locate the origin of the spill
c) Evaluate the personal risk for health and safety
   - Review MSDS or workplace labels if required
   - Ensure appropriate PPE is worn
d) If safe to do so, stop the source and contain the spill including stopping defective equipment, upturning containers, using spill kits and plugging holes
e) Inform work area supervisor

### Supervisor

The supervisor shall:

a) Evacuate personnel from the immediate work area, if necessary
b) If a spill occurs near water, equipment should be safely moved away, and a barrier installed to contain spilled material
c) Prevent spill from continuing if possible
d) If the incident is manageable, call the Environment department and report the situation

### CFI Environment Department

The Environment Department representative shall receive spill information from the work area supervisor and contact the additional personnel that require involvement.

## Emergency Spill Response Threshold

The evaluation process is primarily qualitative in nature and must be conducted by trained personnel who are familiar with all parameters identified below. This evaluation process is conducted by the immediate supervisor or Environmental technician on scene. The following criterion shall be used to evaluate the severity of a spill.

- Quantity of spill: generally, a spill quantity greater than 70L
- Area affected: footprint of the area affected by the spill
- Nature of hazardous material spill: toxicity, persistence, biodegradability
- Mobility: is the hazardous material a solid or liquid state
- Spill location: is the spill on land or on water
- Spill environment: is the spill in a marine environment (ocean), freshwater environment (lake, pond, stream etc.), or in a potable water source (ex. John Fitzpatrick Pond)
- Available resources: equipment, personnel and spill kit material on hand

### Third Party Spill Response Contractor

In the event that a hydrocarbon spill that may require considerable resources over an extended period occurs, the engagement of a CFI approved response organization shall be utilized for the project.

This arrangement is not in place at this time.

## 11.0 Spill Response Investigation

### General

Following clean-up and notification of a reportable spill, the Environmental Technician will conduct a debriefing with all personnel involved in the spill and the corresponding response. The debriefing will include a review of the following:

b) Root cause of the spill
c) Measures to be implemented to prevent a re-occurrence
d) Review with associated personnel
e) Suggestions for how response could have been improved

### Report Form

All spills will be documented by the Supervisor or Environment personnel using the Spill Report Form located in Appendix B and submitted to the Site Environmental Technician within 12 hours of the spill. This report will include information on the cause of the spill and events leading up to it. The type and volume of the substance spilled will be noted. Details of the containment, clean-up disposal and restoration operations will be provided. Photographs will be included as part of the report together with records of notifications, and decision made.

### Environmental Effects Monitoring (EEM)

Following a spill, Environmental Effects Monitoring will be established and undertaken under the direction of the Environmental Technician. Specifics of the monitoring will be planned proportionate to the seriousness and likelihood of the event. Monitoring will establish:

- Effectiveness of spill containment
    - Habitat and wildlife effects

  - Unforeseen spill trajectory or effects
- Effectiveness of spill remediation
  - Restoration of spill site
  - Status of area immediately surrounding site
  - Follow-up of contaminated material removal
- Effectiveness of spill investigation and change implementation
  - Local situations that could produce a similar spill
  - Management and planning for prevention

APPENDIX A – EMERGENCY SPILL RESPONSE CONTACT INFORMATION

| HSE | | |
|---|---|---|
| **Name:** | Phone Number(s): | Email: |
| Peter Hennebury | Cell: 709-277-4869 | phennebury@canadafluorspar.com |
| Anna Warren | Cell: 709-277-5149 | awarren@canadafluorspar.com |
| Josephine Appleby | | jappleby@canadafluorspar.com |
| Natalie Coombs | | ncoombs@canadafluorspar.com |
| Devin Maher | | dmaher@canadafluorspar.com |

| Security | | |
|---|---|---|
| **Name:** | Phone Number(s): | Email: |
| Security Office | Landline: 709-873-3331 Ext. 135<br>Cell: 709-277-4816 | security@canadafluorspar.com |

| Environment | | |
|---|---|---|
| **Name:** | Phone Number(s): | Email: |
| Shelly Adams | Cell: 709-277-4204 | sadams@canadafluorspar.com |
| Gillian Lambert | Cell: 709-873-8300 | glambert@canadafluorspar.com |

APPENDIX B – SPILL REPORT FORM

| CFI Initial Spill Report Form | |
|---|---|
| Date: | Time (Current): |
| Weather Conditions: | |
| Reported by (Name/Company): | |
| Occupation: | |
| Time in Industry: | |
| Time with Company: | |
| Time on Project: | |
| Rotation? (5-2, 7-7, 10-4, 14-7) | |
| # of Days into Rotation: | |
| Supervisor: | |
| Time in Industry: | |
| Time with Company: | |
| Time on Project: | |
| Witnesses: | |
| Equipment involved: | |
| Reason for spill: | |
| Date/Time of spill: | |
| Location of spill: | |
| Type of material spilled: | |
| Estimated quantity: | |
| Is there any risk to the environment? (e.g. near any body of water, near ore, weather conditions (rain), etc.) | |

| |
|---|
| Description of Event (Activity/Job Task - Who, What, When, Where, Why, How): |
| Actions Taken |
| To contain/clean-up spill: |
| To remove contaminated material/materials used during clean-up efforts: |
| To prevent reoccurance: |

**The information relayed above is complete and true to the best of my knowledge.**

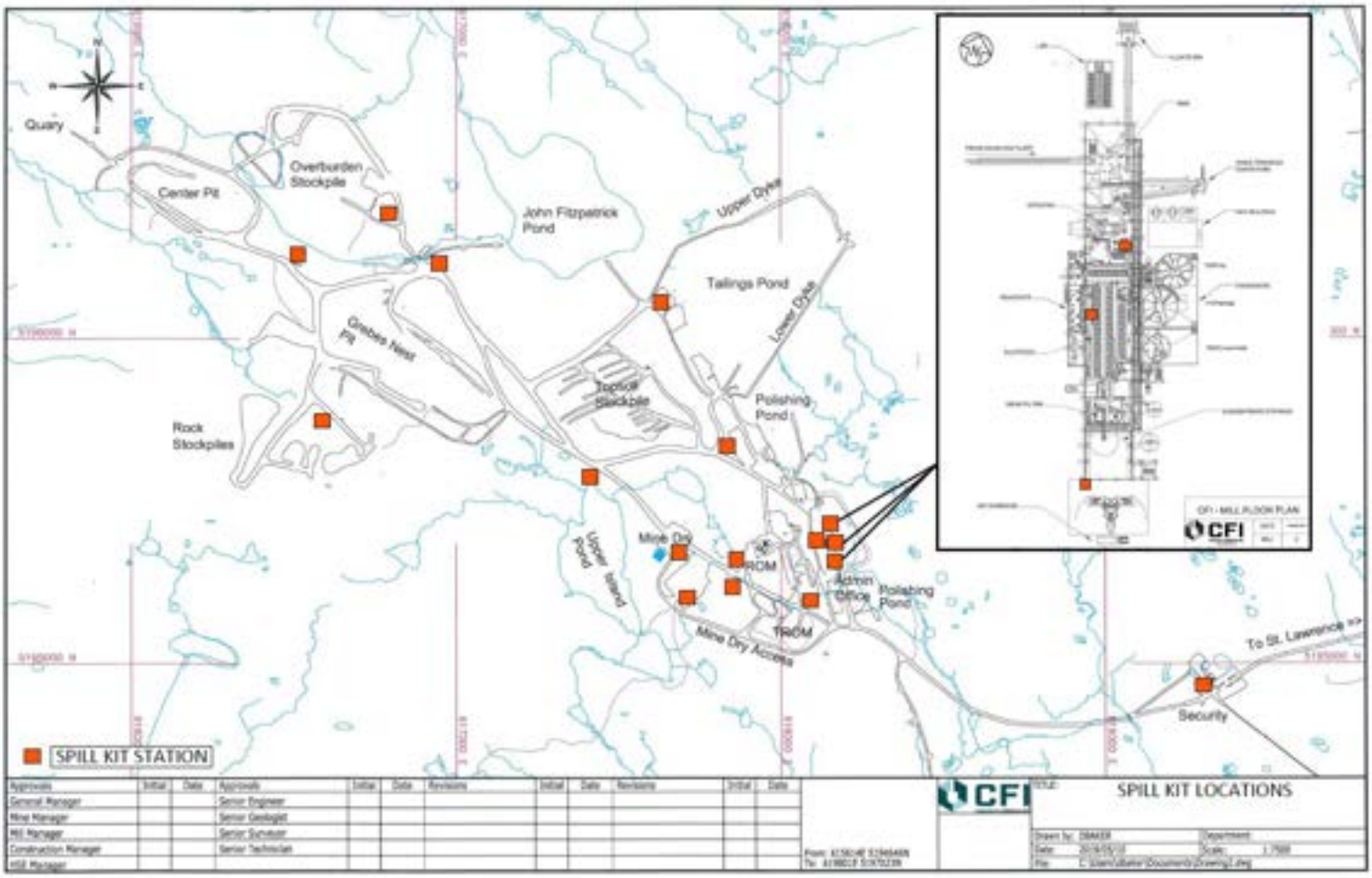
**Employee Signature:** _____

**Supervisor Signature:** _____

**Interviewer Signature:** _____

**If there is a spill, please complete this form and pass in to the Environmental Department. Please ensure that any spill, regardless of quantity is reported to the Environmental Department as soon as possible after discovery. Gillian Lambert 1-709-873-8300** Version 2

APPENDIX C – SPILL KIT LOCATIONS


Quary
Overburden Stockpile
Center Pit
John Fitzpatrick Pond
Upper Dyke
Tailings Pond
Lower Dyke
Grebes Nest Pit
Topsoil Stockpile
Polishing Pond
Rock Stockpiles
Upper Island Pond
Mine Dry
ROM
Admin Office
Polishing Pond
TROM
Mine Dry Access
To St. Lawrence =>
Security
SPILL KIT STATION
SPILL KIT LOCATIONS

# Appendix 2-10: Mineral Resource Report

# MINERAL RESOURCE ESTIMATE
# FOR THE
# SAINT LAWRENCE FLUORSPAR PROJECT,
# NEWFOUNDLAND, CANADA

by

Adam Wheeler and Mark Owen

December 2023

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# 1 SUMMARY

## 1.1 Scope of Work

This report is presented to Canada Fluorspar Inc. (CFI), by Adam Wheeler (of Adam Wheeler Mining Consultant Limited), with additional contributions by Mark Owen, an independent mining geologist. The report provides updated mineral resource estimations for four deposits that lie within the CFI St. Lawrence Fluorspar Project.

The work undertaken is outlined as follows:

- **Resource Estimation** of the Arthur Gordon Stollery (AGS) Deposit, the AGS North (AGSN) Deposit, the North/South Ridge (NS) Deposit and the Tarefare (TF) Deposit.
- **Site Visit** undertaken by Adam Wheeler from 7th to 12th August 2023; so as to understand the project itself, and the data and information available.
- **Report Preparation**, so as to present all information and methods for resource estimation. This report also includes our comments on any potential problems with the Project, with respect to all aspects of resource estimation.
- **Data Transfer** of the updated resource block models and related data, that will be subsequently used for open pit and underground mine planning purposes.

At the time of the visit, mining and mineral processing operations are suspended and only a small number of personnel were present, with the mine in care and maintenance. Mr. Wheeler visited all relevant project areas, which included a review of various drill hole locations, open pit workings, fluorspar outcrops and core storage facilities. Mr. Wheeler reviewed selected drill core intersections from 2019 to 2021 AGS drill programs and the 2019 North/South Ridge South drill program. No independent samples were collected during Mr. Wheeler's August 2023 site visit.

This work follows on from the previous work done by SLR Consulting (Canada) Ltd, Toronto (SLR), who were retained by Canada CFI to prepare an independent NI 43-101 Technical Report (15 June 2022) on the St. Lawrence Fluorspar Project.

## 1.2 Property Description

The Property is located at the southern tip of the Burin Peninsula, Newfoundland, Canada, adjacent to the Town of St. Lawrence and 350 km southwest (by road) of St. John's, Newfoundland. The Property is situated approximately 210 km (straight line) southwest of St. John's, within Electoral District 23 (Grand Bank). The claim lands surrounding The Property are owned by Puddle Pond Resources, Precipitate Gold Corp. and various prospectors.

Underground mining operations at site started in 1933, then stopped in 1978. From 1986 to 1990, Minworth restarted operations with underground mining of Blue Beach and open pit operations in Tarefare and North/South Ridge veins. Open pit mine operations began here in 2017 and continued until operations were suspended in February 2022. Canada Fluorspar Inc (CFI) is a wholly owned subsidiary of Fluorspar Holdings PTE Ltd, Singapore. The old CFI operation was purchased by Fluorspar Holdings PTE Ltd in June 2023 and an infill exploration program is now planned to confirm and expand the inventory of geological resources. Fluorspar

Holdings PTE Ltd is controlled by AMED Capital, and is supported by AMED Funds, a private equity fund incorporated in Luxembourg."

## 1.3 Geology

The CFI deposits are hosted by the St. Lawrence Granite (SLG), rhyolite or meta-sedimentary units. The SLG was formed within the Avalonian belt of the Appalachian Mountain system in eastern Newfoundland. The AGS Deposit was discovered in 2013. The AGS Deposit consists of over 60 individually interpreted veins over a strike length of 1,200m. Diamond drilling encountered various absent intervals (recorded as 'void'), which with subsequent mining were shown to be parts where fault gouge had been washed out. This clay material led to problems with mining and processing.

The AGS North Deposit, previously known as Mine Cove, is located about 1km north of the AGS deposit. It was discovered relatively recently in 2019. It is also hosted in meta-sediments and rhyolite. It is dominated by two veins which are approximately 900m long.

The North/South Ridge (NS) Deposit is dominated by a single fluorspar vein/zone with four minor splays and is hosted in the St. Lawrence Granite (SLG). The main vein is oriented at an azimuth of approximately 320° and has a strike length of approximately 3,000m. The deposit has been subject to historical underground and limited open pit mining in the northern two-thirds of the deposit.

The Tarefare (TF) Deposit is dominated by a main fluorspar vein which is 1,900m long, hosted by SLG. There are also 3 three other smaller veins. It has also been mined in the past, from underground.

Collectively, these four deposits occupy an overall area of ground covering approximately 6 km x 4 km.

## 1.4 Drilling and Exploration

Historically, fluorite mineralization in the St. Lawrence area has been associated with the granite batholith and past exploration has been directed toward areas known to be underlain by granite. All of the four deposits described in this study have been primarily sampled by surface diamond drilling, augmented by underground sample data and limited surface trench samples. The drillholes on all the four deposits are summarised in Table 1-1.

**Table 1-1. Summary of Drillhole Data**

| Deposit | Holes | Total Length | Avg. Length | Holes Sampled | Length Sampled | Number of $CaF_2$ Samples | Proportion of Holes Sampled |
|---|---|---|---|---|---|---|---|
| | | m | m | | m | | % |
| **AGS** | 365 | 65,282 | 179 | 316 | 8,306 | 9,514 | 87% |
| **MS** | 118 | 17,009 | 144 | 49 | 940 | 1,012 | 42% |
| **NS** | 102 | 15,187 | 149 | 84 | 1,488 | 1,570 | 82% |
| **TF** | 77 | 25,120 | 326 | 65 | 529 | 831 | 84% |
| **Total** | **662** | **122,598** | **185** | **514** | **11,263** | **12,927** | **78%** |

Between 2012 and 2019 there were four ground and airborne geophysical surveys, which were integral in the discovery of the AGS and AGS North deposits. At the AGS deposit, there were a series of surface drilling campaigns from 2013 to 2021.

For the NS deposit, drilling in 2019 and 2020 focussed on the relatively undeveloped south extent of the deposit over a strike length of approximately 1,000m. Current Mineral Resource estimates for the deposit include drill information up to 2019.

The Tarefare evaluation is based on drilling up to 2008.

## 1.5 Database

For all of the deposits, sample data was transferred in the form of Excel spreadsheets. Collar coordinates and topography have been as, or have been transformed into, UTM (NAD 83) coordinates. The supplied topographies have been updated using 2023 drone surveys. For the NS and AGS deposits, data has also been supplied for the historical underground workings.

All of the supplied sample and topographical data have been imported and the subsequently processed using the Datamine mining software system. Data from previous estimation work has also been imported from Geovia GEMS mining databases. These data included wireframe and block models.

The imported drillhole collars have been verified by reference to example drillhole collars measured by GPS during the site visit, as well as by comparisons with topographical data. The desurveyed drillhole data and channel sample data have also been referenced to previous cross-sections and, where available, underground survey data.

QAQC information has been collated from previous reports by RPA (2011) and SLR (2022), as well as by discussion with CFI geologists still working with the project. QAQC programs have been implemented in all diamond drilling programs since 2008.

The majority of $CaF_2$ assaying for drillhole samples since 2011 has been completed either by Dual Calcium Titration (DCT) or by Ion Selective Electrode (ISE) determination. This has been done by SGS Lakefield or Eastern Analytical. An on-site laboratory run by CFI used the Nuclear Magnetic Resonance (NMR) technique. This provided a relatively rapid method of analysis. Although this was also used for assaying of drillhole samples for 2016-2017, these assays were subsequently replaced by data assayed using ISE, from a resampling program, due to some discrepancies apparent with the use of NMR for lower (<10% $CaF_2$) grades.

Since 2019, drillhole samples have also been assayed for $CaCO_3$, and carried through to resource estimation.

Downhole surveys were completed using the Flexit system, with measurements of the hole inclination and azimuth taken at the collar and then at approximately 50m intervals down the hole. The deepest holes have been approximately 500m.

During 2014-2015, Itasca Consulting Canada (Itasca) completed a geotechnical study using selected AGS holes. In the same period Acoustic Televiewer (ATV) and Optical Televiewer (OTV) surveys were completed for 13 AGS holes, in order to help develop a geomechanical model for future mine planning.

## 1.6 Mining

In the previous era of open pit production, ore was hauled to ore stockpiles located at the AGS Process Plant, and then loader-fed to the crusher. Previously, the presence of clay in the ore proved difficult for mineral processing and the initial bulk blasting techniques resulted in a high degree of clay contamination. This was due to a lack of a systematic grade control (GC) program, which therefore did not allow modelling of these features and corresponding assistance in short-term planning. Ore blending of material with high and low clay content appears to be very important to the success of the operation.

Before suspension of operations in February 2022, separate ore/waste blasts were initiated, so as to provide the process plant with feed with lower clay content.

Open pit grade control involved the following steps:

- Ore and waste contacts were marked in the field, from the observed bench floor geology;
- Post-blasting ore sorting occurred under the direction of the grade control geologist, from visual examination, producing separate ROM stockpiles containing four different grade categories;
- Any ore with high clay content was placed in a separate stockpile;
- Mill feed material was determined by blending from these stockpiles, based on the visual grade estimates, then confirmed and adjusted based on crushed mill feed samples,to obtain the preferred grade range (19% $CaF_2$ to 23% $CaF_2$); and
- High-clay-content ore was blended as a controlled, small component of the overall blend. This type of management of high-clay ore feed may mitigate the need for feed washing operations in the future., along with the implementation of a GC drill program and structural modelling of significant features.

## 1.7 Mineral Processing

The existing process plant began operation in late 2018. Recovery fluctuated between 40-75% during the following three years. Lower recoveries were partially attributable to poor plant performance, resulting from frequent shutdowns caused by equipment reliability issues. This occurred particularly during early operations in 2019 and in the winter period, in addition to the consequent inability to operate the plant consistently to allow for process optimisation. Many problems were due to excessive clay material being fed in with ore. This is due to fault gouge material, which is discussed in more detail in Section 5.4.2. There was also total lack of maintaining quality control (QC) of the process water since the concentrator was not equipped with a water treatment plant. Also, a lack of automation systems within the plant exacerbated the challenges of maintaining stability within the floatation circuits.

In 2019 and 2020, approximately 150,000t of high grade, clay-bearing ore was selectively stockpiled and reprocessed through a rented and CFI operated wash plant. The washed product was blended with Run-of-Mine (ROM) ore, crushed, and re-introduced into the process plant feed. CFI noted general improvements in plant performance during this trial. However, this additional pre-concentration process was not retained as a permanent feature of the processing plant.

Concentrate grades have varied between 96.6% and 97.8% $CaF_2$. The recovery became more consistent over the last 6 months of 2021. A concentrate grade of 97.5% $CaF_2$ was the target product grade.

Early process plant production was constrained by equipment reliability issues; however, the implementation of a planned maintenance system in early 2021, as well as efforts to address bottlenecks, resulted in improved availability and throughput. In 2021, 930Kt of ore was processed, producing 137 Kt of concentrate.

## 1.8 Mineral Resource Estimation

A computerised block modelling approach has been applied for resource estimation. Mineralised vein wireframe envelopes have been updated with reference to previous interpretations, based on a cut-off of 5% $CaF_2$. This cut-off level stems from parameters developed from previous experience, updated with current studies and specifically focussed on potential open pit mining.

Samples were selected inside these interpretations, and statistics analysed. In all of the deposits analysed here, the $CaF_2$ grade populations generally appear to form three approximate groups: internal waste, low grade and high grade material, split according to the $CaF_2$ grade distributions for each zone. These grade categories, along with the vein structures, were used to control subsequent modelling and grade estimation. Capping levels were assessed by vein and applied prior to compositing the data to 1m lengths.

Geostatistical analysis was used to assist with the setting of estimation parameters and resource category criteria. Primary block model grades of $CaF_2$ and $CaCO_3$ were estimated using Ordinary Kriging (OK). Grades were also estimated using Inverse Distance Weighting (IDW2) and nearest neighbour estimation (NN) for validation purposes.

Separate resource block models were developed for each deposit, based on parent blocks of 10m x 10m x 10m. Internal sub-cells with a cross-strike length of 2m were used for the modelled veins. Model rotation was applied to each deposit, so that blocks were aligned along-strike, with respect to the local veins' general orientation. Previously mined blocks were assigned with a mined flag.

For modelling and mine planning purposes, the elevation coordinates of all drillholes and modelling data have had 1000m added to them, so that all the model and resultant pit bench elevations are positive. This elevation shift has been applied to all of the resource models described in this report.

Resource classification risk matrices were developed for each deposit and used to help develop and apply resource classification criteria.

## 1.9 Mineral Resource Statement

CIM (2014) definitions have been used for Mineral Resources. The reported mineral resources, amenable to open pit mining, in this statement have been constrained within optimised pit shells. For each deposit area, the optimisation has been run with both Indicated and Inferred resources enabled. A summary of the combined mineral resources for the 4 deposits covered in the current study is shown in Table 1-2. A relatively optimistic $CaF_2$ price was applied in the resource calculations, so as to capture all potential mineral target areas that could feed into a project delivery pipeline for the next 20-30 years.

**Table 1-2. Summary of Constrained Open Pit Resources - Combined**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | *Indicated* | | | *Inferred* | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| AGS | 7,459 | 25.2 | 7.6 | 1,443 | 22.3 | 4.5 |
| AGSN | | | | 1,325 | 20.6 | 9.9 |
| NS | 1,579 | 23.5 | 1.7 | 288 | 20.0 | 1.5 |
| Tarefare | 744 | 45.1 | | 1,003 | 48.4 | |
| **Total** | **9,782** | **26.5** | **6.1** | **4,059** | **28.0** | **4.9** |

**Notes:**

- **The Mineral Resources reported above are within optimised pit shells, based on a concentrate price of $550/t $CaF_2$ Conc.**
- **Resources reported above are undiluted, with no mining factors.**
- **It is considered that these resources have reasonable prospects for economic extraction.**
- **Cut-off applied = 5%$CaF_2$.**
- **Tonnages and grades are rounded appropriately.**
- **Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

**Table 1-3. Summary of Potential Underground Resources - Combined**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | *Indicated* | | | *Inferred* | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| AGS | 1,800 | 29.8 | 12.1 | 3,704 | 31.8 | 10.2 |
| AGSN | | | | 449 | 22.7 | 13.8 |
| NS | 808 | 59.5 | 2.0 | 3,116 | 45.2 | 1.9 |
| Tarefare | 1,018 | 47.5 | | 3,988 | 48.1 | |
| **Total** | **3,626** | **41.4** | **6.4** | **11,258** | **40.9** | **4.4** |

**Notes:**

- **The Mineral Resources reported above are below the optimised pit shells.**
- **Resources reported above are undiluted, with no mining factors.**
- **It is considered that these resources have reasonable prospects for economic extraction.**
- **Cut-off applied = 15%$CaF_2$.**
- **Tonnages and grades are rounded appropriately.**
- **Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

## 1.10 Conclusions

The conclusions of this MRE can be summarised as follows:

- Updated resource block models have been developed for the AGS, AGS North, North/South Ridge and Tarefare deposits, which provide a reasonable basis for the calculation and declaration of mineral resources, classified according to CIM (2014) definitions.

- These block models are suitable for use in open pit and underground mine planning, such that mining reserves can be calculated.

## 1.11 Recommendations

### 1.11.1 Drilling

**North/South Ridge Drilling.** The North/South Ridge's deposit is open to the south-east and to depth, so in the future, further follow-up drilling is recommended in these directions, for resource expansion. [Future]

**Geotechnical Drilling.** At the current time there seems to be hardly any holes angled outwards into the probable pit wall areas. In the future, it is recommended that such holes are considered to assist with geotechnical modelling. [Future]

**Triple Tube Drilling.** The use of Triple Tube diamond drilling should be considered, to improve the core recovery and reduce losses associated with fault zones. Data from this would also help with modelling and prediction of fault clay gouge zones. [Future]

**Possible RC Drilling.** To improve speed and to reduce drilling costs, the use of RC drilling to the top of initial vein intersections, followed by diamond drilling, should be considered in the future. This could be particularly useful for planned deeper holes. [Future]

### 1.11.2 Drillhole Logging

**Logging**. Future drillhole logging should include additional mineralogical investigation, including mineralisation grain size distribution; vein mineralogy and morphology; composition of gangue minerals and ratio of vein to gangue; and the proportion of clay gouge. This will allow a better understanding of the ore composition and grade distribution, prior to milling. [Current]

**Recovery Logs.** Total core recovery (TCR) for all drilling and entered/converted into digital form. In addition, specific recording of solid core recovery (SCR) for all drilling should be logged for any new drilling. This is related to the proportion of core with an intact core diameter. [Current]

**Lithology.** A rigidly applied lithology/structural code should be entered, where possible for all core, so as allow future modelling/estimation of fault/rubbilised zones. [Current]

**Mineralisation**. Currently there are no logged codes recorded for the type of mineralisation e.g. Blastonite/Nodular/Banded veins. Discussion is required between mineral processing and geological personnel, to determine if such mineralisation information would be useful for processing purposes, and how feasible it is to code the drillhole data in this way, leading onto modelling, and subsequent use in mine planning. [Current]

**Blasthole Logging.** In future pit production, logging of blast holes should be considered to help identify changes in the nature and dip of the veins, and thickening/ thinning in order to adjust ore/waste layouts and related blast hole patterns. Faults and clay gouge intersections should also be recorded. Use of UV light would also help with this type of logging. For example, in tungsten (scheelite) open pit operations, it is common practice to use UV light to assist with blasthole logging. [Future]

### 1.11.3 Sampling

**AGSN Sampling.** The 2022 drill program was halted at the time of suspension of operations. Sample analysis was stalled at that time but has recently been restarted in September 2023. It is recommended that these outstanding holes' samples assayed as soon as possible. The assays need to also include Pb and Zn. [Current]

**Pb/Zn Assays.** It appears Pb/Zn need to be considered as important deleterious elements with respect to $CaF_2$ concentrates. It is therefore important that the resource models are updated in the future to also Pb/Zn estimates. Any Pb/Zn assay available needs to be also collated and added to the master database. All exploration drilling in the future, as well as blastholes, needs to be assayed for Pb and Zn. [Current]

**Sampling Low Grades.** It is an international standard that all core runs through the mineralised section of each hole, regardless of anticipated grade or quality of recovery, should be sampled where possible. It must be highlighted that sample gaps can result in over-estimation of grade as a consequence. [Current]

**Sampling Review.** Where possible, all core should be reviewed again, with any un-sampled sections being assayed to improve assay profiles of the lower grade material., and lost core intervals marked as such. [Current]

**Blasthole Sampling.** In future pit production, blasthole sampling should also be considered, to augment and improve geological interpretation from bench floor mapping. QAQC controls should also be applied to these samples. For a fast assay turnover, it may be better to refurbish the on-site laboratory for the analysis of blasthole samples. [Future]

### 1.11.4 Density

**Density Database.** An improved density measurement database needs to be created, so that coordinates and grades can be cross-referenced. Any unreliable values should also be flagged as such, with reasons. [Current]

**Density Measurements.** Density measurements in the future should make use of a cellophane wrapper on whole core density billets. This will allow for any potential vugs present. Density measurements of at least 1 every 10m in recommended in external waste. [Future]

**Density Sample Coverage**. The number of density measurements taken for vein material is very small. It is recommended that many more density measurements are taken so that average density values can be determined by individual vein structures, and for very large veins, local density variations can be reflected in the block models. As a minimum, density values should be obtained spaced at least 100m apart horizontally and vertically per vein. [Future]

**Fault Modelling**. In connection with more detailed logging and fault and clay gouge structures, it is recommended that such faults are taken into account in the assignment of resource model densities. [Current]

**Core Box Weights.** In future drilling campaigns, it would be useful to also record overall core box weights, prior to any sampling, with overall FROM/TO measurements for the start and end downhole distances of each box. These data are also very useful with respect to density variations and core recovery. [Future]

### 1.11.5 QAQC

**Preparation.** As previously, exploration samples' preparation and assaying should be completed by a proprietary lab company. [Current]

**Standards.** [Current]

- Any on-site prepared samples should be externally certified.
- If reference standards cannot be certified, then standards should be obtained by outsourcing.
- Additional low grade (<10% $CaF_2$) samples should be prepared. This should give an overall suite of 3 types of Certified Reference Materials (CRMs): low, medium and high grade.

**Reports.** QAQC results should be regularly reported, and any failures or controls' insufficiencies rectified. If results are checked as they are received, and reported monthly, that would be sufficient. [Current]

**Controls**. Pulp duplicates and fine blanks should also be requested and reported as part of the QAQC procedure. An overall insertion rate of all QAQC controls of at least 20% is recommended. Each hole should also have at least one set of QAQC controls. [Current]

**Twin Holes.** To drill some twin-holes in NS and TF, so as to help verify the historical data being used at these deposits. [Future]

### 1.11.6 Database

**Database Update.** An updated master database needs to be created. Logging dates, assaying dates, assay types and assaying companies also need to be referenced. It is also needs to record where and when sample preparation was done, and flagged if any sample has been superseded by subsequent re-assaying, i.e., it must be easy to filter the database to retrieve current finally accepted assay results. [Current]

**Removal of Zeros**. Anything assayed with results below the level of detection should be recorded in the database with some clear code, like 'TR', or -1, meaning trace. Assay results recording zeros should not exist, as they create confusion. [Current]

### 1.11.7 Modelling

**Fault Modelling**. To further assist with the prediction and handling of potential gouge problems, it is recommended that previous bench floor mapping data be collated and combined with fault intersection data from exploration drilling. These data sets can be used to attempt fault modelling or flagging of the resource block models with respect to the probable fault intersection occurrence. [Current]

**North/South Ridge's Fault Modelling**. Modelling of this fault, relative to the NS vein, would be very useful. [Future]

**Geological Modelling**. More detailed work should consider the existence of payshoots related to "pinch and swell" structures. For NS and TF, this will require review of underground sampling

and geological mapping, so that any dip and dip-directions can be established. Improved lithological models are also recommended for all deposits. [Future]

**Underground Mine Plans/Sections**. Available data from underground geological and interpretation need to be collated, to assist with structural interpretation and improve any associated geological models. Just recently, more historical plans have been found, which were archived by the government in St Johns. A brief review of these plans has revealed considerably more information than currently held digitally by CFI. [Current]

### 1.11.8 Other

**Core Storage Security**. At the current time, the core storage area is within a lockable boundary. It is highly recommended that all of the core storage area is within a lockable fence and is regularly checked by security staff. As the primary source of data associated with the resources, not having these facilities secure could be assigned as a Fatal Flaw in any external audits. [Current]

**Winterization**. Full winterization of outside conveyors and belt scrapers. [Future]

**Exploration**. The identification of future exploration targets should use results supported by previous geophysical exploration. [Future]

**Tailings**. A lower cut-off is now being considered for open pit mine planning, with corresponding processing improvements to treat lower grades. With lower grades potentially being economic, it is possible that some of the old tailings (wherever they are located), resulting from underground mining at much higher cut-offs, could now be retreated profitably. It is therefore recommended that the tailings should be considered as a potential resource and should be drilled so as to evaluate it. This will probably require triple-tube or sonic drilling. [Future]

**Metallurgical Testing.** Testing of lower grade material is recommended, to verify that the resource cut-off being applied (5% $CaF_2$) is justified. At the current time, global processing recovery figures have been applied in the cut-off calculation, irrespective of feed grade. [Current]

# 2 INTRODUCTION

## 2.1 Terms of Reference

This Technical report was prepared so as to provide an updated resource estimation for CFI. It is not an NI 43-101 report and should therefore not be used for publication of updated resources in the public domain. However, all of the chapters shown in this MRE are compliant with CIM definitions and Guidelines, and so can be used within directly with an NI 43-101 document. The other chapters required to qualify as an NI 43-101 document would be related to Mineral Processing, Project Infrastructure and Environmental Studies, as well as Reserve Estimation and Economics if the 43-101 was to include Reserves as well.

This report was prepared by Adam Wheeler, along with assistance from Mark Owen. Adam Wheeler visited the site during August 2023.

## 2.2 Sources of Information

In conducting this study, Adam Wheeler has relied on data, reports and information connected with the CFI Project. The information on which this report is based includes the references shown in Section 12.

Adam Wheeler has made all reasonable enquiries to establish the completeness and authenticity of the information provided, and a final draft of this report was provided to CFI, along with a written request to identify any material errors or omissions prior to finalisation.

## 2.3 Units and Currency

All measurement units used in this report are metric, and currency is expressed in US Dollars unless stated otherwise.

## 2.4 Reliance

Adam Wheeler has reviewed and analysed data provided by CFI and has drawn his own conclusions therefrom. Adam Wheeler has not performed any independent exploration work, drilled any holes or carried out any sampling and assaying.

While exercising all reasonable diligence in checking and confirmation, Adam Wheeler has relied upon the data presented by CFI, and previous reports on the property in formulating his opinions.

Title to the mineral lands for the CFI property has not been confirmed by Adam Wheeler and Adam Wheeler offers no opinion as to the validity of the exploration or mineral title claimed.

## 2.5 Declaration

Adam Wheeler and Mark Owen have received fees for the preparation of this report in accordance with normal professional consulting practice. This fee is not contingent on the outcome of this report, and Adam Wheeler will receive no other benefit for the preparation of this report.

Adam Wheeler has no shareholding in the Company, the Exploration Assets or advisors of the CFI company. Consequently, Adam Wheeler considers himself to be independent of the Company.

## 2.6 Disclaimer

Adam Wheeler has based this technical report on information provided by the Company and information collected first-hand. Adam Wheeler has not undertaken any detailed investigations into the legal status of the Project nor the Company.

Adam Wheeler is not aware of any other information that would materially impact on the findings and conclusions of the MRE or this report.

## 2.7 Qualifications

Adam Wheeler is a professional Fellow (FIMMM) in good standing of the Institute of Materials, Minerals and Mining. He has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking as a Qualified Person (“QP”). Adam Wheeler has more than 40 years' international experience in the field of resource and reserve estimation.

# 3 PROPERTY DESCRIPTION AND LOCATION

## 3.1 Location

The Property is located at the southern tip of the Burin Peninsula, Newfoundland, adjacent to the Town of St. Lawrence and 350km southwest (by road) of St. John's, Newfoundland. The Property is situated approximately 210km (straight line) southwest of St. John's, within Electoral District 23 (Grand Bank). Currently, the lands surrounding the Property are predominately held by Puddle Pond Resources, Precipitate Gold Corp. and various prospectors.

## 3.2 Land Tenure

SLR (2022) describes the land tenure in detail and concludes that SLR is not aware of any environmental liabilities on the Property. CFI has all the required permits to conduct the proposed work on the Property. SLR was not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the Property.

*Comment: To the best of his knowledge the author of this report (December 2023) is not aware of any changes in Land Tenure to the findings reported in NI 43-101 2022 report by SLR.*

# 4 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

## 4.1 Climate

The climate in south-eastern Newfoundland is characterized as northern Atlantic, with short summer seasons and long winters from November to April. The mean temperature during the winter months is - 5°C, ranging from 0°C to -18°C, and the mean temperature during the summer months (from May to September) is 10°C, ranging from 5°C to 24°C. The average annual precipitation ranges from 140cm to 180cm (Environment Canada, 2005). While exploration in the St. Lawrence area is affected by the typical seasonal climatic variations, drilling may be carried out throughout the year. Fog is common along the south coast of the Burin Peninsula throughout the year, particularly in late spring and early summer.

*Comment: Clearly the temperature in winter is severe over short periods and can significantly impact the production schedule during extreme cold conditions. Disruption to the drill-blast and haul equipment and operation, storage and office buildings, mill facility including conveyors, port loading conveyors and docks can be mitigated by fully winterising the operation. It is recommended that this situation should be rectified prior to restart of production.*

## 4.2 Physiography

Topographic elevations over the property range from approximately sea level to 100MASL, with the Property laying within an area of low to moderate relief. The Project area hosts many lakes and sparse coniferous forest, with locally abundant outcrops. Vegetation consists predominantly of black spruce, balsam fir, and tamarack trees, all of which are typical of the Appalachian Region in Newfoundland. Outcrop areas are flanked by glacial till or boulder fields. Outcrop exposure is scarce inland from the coast and is generally restricted to areas of topographic highs, brooks, and road cuts.

Overburden cover ranges from 1.0m to 5.0m, locally exceeding 30m. Approximately 90% of the Project area is treeless; however, much of the landscape comprises numerous marshes and peat bogs. Drainage is poor with terraced bogs and occasional small brooks draining southward into the ocean. Land in the Project area is not used for agriculture or trapping. Wildlife in the area includes moose, coyotes, foxes, bears, rabbits, lynx, and various species of birds.

*Comment: Fortunately, it appears that this glacial terrain does not affect soil geochemical sampling as a tool to detect anomalous targets. Therefore, this is an attractive method for future regional exploration.*

# 5 GEOLOGICAL SETTING AND MINERALISATION

## 5.1 Regional Geology

The St. Lawrence Granite is formed within the Avalonian belt of the Appalachian Mountain system in eastern Newfoundland. The Avalonian belt covers an area of over 200km in width on land and extends for more 400km offshore. This sequence is characterized by sections of thick, dominantly sub aerial, volcanic rocks and marine to terrestrial clastic sedimentary rocks of late Precambrian age. Shallow marine sedimentary and minor volcanic rocks of Cambrian age overlie these older lithologies. An angular unconformity lies between the Cambrian rocks and the younger Devonian and Carboniferous sedimentary and volcanic rocks.

Several late Precambrian and late Devonian to Carboniferous aged granites intruded the Avalonian belt rocks. These magmas were generated and emplaced in a variety of arc and back arc or analogous continental arc settings along the length of the Avalonian belt between 635Ma and 550Ma. The calc-alkaline rocks erupted as subaerial caldera pyroclastic rocks, flows and domes. The felsic-to intermediate magmas were the most probable source of the heat and fluids for the large, spatially associated, hydrothermal systems. Folding and thrust faulting of the Cambrian and older sequences preceded the intrusion of the Late Devonian age St. Lawrence granite (SLG).

The St. Lawrence Granite intrudes the shales and limestones of the Brigus Formation and the Late Proterozoic volcanics of the Burin Series. Van Alstine (1948) described the granite as an alaskite type, derived from a highly differentiated magma that was intruded with very little assimilation of the surrounding country rock. The granite has a typical porphyritic texture with three well-developed joint sets. One set parallels the north-south elongate trend of the granite, a second set is normal to the north-south trend and a third set is horizontal. Quartz porphyry

dykes and sills have been observed in the area and appear to have a similar chemical composition as the granite. These dykes and sills are considered to have come from the same source as the granite.

Teng (1974) suggests that the granite was emplaced in four separate stages. The first phase introduced the rhyolite sills and dykes to the area. The remaining phases introduced larger volumes of magma with associated volatiles carrying the mineralization and causing the associated alteration. Recent field work has identified an apparent later phase of rhyolite dykes that have been observed to cut the granite in the St. Lawrence area.

The SLG pluton has been radiometrically age dated as 315+/- 10Ma. This age places the granite in the Lower Pennsylvanian age (Bell and Bleinkensop 1976). More recent age dating research on the SLG using U-Pb zircon ages by Kerr, Dunning and Tucker in 1993 returned an age of 374 +/-2Ma. This latest age determination places the SLG in the Late Devonian period. Recent U-Pb zircon age dating of the rhyolite sills at AGS by Greg Dunning returned a preliminary age of 377 +/- 1.3Ma (Magyarosi and Sparkes, 2019). This age is consistent with the SLG age within error limits, supporting the Teng (1974) emplacement hypothesis and observations from CFI geologists.

## 5.2 Local Geology

The St. Lawrence granite is host to over 40 significant fluorite bearing veins. These veins vary in width from a few centimetres to locally over 30m, with a strike length ranging up to 3km. The host rock is a porphyritic peralkaline granite pluton of Late Devonian age that has intruded Late Precambrian and Cambrian volcanic and sedimentary rocks. The grain size is characteristic of intrusive rocks and exhibits a decrease in grain size toward the contact with the older rocks. Within the granite, tuffisite, comprised of angular granite fragments in a fine matrix has been observed. Miarolitic structures are present in the granite adjacent to the contacts with the older rocks. Pink quartz-feldspar porphyry dykes are present within the granite batholith and outside the western margin of the granite intrusion.

The fluorite veins in the granite are associated with jointing and faulting within the batholith. The thicker fluorite veins exhibit features commonly associated with multiple periods of movement (rehealed breccia) and fluid injection (multiple cross cutting veins). The veins exhibit features that are characteristic of boudinage type structures with a variation in thickness along strike and with depth. The veins contain higher grade pods or lenses and varying amounts of mineralized granite breccias along one or both sides of the vein structure.

Historically, fluorite mineralization in the St. Lawrence area has been associated with the granite batholith and past exploration has been directed toward areas known to be underlain by granite. The diamond drill program completed during 2013, identified a significant fluorite bearing structure hosted in the meta-sediments. Subsequent drill programs conducted in 2014 and 2015 have confirmed and defined a fluorite resource at AGS. Rhyolite sills and dykes are known to intrude the area containing the mineralized structure in the meta-sediments. As a result of the data obtained from the 2013-2015 drill programs, the number of major types of fluorite veins that have been identified in the area has been expanded to four. They are as follows:

- Low grade veins with an average width of 7.0m and containing grades that vary from 35% to 70% $CaF_2$. This type of vein commonly has a north-south trend and includes Tarefare, North/South Ridge, Hares Ears and Blue Beach North and South veins;
- High grade veins with an average thickness of less than 1-metre and containing grades averaging 95% $CaF_2$. This type of vein commonly has an east-west trend and includes Black Duck, Lord and Lady Gulch, Iron Springs and Canal veins;
- Northwest-southeast trending veins identified in the meta-sediments and containing high grade mineralization of 30% to 80% $CaF_2$ over widths of 1 to 6 metres. The AGS Vein is presently the only known example of this type of vein; and
- The fourth type includes veins in the peripheral areas containing significant amounts of barite with fluorite. This type of vein is also commonly east-west trending and includes Meadow Woods, Lunch Pond, Clam Pond and Anchor Drogue veins.

Van Alstine, 1948, suggested that the mineralized veins in the peripheral areas of the SLG pluton might extend to a greater depth than those in the more central areas due to the effects of erosion.

## 5.3 Property Geology

In general, seven rock types are recognised in the current drilling area on the Property. These are described below.

**1. St. Lawrence Granite (SLG):** Red, medium to coarse grained granite with porphyritic texture. Red to pink feldspar phenocrysts commonly present in a predominantly siliceous (quartz) matrix. Miarolitic cavities (2-5mm) and vuggy quartz veins are common. In places, hematitic and manganese oxide staining along fractures is also present. Brecciated zones and calcite veinlets are common, and occasional intersections with chloritic-pyrophyllite alteration, up to 30m wide, are also present. SLG is the dominant rock type throughout the Blue Beach North Vein area.

**2. Tuffisite**: This is a local name given to the fragmental variety of the SLG. It is commonly present as 0.5m-2.0m intersections of dark brown-red, medium to coarse grained fragmental rock, with occasional banded texture. In general, tuffisite is associated with brecciated granite in the footwall (FW) contact of the fluorite vein. Several tuffisite intersections on both sides of the mineralized structure are present however, where they are associated with fluorite mineralization. The Blue Beach North Vein is associated with one of the largest tuffisite zones.

**3. Blastonite**: Also, a local name, describing a brecciated fluorite cemented by a mixture of microcrystalline quartz and fluorite. In places it exhibits faint banding and resembles mylonite. Blastonite may be present in different parts of the assemblage but is more commonly adjacent to and associated with the hanging wall (HW) contact of the fluorite vein.

**4. Fluorite Veins**: There are a range of different vein types, associated with different depositional phases, along with intervals of faulting with quartz/carbonate veining. This in turn has led to wide range of $CaF_2$ grades associated with the different vein types. Veins are generally steeply dipping and also vary greatly in width from 10s of centimetres to 10s of metres.

**5. Meta-sedimentary Rocks**: Also known as argillite in historic mine terminology, this is comprised of dark green to black chloritic schist which overlie the SLG and covers the northern part of the Tarefare Vein. Concurrently, the SLG has been identified beneath the meta-sediments in the AGS and AGS North areas of the Property. Near the contact zone with the SLG, large blocks (greater than or equal to one metre) of the SLG occur within these meta-sedimentary rocks. These rocks exhibit local chlorite and potassic alteration, finely laminated bedding, and locally massive darker black-grey siliceous intervals.

**6. Rhyolite**: Consists of fine grained, pink-orange-red quartz-feldspar porphyry which contains quartz and feldspar phenocrysts in a fine-grained matrix. The meta-sediments overlying the SLG are cut by rhyolite sills and dykes. The sills have a low angle dip to the northeast and vary in thickness from less than a metre to in excess of 10m. At least two and possibly more ages of rhyolite sills and dykes have been identified cutting the meta-sediments. The presence or absence of magnetite in the rhyolite intrusions is a distinguishing feature. Rhyolite dykes have also been observed to cut the granite. Fluorite mineralization in the AGS structure is possibly related to the intrusion of the rhyolite sills into the meta-sediments.

**7. Mafic Dyke**: Dark green, fine-grained rock of basaltic or lamprophyre composition. These rocks have been observed particularly near the south end of the Blue Beach North Vein. They are often intensely fragmented and altered to chlorite. It is possible that these dykes are of Cretaceous age (Harris et al., 2000).

In general, there are two sets of fractures and faults interpreted to be present on the Property. These are northwest and northeast trending faults. Neither one of these structures has been clearly identified in the drilling completed to date, although numerous fracture zones have been recorded in the drill logs. The isopach map of depth to the contact between the SLG and the overlying shale in the Tarefare Vein area indicates these two structures.

## 5.4 Structural Setting

### 5.4.1 Principal Lineaments

Regional geological mapping and airborne and ground magnetic surveys indicate that at least three prominent sets of lineaments occur on the Property including:

- **West-northwest** trending lineaments, such as the AGS Veins;

- **Northwest** trending lineaments, which are the most prominent in the region and are associated with the three major mineralized vein systems on the Property, North/South Ridge Vein, Blue Beach North and South Veins, and Tarefare Vein. The orientations of the St. Lawrence Bay, Little St. Lawrence Bay, and Burin Inlet are also northwest, indicating that they postdate the intrusion of the SLG; and

- **North** trending lineaments, such as at Shoal Pond, south of Blue Beach North Vein. Recent ground geophysical (magnetometer and HLEM) and airborne geophysical (magnetometer and VTEM) survey results indicate that numerous weak to moderate electromagnetic (EM) conductors and magnetic lows (lineaments) occur over the Property. Two of the prominent EM conductors are coincident with the surface traces of the mineralized structure at the North/South Ridge Vein and the AGS Veins, respectively.

*Comment: It is encouraging that these results indicate additional potential mineralized structures are located on the Property. It is recommended that these are used to help with identifying exploration targets.*

### 5.4.2 Faults

Early AGS pit production encountered significant problems with fault clay gouge material adversely affecting both mining and milling operations. Problems resulting from fault gouge include:

- Water retention within the pit area.
- Problems with ore handling and separation.
- Problems with blasthole drilling and subsequent blasting.
- Problems with processing operations due to excessive clay.

An improved understanding and prediction of faulting, in both ore and waste, is therefore extremely important for on-going pit operations.

Historic information is important to understand, when considering possible fault gouge clay content versus open cavities in the subsurface. Several mines in the district, most notably the Iron Springs and Black Duck mines, are very well known for their open cavities, that contain spectacular, large fluorite crystals. These cavities have been reported to measure 25 x 9 feet (Black Duck Mine), up to 200 x 100 feet (Iron Springs Mine) and several crystal-lined cavities at the West Extension Vein. The historic reports in the archives also describe clay (pug) occurrences in faults and cavities as variable, but that some cavities were free of pug material (Iron Springs).

Clay-bearing fault zones also have variable amounts of fluorspar contained within them. At AGS, both barren and mineralized clay-filled faults are present. Over the course of pre-production mining, geologists directed the removal of separable barren zones to the overburden dump area wherever possible. Mineralized fault gouge was often mixed with “normal” ore in the muckpile upon blasting. In addition, pre-production powder factors were higher than operations blasting, as per the original 2016 mine plan. Furthermore, ore and waste were always blasted together as per the 2016 Mine Plan (no in-pit segregation or blending at the crusher) thus permitting mixing of the various components of the AGS structure (veins, fault gouge, waste wallrock). Figure 5-1 and Figure 5-2 show barren and mineralized fault gouge examples. Darker black material indicates occurrences of Manganese-enrichment in the fault gouge.

Geological mapping and core logging indicates that much of the ore in Grebes Nest Pit, on the east side of the general AGS area, contains clay fault gouge. Open cavities are still likely present, but with higher clay content than previously thought. It appears that to the west of Grebes Nest Pit, the clay fault gouge content decreases significantly. Past trench mapping activities and diamond drilling records also indicate a much lower clay content in the Center Pit veins.

**Figure 5-1. Example of Barren Fault Gouge – Grebes Nest Pit**

**Figure 5-2. Example Ore Face at Grebes North Pit**
**[Clean ore – right side; Mineralised fault gouge – centre and left side]**

Plans made in 2018 to mitigate these fault gouge problems included the following:

1. **Geological Mapping** – Detailed mapping to delineate all ore types by $CaF_2$ grade and clay/fault gouge content. Identifying these zones allows for proper planning for ore handling and grade control;
2. **Mine Plan** modification to allow Ore Segregation and Blending. This will be done with relation to $CaF_2$ grade and clay/fault gouge content based on mapping and muckpile observations/grading. Fault gouge that contains no ore should also be segregated in the pit where the situation permits;
3. **Blast Planning** – selective separate blasts of ore and waste. Removal of waste and fault gouge prior to ore blasting in certain situations. Selective slot blasting of ore-only has also being tested; and
4. **Clay Processing** – phased small amounts of clay feed and/or washing of crushed ore may mitigate clay processing problems. Clean water and/or flocculants may also be helpful.

Some clay-laden material was mined throughout pre-production and up to commissioning of the Mill. Once it was clear the Mill was not equipped to process this type of potential ore, it was demarcated as Temporary ROM (TROM) material. This material then went through many segregation phases from sorting out oversize, to static grizzly screening, trommel screening, and then ultimately controlled stockpile blending, until it was exhausted. None of this TROM material currently remains.

## 5.5 Hydrothermal Alteration

Hydrothermal alteration in the Project area varies from silicification (quartz veinlets) to carbonate alteration (calcite veinlets) and chloritic to sericitic alteration, associated with the brecciated fluorite mineralized zones in historic and recent drill holes. The alteration zone associated with the fluorite veins on the Property is also marked by hematite and feldspar alteration, which imprints a brick red colour on the rock. In places, where only fluorite veining occurs, the contacts with the host granite is sharp, and the veins may be purple, grey to light green in colour.

## 5.6 Mineralisation

### 5.6.1 General

Review of the style of mineralization on the Property suggests that fine grained quartz and fluorite are commonly present, and they occur as fine grained to microcrystalline intergrowths. The types of occurrences are described as follows:

- **Blastonite**: This is the name given to rock which is brecciated, with relatively coarse crystalline fluorite in a matrix of microcrystalline quartz and fluorite. This is also a local name, describing a brecciated fluorite cemented by a mixture of microcrystalline quartz and fluorite, and a specific gravity of the order of 2.83. In places, it exhibits faint banding and resembles mylonite. Blastonite may be present in different parts of the assemblage, but is more commonly adjacent to, and associated with, the HW contact of the fluorite vein when hosted by the SLG. At AGS, Blastonite is common but less abundant than the SLG hosted deposits. Blastonite and quartz-breccia veins are normally thin (2.0-15cm in width) but locally reach greater widths. Commonly, it is associated with green-white fluorite veining hosted within a late fault zone that cuts the earlier main-phase fluorite deposition;

- **Nodular ore**: Microcrystalline quartz is present as zoned material around brecciated granite fragments on which fluorite nucleation has occurred. This is locally termed as 'nodular ore'. Nodules with granite centres are most common adjacent to the vein walls and can vary in size from a few millimetres to many centimetres in diameter. In the centre of a vein nodular ore more often contains earlier fluorite at its centre, however, all nodules exhibit similar banding of fluorite and intergrown microcrystalline quartz and fluorite (Wilson, 2008); and

- **Banded veins**: Veins exhibiting rhythmic deposition of fluorite in parts of all the veins on the Property. Typically, this occurs as very thin bands of fluorite (one millimetre to two millimetres each) forming a one centimetre to two-centimetre-thick banded vein bounded by more massive fluorite veins (0.5cm to one centimetre) or aggregates of fine-grained quartz and fluorite in intimate intergrowth.

Fluorite mineralization in the Project area commonly occurs within veins. The thickness of individual mineralized zones ranges from less than one metre to locally over 30m, with an average thickness ranging from 2.0m to 7.0m. The most common gangue mineral is quartz, occurring in "blastonite" – although this is less abundant at the AGS Vein. Nodular forms of fluorite and calcite are common in larger veins, predominately along the FW. Calcite occurs in nearly all the fluorite veins, particularly in the eastern portion of the AGS grid and is related to late-stage faulting.

The St. Lawrence area of Newfoundland hosts over 40 fluorspar veins, predominantly within granitic rocks of Late Devonian age. Recent exploration has demonstrated that significant amounts of fluorite mineralization are also hosted by late Proterozoic meta-sedimentary rocks and undated rhyolitic sills, such as at the AGS Vein. Only a few of these, however, contain significant Mineral Resources and have been mined in the past. These include the North/South Ridge, Blue Beach North, Tarefare, Iron Spring, and Black Duck veins. The AGS Vein, although with some historic work, has recently been explored in detail and contains significant fluorspar resources.

The fluorspar veins are complex structures, commonly along fault zones within the SLG and related porphyries, meta-sedimentary rocks, and rhyolite dikes and sills at AGS. Commonly, the faults exhibit evidence for multiple episodes of movement. Typically, the veins have a high grade core, and irregular amounts of mineralized brecciated granitic material along one or both walls. Regarding content, four major types of fluorite veins are recognized, as follows:

- **Moderate to low grade veins,** with grades ranging from 35% $CaF_2$ to 70% $CaF_2$, over widths commonly ranging from 5m to 7m, such as the North/South Ridge, Tarefare, Hares Ears, and Blue Beach North, and South veins. These veins commonly trend north;

- **High grade veins**, with an average thickness of less than one metre and grades averaging 95% $CaF_2$, such as the Black Duck, Lord and Lady Gulch, Iron Springs, and Canal veins. These veins commonly trend east;

- **Moderate to high grade northwest trending veins** identified in the meta-sediments and containing high grade mineralization of 30% $CaF_2$ to 80% $CaF_2$ over widths ranging from 1m to 25m. The AGS Vein is presently the only known significant example of this vein type;

- **Mine Cove.** The historic Mine Cove (AGS North) occurrence likely represents another example of this vein type; and occurs in the peripheral region and have significant barite intergrown with fluorite, such as the Meadow Woods, Lunch Pond, Clam Pond, and Anchor Drogue veins. These veins commonly trend east.

Fluorite is mostly massive and coarsely crystalline, filling veins. Close to the vein walls, the fluorite is commonly finely banded, suggesting a rhythmic deposition. In the larger veins, fluorite surrounds sharp fragments of granite. Fluorite occurs in a wide variety of colours. Garrison (1927) attributed this feature to the presence of hydrocarbons oxidized at the time of crystallization. Conversely, Tilsley (1975), suggests that colour in fluorite is caused by atomic disorder in the crystal rather than chemical impurities. Tilsley further reports that coloured fluorite crystals may dissolve in water as much as two and a half times as rapidly as the clear variety.

*Comment: The description of fluorite mineralisation given appears comprehensive in terms of deposit geology. However, it is recommended that future logging has additional mineralogical investigation including grain size distribution; vein mineralogy and morphology; composition of gangue minerals and ratio of vein to gangue; and the proportion of clay gouge. This would allow a better understanding of the ore composition and grade distribution prior to milling, if these characteristics were carried through to modelling.*

### 5.6.2 North/South Ridge Vein

The North/South Ridge (NS) deposit has a strike length in excess of 2km and varies in width from 0.3m - 30m. The principal vein strikes approximately 140° and dips 70° easterly, although it can be locally vertical. Similar to the Blue Beach vein, it terminates shortly after passing into sediments at the northern end. Data and information associated with the (NS) vein has the prefix NS-, stemming from the area's former name, Director-Surface.

The main North/South Ridge vein splits at the north end, the westerly branch largely following the contact of the granite and the sediments. The south end is somewhat irregular with the veins structure becoming obscure and difficult to follow. Near the locality where NS becomes irregular, hydrothermal alteration of the granite consists of a soft green material, thought to be fault gouge.

*Comment: It is recommended that modelling of this fault, relative to the NS vein, would be very useful.*

Previous work has described "pinch and swell" features along strike, which have created three principal ore lenses. The North (No.1) lens is the largest (approximately 800m) and is separated from No.2 lens to the south by a 100m long pinch. The No.2 lens is 300m long.

*Comment: It is recommended that more detailed work should consider the existence of payshoots related to "pinch and swell" structures. It will be required to review underground sampling and geological mapping so any dip and dip-directions can be established. Analysis and digitisation of historical mine plans would be also be highly beneficial in connection with this issue.*

Fluorite at NS is commonly banded, predominantly colourless, pale blue and green and coarsely crystalline. Nodular ore and blastonite are both important constituents. Associated minerals are quartz and calcite with lesser barite, chalcopyrite and galena. The hanging wall may locally contain numerous spar veinlets up to 30m thick. Underground exposures expose a multiplicity of the veinlets, which vary in width up to a maximum of 0.6m. Comments related to previous mapping note that the NS occupies a left lateral fault with about 180m of movement (E side N).

The North/South Ridge Deposit has been the target of four recent drill programs since 2013 and, although historically mined, demonstrated an extension of the deposit to the southeast. This northwest trending NS vein has been encountered in surface trenches, diamond drill holes, and underground openings, and extends approximately 2.2km along strike and from the surface to approximately 450m at depth. Drill hole intersections to date indicate that the vein thickness ranges from less than 1m to 11m.

The North/South Ridge Deposit is located approximately 4km east of the AGS Deposit and 2km west of the Town of St. Lawrence. The North/South Ridge Deposit consists of a single fluorspar vein/zone with four minor splays and is hosted in the St. Lawrence Granite (SLG).

Most of the underground workings are in the North Ridge area. Multiple drilling programs from 2013 to 2020 were conducted to test the vein extents in addition to in-fill and expansion drilling.

This northwest trending vein, which has been encountered in surface trenches, diamond drill holes, and underground openings, extends approximately 2.2km along strike and from the surface to approximately 450m at depth. Drillhole intersections to date indicate that the true vein thickness ranges from less than 1 to 11m. The vein strikes approximately 140° and dips 75° westerly, although it is locally vertical. Like the Blue Beach Vein, it terminates shortly after passing into sediments at the north end.

North/South Ridge Vein mineralization occurs as pink to brick red, medium to coarse grained, massive to fragmental rock with interstitial as well as 1cm – 3cm thick veins of purple fluorite, and a specific gravity of approximately 3.08. Mineralization is typically hosted in the SLG, with drilling confirming mineralization is not continuous into the meta-sediments at North/South Ridge. Fluorite is commonly very fine grained or amorphous in nature, with rare crystalline fluorite observed. In general, the mineralized intersections represent a single vein, which demonstrates good continuity along strike as well as at depth. Based on recent drilling in the northern portion of the North/South Ridge Vein, however, it is possible that mineralized intersections represent two veins at depth.

The deposit has been subject to historical underground and limited open pit mining in the northern two-thirds of the deposit. Drilling in 2019 and 2020 focussed on the relatively undeveloped south extent of the deposit over a strike length of approximately 1,000m.

### 5.6.3 Tarefare Vein

The Tarefare (TF) vein occurs within a 20m thick zone, which contains brick-red brecciated granite rock and vein material. The deposit lies beneath extensive overburden and bog cover. The veins here are rarely exposed at surface. In the northern part of the TF, the mineralised zones are overlain by thick cover of meta-sedimentary rocks.

The TF vein has a strike length of approximately 2.5km and ranges from 0.60m-14.0m in horizontal thickness, with an average of 4.91m. It has been outlined by some 77 holes and extends and extends from surface at the southern extremity to a depth of at least 500m near the northern end of the vein. Much of the vein in the southern part has been mined out.

The TF vein is orientated north-westerly (Az. $325^0$) and is sub-vertical or steeply dipping to the NE. The TF vein contains abundant blastonite, accompanied by crystalline, locally banded massive fluorite, with gangue of quartz and calcite and lesser amounts of sulphides. At the TF vein, fluorite mineralisation is also present in numerous steeply dipping veins within the granitic rocks. Only one of these veins exhibits continuity along strike and is referred to as the H/W structure. At least seven discontinuous veins are recognised within both the H/W and F/W assemblage of rocks. Vein and fluorite grade continuity appears good.

The Blowout vein is a subsidiary vein structure which contains at least four sub-parallel veins in the F/W assemblage of rocks. The Blowout vein has been traced for 350m along strike.

Roscoe Postle Associates Inc. (RPA) were retained by Canada Fluorspar (NL) Inc. (CFI-NL), formerly Burin Minerals Ltd. (BML), to prepare a Pre-feasibility Study (PFS) and a National Instrument 43-101 (NI 43-101) Technical Report (29 April 2011) on the St. Lawrence Fluorspar Project (the Project), located in St. Lawrence, Newfoundland. The conclusions of this study included:

- RPA estimated Mineral Resources at a cut-off grade of 20% $CaF_2$ and a minimum horizontal thickness of 2.0m, of the St. Lawrence Property totals approximately 9.1Mt of Indicated Mineral Resources at an average grade of 42% $CaF_2$, and 950,000t of Inferred Mineral Resources at an average grade of 31.1% $CaF_2$.

- Blue Beach North Vein (BBN) contained approximately 4.4Mt of Indicated Mineral Resources at an average grade of 39% $CaF_2$. In addition, the Blue Beach North Vein contained approximately 355,000t of Inferred Mineral Resources at an average grade of 30% $CaF_2$.

- Tarefare Vein (TF) (and the associated Blowout Vein), contained approximately 4.7Mt of Indicated Mineral Resources at an average grade of 44.8% $CaF_2$. In addition, the Blowout Vein contains approximately 595,000t of Inferred Mineral Resources at an average grade of 31.8% $CaF_2$.

- The thickness of individual mineralized zones ranges from <2m to 17m, with an average thickness ranging from 2m to 5m for BBN and from 2m to 4m for TF;

- Drilling carried out by CFI-NL at St. Lawrence had confirmed the earlier results by Alcan;

- Historical exploration results to date indicate that the St. Lawrence area has geological potential for additional resources of mineralized veins with similar average grades as the BBN and TF vein;

- RPA was of the opinion that the procedures used by BML for sample preparation, analysis and custody of samples, and the analytical procedures at SGS for the St. Lawrence Fluorspar Project were in keeping with the industry standards;

- Results of RPA's check assays showed that, with two exceptions, the values obtained by RPA are very similar to the ones reported by CFI-NL and show only a small difference in average grade with the RPA values being slightly higher. RPA considers these differences acceptable in view of the fact that different portions of the split drill core were assayed (half core by CFI-NL and quarter core by RPA);

- RPA were of the opinion that the drill hole spacing and geological interpretation are adequate and the drill hole assay data are acceptable for estimation of Mineral Resources;

- RPA recommended that additional diamond drilling should be planned in selected target areas in order to increase the potential for additional mineral resources, given the positive results of the present economic analysis of the Project.

### 5.6.4 Blue Beach North Vein

The Blue Beach North Vein (BBN) is approximately 2.5km long and extends from the surface to approximately 400m below the surface. It is situated in the eastern part of the Property, close to the western boundary of the Town of St. Lawrence, trends northwestward (Azimuth 310°), and dips steeply (75° to 85°) to southwest. From southwest to northeast, the general sequence of rocks intersected in the Alcan 1984 drill holes as well as the BML 1999 drill holes in the area of the Blue Beach North Vein are: SLG, blastonite, fluorite vein, and tuffisite.

The Blue Beach vein has not been considered in the current resource estimation.

### 5.6.5 AGS Vein System

Most recent drill exploration has concentrated on the AGS Deposit. The main features of AGS include:

- The AGS deposit is located approximately 6km west of the town of St. Lawrence and is the most advanced of all the deposits in the Project. The deposit was discovered in 2013 and became an operating open pit mine in 2017 and continued until operations were suspended in February 2022, due to insolvency proceedings;

- The deposit consists of over 60 individually interpreted veins that are hosted in rhyolite and meta-sediment units and occur over a strike length of 1,200m. The main trend of the veins is oriented at an azimuth of approximately 305° with veins varying from less than 20m to up to 1,000m (for the GP2 vein) in length and from less than 1m to up to 30m in thickness; and

- Interpreted fluorspar veins were updated for the SLR Mineral Resources in 2022, including the most recent drilling information from 2019 and 2020, and the inclusion of vein survey points where they were exposed on the floor of the working open pits.

The AGS Deposit is an east-southeast trending (Azimuth 110° to 125°) structure in the Grebes Nest area, which contains several significant fluorite veins over a strike length of approximately 2km. The AGS Deposit is hosted by Proterozoic meta-sedimentary rocks, undated rhyolitic sills, and the Late Devonian SLG. This represents the first significant fluorite mineralization identified that is not hosted entirely by the SLG and the first major new discovery in the area in approximately 75 years. In general, the fault structure dips steeply to the southwest. Locally, north-dipping structures and structurally modified sections are also observed. Field observations and drill logs indicate that the AGS Vein structure is comprised of three main vein systems including the North Vein and South Vein in the western part of the grid, and the Grebes Nest Vein in the eastern part of the grid. The orebodies have two main economically significant phases of fluorite vein formation, plus other minor phases. The paragenesis of mineralization interpreted by CFI geologists is as follows:

- The AGS fault zone is penecontemporaneous with, and postdates, the intrusion of the SLG batholith. Observations in the exposed fault zone suggest that movement varied over time, with evidence for both sinistral and dextral movements during late events.
- Subsequent uplift caused by the intrusion of rhyolite sills in the area resulted in the dilation of the existing structure permitting quartz/carbonate/fluorite bearing solutions to circulate through these structures.
- Fluorite veins contain five depositional phases, separated by intervals of faulting with quartz/carbonate vein.
- The earliest phase of mineral deposition appears to be siliceous, with minor amounts of purple fluorite (fracture coatings, fault matrix flooding and stockwork) and calcite hosted in brecciated rocks and fracture zones.
- The second phase of fluorite vein formation contains primarily crystalline red, yellow, grey, black, clear, and white varieties of $CaF_2$ and forms the most significant phase at AGS. Near

the end of this phase, fluorite is intergrown and synchronous with the deposition of banded sulphides in the structure including sphalerite, galena, and lesser amounts of chalcopyrite and pyrite.

- The third phase of fluorite deposition is primarily massive to vuggy, crystalline green $CaF_2$ with lesser amounts of white fluorite. This mineralization is deposited very close to the end of the period of sulphide deposition with sphalerite and galena forming disseminated grains. The veins of green fluorite are commonly less than 2m in width and cut the earlier red/yellow veins south of and parallel to the main AGS Vein. Green fluorite veins have also been noted in meta-sediments in drill core from the Tarefare area.
- A fourth, but volumetrically minor, phase of fluorite mineralization is represented by clear $CaF_2$ cubes forming on the green fluorite in vugs.
- A fifth fluorite phase occurs after a period of quartz-carbonate veining (with Blastonite) and is present in the form of calcite fluorite stockwork veinlets and massive veins. This phase is associated with late crosscutting fault structures and is prevalent at the eastern end of the North Vein and the western half of the Grebes Nest 2 vein. Fluorite is normally clear-white-grey-purple in colour. Calcite is the dominant component of this phase, having ratios of 3:1 to 10:1 versus fluorite. Areas containing this late phase mineralization are referred to as “High Carbonate” material.

The AGS Deposit consists of at least three major veins (North, South, and Grebes Nest veins) and several intermediate and minor subparallel veins in the HW and FW. The overall strike length of the AGS Deposit is approximately 2km. The thicknesses of the veins vary, ranging from 2m to approximately 31m, and extend from the surface to approximately 350m at depth. Of the major veins listed, individual strike lengths range from 400m to 750m and display typical pinch and swell geometries common in vein deposits. Several veins have demonstrated higher amounts of calcite related to late-stage vein stockwork and breccia event, particularly the Grebes Nest veins. Many areas of the AGS Deposit remain open for expansion and additional vein discoveries and will be continually explored on an ongoing basis.

Vein contacts were surveyed where they have been exposed during pit operations. This information has been used to re-interpret and refine the vein model wireframes. The impact of these adjustments were generally localised and were not anticipated to impact the overall mineral resources. In some instances during pit production, splays or smaller mineralized veins have been discovered in exposure in the pits, that were not picked up from diamond drilling.

*Comment: It is recommended that in future pit production, grade control (GC) drilling is completed as a routine part of mine production. This should provide additional information that will include clay occurences, changes in dip of the veins and thickening/ thinning in order to adjust ore/waste layouts and related blast hole patterns.*

The GP2 Vein is the largest vein within the AGS structure. It has been tested by 47 holes and extends from the eastern part of the Grebes Nest Pond on Line 13+00 E to Line 20+00 E, a distance of 700m, and extends approximately 350m at depth. The thicknesses of the mineralized intersections range from 2m to 31m, with an average thickness of approximately 9.25m, with thicker intersections closer to the surface. Contouring the grade x thickness indicates two pods with gentle northwesterly plunge. The contoured $CaF_2$ data also indicates a low grade “tongue” at moderate to lower elevations which is closely coincident with a zone of higher grade $CaCO_3$. CFI interprets that strong $CaCO_3$ veining is related to a later structural event and exhibits a relatively steep plunge compared with the earlier, main $CaF_2$ events.

The South Vein (SV) extends approximately 700m along strike in the western part of the AGS grid. Currently, SV has been tested by 35 holes and traced until the western shoreline of Grebes Nest Pond, but due to the presence of the Grebes Nest Pond, and apparent offsets in the orientation of the vein, its eastern extent has been marked on Line 11+00 E. Diamond drilling indicates that fluorspar mineralization extends from the surface to approximately 225m at depth. Further drilling may indicate it to be the western extension of the GP2 Vein. The thicknesses of the mineralized intersections range from two metres to 18m, with an average thickness of approximately 5.1m. Contouring grade-thickness values indicate a moderate plunge in a south-easterly direction. The fact that the mineralized trends appear to be different in GP2 and SV is due to a phase with a significant increase in $CaCO_3$ veining that obscures the original $CaF_2$ grade distribution in the GP2 vein, whereas the SV is not affected by the late stage $CaCO_3$ veining. The fluorite content of the SV Vein is also of the same magnitude as the GP2 Vein, and therefore contoured the GT data is less complex and likely more representative of its original distribution.

### 5.6.6 AGS North

A new discovery of fluorspar veining was found in 2019 at AGS North. This discovery was made during targeted drilling of anomalies generated from a high-resolution airborne magnetic survey. The AGS North Vein (formerly Mine Cove vein), is situated approximately 1.2km northeast of the AGS Deposit, was being investigated up until the suspension of operations in February 2022. Data and information associated with the AGS North/Mine Cove deposit has the prefix MS-, stemming from Mine Cove + Surface.

Three drill programs were carried out in 2019, 2021 and 2022, totalling approximately 9,600m.

The MS deposit extends approximately 400m along strike and is situated approximately 200m north of SV in the western part of the AGS grid. MS has been tested by 118 holes and is cut by faults both at its western and eastern extremities. Diamond drilling to date indicates that fluorspar mineralization extends from the surface to approximately 220m at depth. The thicknesses of the mineralized intersections range from 2m to 12.25m, with an average thickness of approximately 5.1m.

*Comment: The 2022 drill program was halted at the time of suspension of operations and sample analysis remains outstanding. It is recommended that these samples are assayed as soon as possible.*

## 6 DEPOSIT TYPES

Vein hosted fluorite deposits of the St. Lawrence area are characteristically associated with intrusive rocks (Devonian to Carboniferous granites with miarolitic cavities) hosted within sequences of Late Precambrian volcaniclastic and sedimentary rocks. As currently interpreted, the AGS and North/South Ridge deposits are subvertical and have a north-westerly trend, and their geometry is controlled by faults. The alteration zone in the Project Area is marked by a silica, hematite, and feldspar alteration, which imprints a brick red colour on the rock. In places, where only fluorite veining occurs, the contact with the host granite is sharp, and the veins may be purple, grey to light green in colour.

# 7 EXPLORATION

The exploration methodology applied by Alcan in the early 1970s, and by CFI during recent exploration programs, has consisted of geological mapping and prospecting, geochemical sampling of streams and ponds in the Project area, as well as trenches, airborne and ground geophysical surveys (mainly ground EM and magnetometer surveys), and evaluating targets by drilling. The justification for this exploration approach is that ground geophysical targets are interpreted to be surface expressions of mineralized structures in bedrock, and geochemical anomalies in trenches are related to fluorspar mineralization within the underlying felsic intrusive (SLG) and meta-sedimentary rocks.

## 7.1 Trenching

From July 9 to October 12, 2013, CFI carried out a trenching program, whereby seven trenches approximately 2m wide, were dug across the interpreted surface trace of the AGS Vein. In total, CFI carried out approximately 682m of trenching using an excavator. The first three trenches, AGS-T1 to AGS-T3 were spaced 100m to 200m apart, and trench numbers AGS-T4 to AGS-T7 were spaced 200 m to 600m apart. The latter trenches were not sampled, since the AGS Vein structure was not exposed in them.

Assay results from trenches AGS-T1 to AGS-T3 indicated fluorspar mineralization ranging from 59% $CaF_2$ to 84% $CaF_2$ over widths ranging from 2.6m to 6.0m, with some high-grade intervals of +97% $CaF_2$ over one metre.

## 7.2 Geophysical Surveys

### 7.2.1 2012 Ground Geophysical Surveys

In 2012, Abitibi Geophysics Inc. (Abitibi) Atlantic Division, carried out ground geophysical surveys (magnetometer and HLEM) on behalf of CFI, over three grid areas: North/South Ridge, AGS, and Black Duck areas. The purpose of the ground geophysical surveys was to detect fault zones, which may be conductive (HLEM) and associated with magnetic lows and fluorite mineralization. Abitibi completed 80 line-km of ground magnetometer and 64 line-km of HLEM surveys over the three grid areas.

Results of the 2012 ground magnetometer and HLEM surveys indicated weak to moderate EM conductors and magnetic lows are associated with the North/South Ridge Vein. Over the AGS and Black Duck grid areas, however, only magnetic lineaments were detected without association with conductive zones (Lambert, 2012). The geophysical anomalies have been drill tested at the North/South Ridge grid, and the AGS Vein area has now been extensively explored by three drilling campaigns. No drilling has been carried out on the Black Duck grid area, although some limited mining has occurred at the historic Black Duck Mine (CFI-NL, 2013)

### 7.2.2 2015 Airborne Geophysical Surveys

Geotech Ltd. carried out airborne geophysical surveys (magnetometer and VTEMplus) from May 29 to June 9, 2015, over the entire Property on behalf of CFI. Based on the successful results of the 2012/2013 ground geophysical surveys (in detecting magnetic lows associated

with areas of fluorite mineralization), the purpose of this survey was to detect targets similar to those detected over the North/South Ridge, Tarefare, and Grebes Nest Pond deposits.

Geotech Ltd. completed 846.1 line-km of helicopter borne geophysical surveys over the two blocks of the Property. For the main (southern) No. 1 block, the flight lines were oriented northeast-southwest, i.e., the same orientation as the cross sections of the drill holes. For the northern No. 2 block, the flight lines were oriented north-south. For both blocks, the flight lines were spaced approximately 75m apart.

Results of the magnetic survey indicated that the southern block exhibits two distinct domains of magnetic susceptibilities separated by a northeast trending lineament. The northern block exhibits similar magnetic responses as the southern block. The survey results also indicated a number of relatively weak EM anomalies, generally associated with magnetic highs. In particular, these survey results demonstrate that:

- The AGS structure and associated veins are situated within the western magnetic domain with generally low magnetic susceptibilities, but the actual structure is associated with a west-northwest trending narrow magnetic high. CFI notes that there are similar features (narrow magnetic highs) in this area that are not yet tested by drilling;
- The Tarefare Vein is situated within the magnetic high domain; and
- The North/South Ridge Vein is situated along the eastern margin of the magnetic high domain.

### 7.2.3 2016 Ground Geophysical Surveys

The results of the 2015 airborne geophysics outlined several priority targets for follow-up testing. As a result, significant grid cutting extensions were completed in late 2015 including the Mine Cove, AGS South and, Iron Springs grids. The Mine Cove and AGS South grids were extended from the main AGS Grid while the Iron Springs Grid was tied into the North/South Ridge Grid, originally cut in 2012. Ground magnetics and HLEM geophysical surveys were completed on the 2015 extended grids by Abitibi during February of 2016. An additional compilation and merging of data from the AGS and North/South Ridge grids was completed within the scope of the 2016 program. Abitibi outlined multiple geophysical anomalies on the Mine Cove and AGS South areas that trend parallel (or nearly so) to the AGS Deposit.

A significant east-west trending, coincident magnetics and HLEM anomaly was also identified at Iron Springs. From February 8 to 28, 2016, HLEM and magnetometer surveys were conducted over the area of the new grids. Readings were recorded at a 25m interval (12.5m readings for the magnetometer) along the grid lines including the tie lines and the base lines. In order to maintain a degree of continuity between the 2012, 2014, and 2016 surveys, similar equipment and survey procedures were followed in all surveys. Data from the three surveys has been merged to allow for the preparation of compilation maps of the surveyed areas.

The geophysical survey of the AGS South Extension and Mine Cove grids identified a number of SE-NW trending HLEM and magnetic anomalies. On the Mine Cove Grid, three HLEM anomalies were identified. One anomaly was identified on the north side of the baseline on Line 2W and trended approximately parallel the baseline to Line 26E, where the strike shifted to a SE trend and continued to the end of the grid coverage on Line 44E. A second shorter HLEM anomaly was identified along the baseline between Lines 14E and 32E. This anomaly paralleled the baseline to Line 27E where the strike shifted to a SE trend. The third HLEM

anomaly was identified to the south of the baseline on Line 0+00 and traced east to Line 29E. This anomaly strikes approximately parallel to the baseline up to Line 26E where the trend of the anomaly shifts to the SE. All three HLEM anomalies strike approximately parallel and have a trend that shifts to the southeast in the same location, suggesting the presence of a NE-SW striking, crosscutting structure. Magnetic low anomalies were identified in close proximity to the HLEM anomalies; these commonly occur parallel to the HLEM anomaly, rarely crosscutting its trend.

Three significant HLEM anomalies were identified on the AGS South Extension Grid. One anomaly was identified on Line 5E and was traced east to the end of the grid coverage on Line 39E. The HLEM anomaly occurs at the junction of the southern extension of the original AGS Grid and the northern extension of the new AGS South Extension Grid.

### 7.2.4 2019 UAV-MAG Airborne Geophysics Survey

CFI completed a regional exploration assessment during 2018 to 2019 to focus on areas of high potential for additional resource definition and new discoveries. In order to concentrate efforts efficiently, selected areas were chosen including the St. Lawrence North area where known mineralization is present (Ex. Clam Pond, Ryan Hill, Salmon Brook, and Black Duck veins. In addition, the AGS area and region to the north of the AGS Deposit was considered highly prospective. The historic Mine Cove occurrence and CFI generated ground geophysical anomalies are present north of the AGS Deposit. Exploration further north of the AGS Deposit is of interest to CFI. A decision was made to perform high-resolution Unmanned Aerial Vehicle (UAV)-MAG surveys in both areas. Drone supported (UAV) geophysical surveying is in the early stages of experimentation and practical application and as such, the 2019 AeroVision UAV-MAG survey is considered experimental in its application. Two survey blocks were completed on the Property, totalling 397.5-line km from May 16 to May 25, 2019.

The St. Lawrence North Grid data was collected along 70 traverse lines, oriented north-south and spaced 50m apart. Two detailed blocks were flown in areas of known high potential with traverse lines at 25m spacing. The survey produced very high-quality, high-resolution data that could be used immediately for follow up evaluation. Two regional scale domains were observed including a high magnetic region in the northwest corresponding to the siliciclastic sedimentary rocks as mapped in the area and the area to the east and southwest mapped as part of the SLG pluton. The internal complexities reveal numerous east-west, northwest-southeast trending and “curved” features assumed to be associated with structures that may or may not pertain to fluorspar mineralization. Screening of these structures will form the basis of future follow up exploration.

The AGS Grid data was collected along 59 lines oriented in a northeast direction at an azimuth of N33° and spaced 50m apart. A detailed grid was flown over the western part of the AGS Deposit at 25m spacing. The rationale was to collect detailed data over the known fluorspar host structure and apply it as an exploration analogue in the area to the north based on similar geological settings. The data identified a very complex network of west-northwest and northwest trending fault structures similar to that of the AGS Deposit in orientation and internal “disruption”. Several of the anomalies are persistent over the entire survey area, indicating major tectonic structures are present. CFI designed a diamond drilling program to test several of these features in the summer of 2019. The results were successful in identifying fault structures associated with each anomaly, including the discovery of significant fluorspar mineralization in two areas.

*Comment: This method of exploration described here appears excellent in identifying structure and fluorspar mineralisation.*

### 7.2.5 Regional Geophysics

CFI has been quite active on exploration and evaluation projects outside of the immediate AGS Deposit. Regional geophysical surveys have been completed along with diamond drilling programs with various scopes. Notably, CFI has advanced exploration and resource generation/evaluation on South Ridge. A new discovery of fluorspar veining was discovered in 2019 at AGS North. This discovery was made during targeted drilling of anomalies generated from a high-resolution airborne magnetic survey.

Various ground and airborne surveys have been conducted from 2012 – 2019.

In 2015, CFI contracted Geotech Ltd. to complete an airborne geophysical survey of its land holdings. The helicopter borne survey used the versatile time domain electromagnetic (VTEM) plus system for locating conductive anomalies and was fitted with a cesium gradiometer for mapping geological structure and lithology. Geotech Ltd. conducted the survey between May 22 and June 7, 2015, and covered 867 line-km of surveying over all the CFI mineral licenses.

Recent ground geophysical (magnetometer and HLEM) and airborne geophysical (magnetometer and VTEM) survey results indicate that numerous weak to moderate electromagnetic (EM) conductors and magnetic lows (lineaments) occur over the Property. Two of the prominent EM conductors are coincident with the surface traces of the mineralized structure at the North/South Ridge Vein and the AGS Veins, respectively. These results further indicate additional mineralized structures may be present on the Property.

*Comment: The magnetic surveys have provided further regional targets to follow up. It is encouraging that both the South Ridge and AGS North areas gave CFI high-potential projects to evaluate and support their ongoing development, of which this report is part.*

## 7.3 Soil Sampling

An orientation soil sampling survey was conducted at AGS over the North and South veins in 2016. Samples were collected at 25m intervals along a composite line chosen to coincide with vegetative cover with the best opportunity to collect B-horizon soil material. A total of 49 samples were collected and 27 samples were analysed for fluorine using inductively coupled plasma (ICP) at SGS Laboratories, in Lakefield, ON (SGS). The program was successful in detecting anomalies for several metals in soils that are coincident with fluorspar veins.

Further soil sampling was planned, but not executed, for upcoming exploration programs as a preliminary screening tool for geophysical anomalies detected from ground and airborne surveys in recent programs.

*Comment: This appears to be a useful first pass exploration tool, even though it is in an area of glaciated terrain.*

# 8 DRILLING

## 8.1 Up to 2008

Drilling on the Tarefare (TF) deposit was done before the other 3 deposits presented in the current study. From the 1940s to 1990, exploration was done by Alcan and Newfluor Drilling, representing 29% (22 holes – 7,173m) of the drilling done on TF. In 1999, the TF drilling was done by the then-owners, Burin Minerals Ltd. (BML), for 23% (16 holes – 5,769m) of the TF drilling. Finally in 2008, drilling was done by Canada Fluorspar (NL) (CFI-NL), for 48% (39 holes – 12,177m) of the TF drilling. All of this diamond drilling recovered NQ core.

In the BML phase, these drillholes were downhole surveyed using the Wellnav system. RPA (2011) reported the BML and CFI-NL drilling being done to industry standards.

## 8.2 CFI Exploration Drilling (2013-2015)

During the 2013, 2014, and 2015 exploration programs, CFI completed 61,149m of drilling in 287 diamond drill holes, as follows:

- **2013**: 15,165m of drilling in 80 diamond drill holes on; North/South Ridge Vein extensions and western part of AGS grid and seven holes at Hares Ears;
- **2014**: 23,400m of drilling in 112 diamond drill holes on In-fill drilling and eastern part of the AGS Vein structure; and
- **2015**: 22,580m of drilling in 89 diamond drill holes, including 57 exploration holes (18,678m), nine geomechanical holes (total: 1,278m), and fourteen condemnation holes (2,335m). 58 of the exploration holes (16,457m) were completed on the AGS grid and nine holes (2,036m) were completed on the North/South Ridge North grid.

The SLR (2022) report states that approximately 127,184m of diamond drilling in 672 holes has been completed on the Property by CFI and its predecessors during the past 72 years.

### 8.2.1 2013 Drilling

From January 14 to September 22, 2013, CFI completed 14,450m of diamond drilling. This comprised; 5,020m in 25 holes testing the northern and southern extensions of the North/South Ridge Vein, 8,425m of diamond drilling in 42 holes testing the central and western portions of the AGS Vein, and 1,005m in seven holes testing the Hares Ear target area.

*North/South Ridge Vein Extensions*

In 2013, CFI completed 5,029m of drilling in 25 diamond drill holes on the North/South Ridge Vein extensions, the majority of which (15) intersected significant mineralization of greater than 20% $CaF_2$ over intervals ranging from 0.70m to approximately 13.60m. Results of recent drilling indicate that fluorspar mineralisation extends at depth in the northern part of the North/South Ridge Vein but exhibits limited depth and along strike extensions in the southern portion.

*AGS West Extensions*

In 2013, CFI completed 9,131m of drilling in 48 diamond drill holes on the western part of the AGS Vein structure, the majority of which (33) intersected significant mineralization of greater than 20% $CaF_2$ over intervals ranging from greater than 2.0m to approximately 21.5m. These holes tested 2.5km of the approximately 4km long AGS structure. The holes intersected the AGS Vein at depths ranging from 90m to 200m vertically below the surface.

### 8.2.2 2014 Drilling

Drilling From June 16 to December 19, 2014, CFI completed approximately 23,400m of drilling in 108 diamond drill holes, further testing the western, central, and part of the eastern extension of the AGS Vein structure. Some of the holes were twin holes, due to poor ground conditions. In addition, CFI completed reconnaissance holes testing some of the HLEM conductors situated north of the AGS Vein structure. The majority of the 108 drill holes completed intersected significant fluorspar mineralisation of greater than 20% $CaF_2$ over intervals ranging from two metres to approximately 20m. Interpretation of the drill results indicates that:

- At the western part of the AGS Vein grid the mineralized structure maintains a relatively uniform strike and width within a depth of 200m to 250m vertically below the surface;
- Very competent core and good continuity of mineralized material at depth; and
- Much of the fluorite mineralization is hosted by meta-sedimentary rocks (weakly metamorphosed interbedded siltstones and siliceous mudstones), whereas most of the mineralization present in the major fluorspar veins– the historic North/South Ridge, Tarefare, and Blue Beach North Deposits – is hosted by the SLG (CFI-NL Press Releases, July 11, August 29, and October 25, 2013).

### 8.2.3 2015 Drilling

*AGS Vein Structure*

From January 22 to August 24, 2015, CFI completed approximately 22,265m of drilling in 84 diamond drill holes further testing the western, central, and part of the eastern extension of the AGS Vein structure. The majority of the 84 drill holes intersected significant fluorspar mineralization similar to the 2014 results.

- Nineteen in-fill holes further testing the fluorspar mineralized zones discovered both along strike and further at depth in the north-western (low-carb) portion of the AGS Vein structure (total, 4,696m);
- Thirty-eight in-fill holes further testing the fluorspar mineralized zones occurring both along strike and further at depth in the south-eastern (high-carb) portion of the AGS Vein structure (total, 12,363m);
- Five holes testing other geophysical targets north of AGS (total 1,594m);
- Eight geomechanical holes; total 1,278m; and
- Fourteen condemnation holes; total 2,335m. Most of the holes testing the AGS Vein structure intersected fluorspar mineralization ranging from 91.3% CaF2 over 2.0m to 50% CaF2 over 21.6m. Springdale Resource Management Inc. (Springdale) was retained by CFI for the 2013, 2014, and 2015 drill programs. The drilling crews worked two 12-hour shifts and recovered NQ core throughout the hole.

*North/South Ridge North Vein Structure*

In 2015, a short exploration drill program was designed to test the geophysical anomalies identified from geophysical surveys completed in October 2014, and to test for possible fluorite mineralization in the overlying meta-sediments. The HLEM MaxMin and magnetometer surveys were completed over the grid extension of AGS and North/South Ridge by Abitibi. Springdale was contracted to undertake the drill program which began in on February 2, 2015, and concluded on March 11, 2015 on the North/South Ridge North Extension. A total of six drill holes were completed with 2,037m drilled.

All drill holes were collared in meta-sediments with an azimuth of 050° and were stopped in SLG once the structure identified by the geophysical surveys was intersected. Though no fluorite bearing structures were observed in the meta-sediments, the northern extension of the North/South Ridge Vein was intersected in all of the drill holes. Fluorite mineralization intersected ranged from a broad stockwork, breccia zone to locally massive veining. Mineralization ranged from 19% $CaF_2$ to 36% $CaF_2$ across broad zones of mineralization from 4m to 19m and upwards of 69% $CaF_2$ across 1.03m of massive veining.

## 8.3 2016 to 2019 Drilling

From 2016 through 2019, CFI completed several phases of delineation drilling on the AGS Deposit as well as exploration projects and drilling on other target areas. Additionally in 2016, CFI completed a major core re-sampling program in order to capture lower grade mineralization that would be modelled with lower cut-off grades and ultimately, mined at lower cut-off grades in the open pit. A drill program targeting aggregate was completed in 2017 to collect material for test work and further define the waste rock mass. CFI met the objectives for continued evaluation of the AGS Deposit which included:

- Resource conversion from Inferred to Indicated categories;
- Expansion and delineation of numerous smaller fluorspar veins that are within the pit shells; and
- Overall increased definition and delineation of the fluorspar veins at AGS in the upper 150m of stratigraphy, in order to evaluate the mineable open pit reserves and maximize open pit mine life.

### 8.3.1 2016 AGS Drilling

Drilling Diamond drilling in 2016 included a limited exploration program at Iron Springs and an Ore Variability (Metallurgical) drill program at the AGS Deposit. The metallurgical drill testing program began on February 3, 2016, and was completed on February 19. Springdale was contracted to complete 15 drill holes totalling 1,237m. The 2016 drill program was designed to collect metallurgical samples from the AGS Deposit, to test various vein domains from different years of planned production in the resource area and to gain a better understanding of the ore chemistry variability, as it would be received by the mill over time.

Five of the holes were twin holes from previous drilling campaigns to gain higher confidence in the expected volume and grade characteristics of the ore, while the remaining ten holes consisted of newly designed holes to gain information where no previous drill holes were completed. A total of seven composite samples were obtained from the five twin holes to be

sent for bulk ore variability testing and thirteen additional composites were prepared from the new holes, for a total of twenty composite samples. The thirteen new composites were sampled for assay as per the CFI sampling protocol.

### 8.3.2 2017 AGS Drilling

In 2017, a diamond drill program was planned and completed to achieve the following objectives:

- In-fill drilling to define the AGS Deposit underneath the newly drained Grebes Nest Pond.
- To better define the complex vein/structural corridor between the Grebes Nest Pond and Center Pit;
- To better define the limits of the Grebes Nest veins at the east end of the Grebes Nest Phase 1 Pit; and
- To meet the objectives required for final design of the Grebes Nest Pit shells.

The 2,928m in-fill drilling program was completed at AGS from May 24 to July 8, 2017. The 27-drill hole program focused on defining and upgrading the open pit resource classification underneath the recently dewatered and now accessible Grebes Nest Pond, the area between the Grebes Nest and Center pits, and the area near the eastern limits of Grebes Nest Pit. The drilling contract was awarded to Springdale. A single Duralite 500 nodwell-mounted rig was used to drill NQ-sized drill core. Assays were performed in CFI's onsite laboratory while check assays were completed at both SGS Lakefield and Eastern in Lakefield, ON and Springdale, NL, respectively.

The 2017 program was successful in meeting all planned objectives. Logistically, the program required significant assistance from mine operations for road access within the Grebes Nest Pond limits. While scheduling drill hole relocations and hole shutdowns around blast times was very dynamic, all field logistical concerns and scheduling were appropriately addressed.

Drilling conducted on the west end of the GP2 Vein was successful in delineating thick, predominately moderate to high grade zones of fluorspar and calcite veining. Additional veins were intersected in the AGS Deposit area during the program, some of which will be modelled in the next resource update. Mining activities and pit mapping data have confirmed the presence of these mineable veins in the northwest and southwest portions of the Grebes Nest Phase 1 Pit.

Drilling on the east end of the Center Pit also proved positive and will have implications for final pit design. Though the AGS Deposit continued to display a pinch zone between the two pits, some impressive intersections were realized in this highly complex area. Ongoing vein wireframe modelling based on reinterpretation work will potentially be added to the AGS Mineral Resource in this area. Drilling on the east end of the Grebes Nest Pit was completed to help refine the pit limit in this area. Drilling results were consistent with previous interpretations and with no significant changes in the resource or pit shells.

### 8.3.3 2019 AGS Drilling

In 2019, CFI completed a 43 hole - 4,220m resource definition, in-fill and expansion diamond drilling program at AGS. The 2019 program was designed primarily to in-fill and provide definition of resources for new pit designs, and further expand and define additional resources on several veins in the northeast portion of the Center Pit. The 2019 program was successful as the resource increased and orebody definition improved. AGP (a Canadian consultancy) was engaged to provide the revised mineral resource estimate, block model, and create a new pit design along with the LOM plan.

## 8.4 2020 to 2021 AGS Drilling

From December 3, 2020, to March 5, 2021, a 5,311m in-fill and expansion drilling program at AGS was conducted. The 34-hole program focused on further vein definition in the Center Pit as well the transition zone between the Grebes Nest and Center pits (known as Pond Pit). Expansion drilling was also targeted the NV footwall structure on the north side of the Center Pit. CFI Geology Department staff managed the program and retained contract geologists to log drill core. The drilling contract was awarded to Majors Contracting Limited (Majors). A single Duralite 1000 track-mounted rig was used to drill NQ sized core drill holes. Assays for $CaF_2$ and $CaCO_3$ were performed at Eastern.

The 2020 to 2021 program was successful in meeting all planned technical objectives outlined above. Infill drilling focused on the Center Pit and further refined the complex nature of vein bifurcations in the area. Ultimately this information was used to aid in the interpretation and wireframe modelling of the South and North Veins, in addition to associated intermediate sized veins. Six drill holes were completed in the Center Pit to Pond Pit transition area providing further clarification of this complex zone. This is important to both short and medium term mine planning and pit design.

These holes were also successful in intersecting high grade fluorspar in relatively narrow veins and displaying vertical continuity to veins present in this area. The presence of high-grade material within the North Vein structure at deeper elevations was also confirmed. Drilling conducted on the north side of the Center Pit was focused on resource expansion and in-fill drilling on 50m spacing. The 2020 to 2021 program was successful in further defining the North Vein footwall structure and confirmed high grade fluorspar in relatively narrow veins up to a depth of 200m below surface. It should be noted that drill hole GS-2021-302 intersected a 30m interval which assayed 19% $CaF_2$ including 7.65m at 52% $CaF_2$ at an elevation of 150m below surface.

Results from the drilling program were positive, with intersections averaging one metre to 40 m in width. Assays of fluorspar mineralization predominately returned moderate to high grades, with values ranging from 5% $CaF_2$ to 90% $CaF_2$. Drill hole GS-2020-281 assayed 41% $CaF_2$ over 20.3m including a 10.3m interval grading 52% $CaF_2$. Furthermore, GS-2021-296 assayed 58% $CaF_2$ over 11.57m including an 8.5m interval grading 82% $CaF_2$. Drill hole GS-2021-305 assayed 19% $CaF_2$ over 39.9m interval including a 7.65m interval grading 52% $CaF_2$.

### 8.4.1 North/South Ridge Vein

Following the 2015 exploration programs, two further in-fill and expansion diamond drill programs were completed in 2019 and 2020 on the South Ridge part of the deposit.

In 2019, a 2,444m in-fill and expansion drilling program was completed at South Ridge from August 15 to September 22, 2019. The 24-hole program focused on further vein definition by drilling on 50m spaced sections from the 100m spaced section drilling completed in 2013. As a result, fluorspar resources were upgraded from Inferred to Indicated which allowed economic analysis of the North/South Ridge Deposit. CFI Geology Department staff managed the program and retained contract geologists to log drill core. The drilling contract was awarded to Logan Drilling Limited. A single Duralite Marooka mounted rig was used to drill NQ sized core drill holes. Assays for $CaF_2$ and $CaCO_3$ were performed at Eastern.

The 2019 program was successful In meeting all planned technical objectives outlined above. The North/South Ridge Deposit remains open at depth and along strike to the south, where favourable results were generated on Section 18+50S, the southernmost drilling conducted south at the time. Logistical and operational issues were minimal as the program was completed without any significant issues. Drill hole DS-2019-149 was terminated prior to completely penetrating the main North/South Ridge Vein structure due to poor ground conditions. DS-2019-149a was collared 10m grid east from the original collar, successfully cut the North/South Ridge Vein structure, and reached the planned final depth.

Results were positive from the 2019 drilling program, with intersections averaging 5.0m to 20 m in width. Fluorspar intersections returned predominately moderate grades, ranging from 10% $CaF_2$ to 40% $CaF_2$. Hole DS-2019-147 assayed 22.2% $CaF_2$ over 10.27m. Hole DS-2019-155 assayed 27.5% $CaF_2$ over 20.5m, including a 5.8m interval grading 49.1% $CaF_2$.

CFI engaged AGP to complete a revised resource estimate at North/South Ridge South including pit design and mineral reserve statements. The 2019 program was successful in upgrading and expanding the Mineral Resource as the NI 43-101 compliant Mineral Resource generated in April 2020 included *Indicated* Resources of 1.0Mt at 30.5% $CaF_2$ and *Inferred* Resources of 0.07Mt at 15.5% $CaF_2$.

In 2020, a 2,552m expansion, and minor in-fill drilling program, was completed at South Ridge from October 25 to December 2, 2020. The 20-hole program focused on expanding fluorspar Mineral Resources along strike to the south, minor in-fill drilling, and definition of Mineral Resources near the southern limit of historic underground mining. The 2020 drilling program was designed to increase the Fluorspar Mineral Resources, add to the Indicated Resources and thus allow further economic analysis of the North/South Ridge Deposit. CFI Geology Department staff managed the program and retained contract geologists to log drill core Canada Fluorspar Inc. The drilling contract was awarded to Majors. A single Duralite 1000 track-mounted rig was used to drill NQ sized core drill holes. Assays for $CaF_2$ and $CaCO_3$ were performed at Eastern.

The 2020 program was successful in meeting all planned technical objectives outlined above. The North/South Ridge Deposit remains open at depth and was extended toward the south to Section 21+50 S, the southernmost drilling conducted to date. Fluorspar intersections were observed in all drill holes and assay data indicated strong results to 20+00 S, with weaker results further south. Two holes drilled at the southern limit of historic underground mining

returned broad intersections (>50m core length) low to moderate grade fluorspar veining and stockwork. Logistical and operational issues were minimal as the 2020 program was completed without any significant issues.

Results were positive from the 2020 drilling program, with intersections averaging 1.0m to 75m in width. Fluorspar intersections returned predominately moderate and low grades, ranging from 5% $CaF_2$ to 40% $CaF_2$. Hole DS-2020-160 assayed 7.1% $CaF_2$ over 57.7m including a 10.2m interval grading 15.1% $CaF_2$. Hole DS-2020-169 assayed 26.3% $CaF_2$ over 6.0m. Hole DS-2020-177 assayed 13.7% $CaF_2$ over 47.95m, including a 6.0m interval grading 35% $CaF_2$.

*Comment: These encouraging results warrant further follow up drilling.*

### 8.4.2 AGS North

Prior to 2019, no exploration drilling had been conducted by CFI in the area of AGS North (previously known as Mine Cove). The 2019 AGS North drilling was designed to test geophysical targets generated by the UAV-AeroVision Magnetics survey conducted in May 2019. From initial discovery of the AGS North ore body, multiple drill programs were conducted along vein extents in order to advance the area to initial mineral resource calculations. It is noted that at the time of receivership, the AGS North drill program was still in progress leaving planned drilling and assay samples unfinished.

*2019 AGS North*

CFI completed 3,156m of NQ core drilling in 27 holes at AGS North which resulted in the identification of two new fluorspar veins warranting additional drilling. Mineralisation in the AGS North area is similar to the AGS Deposit overall, including paragenetic mineralisation phases. Early interpretation indicates that the AGS North Veins have an east-west trend, as opposed to the NNW-SSE trend of the major veins at the AGS Deposit.

*2021 AGS North (Phase 1)*

In 2021, a Phase 1 drilling program was designed at AGS North to continue exploration in the area. A 4,087.5m in-fill and expansion drilling program at AGS North was conducted from March 26, 2021 to May 7, 2021. The 30-drill hole program focused on in-fill drilling, resource expansion, and further definition of the mineralization identified in the AGS North area. The 2021 program was successful in meeting and exceeding the planned objectives. The Vein #2 structure was intersected in all drill holes, further defining the vein orientation, extending the strike length from approximately 250m to approximately 750m and ultimately providing information that will justify the planned initial Mineral Resource Estimate which was originally scheduled for early 2022. Due to insolvency, the initial Mineral Resource Estimate was not achieved.

CFI Geology Department staff managed the program and retained contract geologists to log drill core. The drilling contract was awarded to Majors. A single Duralite 1000 track-mounted rig equipped with a NQ sized core barrel was used to drill all planned holes. Assays for $CaF_2$ and $CaCO_3$ were performed at Eastern. Logistically, the 2021 program was completed ahead of the predicted timeline, this is attributed to short moves and no shutdowns due to equipment failure, as well as favourable ground and weather conditions. The efficient execution of this

program resulted in the program being below budget, allowing additional meterage to be added to the program.

In-fill and definition drilling on Vein #2 were successful in confirming the east-west strike and steeply dipping orientation of the vein. Results from this program were positive, with mineralised intersections ranging in size from 4m to 42m in width. Assays of fluorspar mineralization returned predominately low to moderate grades with values averaging 4% $CaF_2$ to 48.5% $CaF_2$. Notable drill intersections include drill hole MS-2021-032 which assayed 28% $CaF_2$ over 10.92m including a 3.97m interval grading 54.4% $CaF_2$, MS-2021-045 which assayed 16.9% $CaF_2$ over 11.5m including a 6.0m interval grading 21.3% $CaF_2$ and MS-2021-049 which assayed 13.7% $CaF_2$ over 30m including an eight-metre interval grading 27% Ca $CaF_2$.

Overall, the AGS North structure has been intersected over a strike length of approximately 750m. It has an east-west strike and dips sub-vertically to steeply north. Establishing continuity of the broad low-grade zones, and high grade veining within these, is challenging due to the structurally-controlled nature of the vein system and presence of multiple veins. All indications to date suggest a strong similarity with the AGS Deposit in terms of fluorspar mineralization, accessory minerals, vein paragenesis, overall structural controls and associated alteration.

*2021 to 2022 AGS North (Phase 2)*

As a direct result of the success of the 2021 to 2022 drill program, CFI planned and permitted an additional Phase 2 drilling program for AGS North to further support the calculation of the planned initial Mineral Resource estimate in 2022. CFI had planned to use the results from the 2021 to 2022 AGS North drill program to evaluate the economic potential of adding AGS North to the overall LOM plan. However, due to its 2022 Receivership status, this plan was placed on hold.

In September 2021, Phase 2 of the AGS North drilling program commenced and drilling continued in the area until site shut down on February 19, 2022. At the time of shut down, the drill was stationed on drill hole MS-2022-118 at a depth of 100m with a planned depth of 150m. The data for the Phase 2, 2021 to 2022 drill program was still being compiled at the time of writing the SLR Technical Report.

From September 23, 2021 to February 14, 2022, a 9,606.80m, 61 hole in-fill and expansion drill program was conducted at the AGS North property. Forty-two drill holes totalling 6,713m were drilled in 2021, with 19 holes drilled in 2022 totalling 3,045m. While the initial results of this program appeared promising, the majority of the drill core samples were still awaiting cutting and assay analysis by the time of writing the SLR Report.

SLR recommended completing the planned drilling, core sampling, and assays of these samples. Once this data has been analysed and the results reviewed, this area has the potential to advance to an initial Mineral Resource estimate. Presently, all core from this program has been logged and sampled and assays are expected to be fully returned in late December. Analysis of the results is schedule for Q1 of 2024.

*Comment: The author concurs with the recommendations given above by SLR.*

## 8.5 Re-Logging and Re-Sampling Programs

### 8.5.1 2016 and 2017 AGS Core Re-logging and Re-sampling Program

In 2016 and 2017, CFI conducted a large scale AGS core re-sampling and logging program. The program was initiated on July 20, 2016, and included evaluation and re-sampling of 210 exploration diamond drill holes, eight geomechanical drill holes, 15 metallurgical drill holes, and 20 condemnation drill holes that had been completed at AGS from 2013 to 2016. All holes were reviewed for potential re-sampling opportunities, with the exception of the condemnation holes. A total of 3,365 samples were generated from the program and sent for assaying.

The AGS Deposit re-evaluation involved three phases:

- Re-model the deposit vein wireframes in three dimensions (3D) using GEMS software to encompass lower grade samples already available in the database that did not meet the previous modelling criteria. A new block model and resource estimate was generated giving positive results. Phase 2 was then initiated;
- Complete core re-sampling of all prospective drill core that contained lower grade zones not meeting previous sampling criteria, expanding shoulder sampling where moderate grade $CaF_2$ was present, and sample smaller vein zones that had not been sampled because open pit mining had not been considered in the early stages of exploration; and
- Re-model the AGS deposit again using revised criteria and complete a new block model and resource estimate. Prior to re-modelling, a 2,928m in-fill drilling program was completed during the summer of 2017 to allow an upgrade in resource classification in certain parts of the deposit.

The updated data from this program is what was used in the current estimation study for the affected holes.

### 8.5.2 2019 North/South Ridge Re-logging and Re-sampling Program

In 2019, CFI conducted a re-logging and re-sampling program of the 2013 North/South Ridge drill holes. A total of 440 samples were generated from the program and sent for assaying. The program was planned to further test smaller mineralised intersections to enhance interpretation and vein modelling. Some samples were taken to expand the mineralized structure, while others were used to close gaps in the sample assay database to assist with vein modelling.

CFI planned to continue exploring for fluorite on Property with systematic exploration programs to assess the potential for an additional economic open pit, aggregate, and possible underground fluorite deposits. The 2022 AGS North drill program was cut short due to financial restrictions in February 2022. Completing the planned drilling and sample assays at AGS North will allow this area to advance to preliminary resource estimation.

*Comments: It is understood that the 2019 results of re-sampling have been used in the current study for the affected holes. It is recommended that in subsequent master database updates, the date of logging, assaying, assay types and assaying companies are all referenced.*

## 8.6 Drilling Procedures

### 8.6.1 Diamond Drilling

Most drill programs undertaken on the Property include NQ core, with specific programs using the larger, HQ core for bulk aggregate testing. CFI has worked with multiple diamond drill contractors to complete the various drilling programs throughout the years, with all contracts being awarded based on a bid and tender system.

In a typical drill program, the drilling crew worked two 12-hour shifts and recovered core throughout the hole. Proposed drill hole locations were marked in the field in advance of drilling, with a collar and two back sight pickets. Drills were directed to set up on proposed drill hole locations and sighted using back sights and handheld compasses by the CFI Geology team. At AGS, upon completion of a drill hole it was common practice for drill crews to remove the casing from the ground due to heavy equipment and mining activity. Drill crews would identify the collar prior to leaving the drill pad so hole locations could be accurately surveyed by CFI surveyors. Removing the casing is common practice for most of the exploration programs conducted by CFI. The procedures used during the diamond drilling programs are summarized as follows:

- Collar locations of all drill holes were surveyed and marked in the field using survey equipment.
- For downhole surveying the holes, CFI used the Flexit system provided by drill contractors. Measurements of the hole inclination and azimuth were taken at the collar and then at approximately 50m intervals down the hole.

*Comment: Description of the drilling procedures appear to meet Industry Best Practice, which would conform with NI 43-101 reporting guidelines.*

### 8.6.2 Logging Procedures

Lithological logging of drill core and geotechnical observations was completed by core logging CFI and contract geologists. Logging was completed by depicting all down hole data including definition of sample intervals. All information was recorded on logging forms prepared by CFI.. This included marking:

- Lithologic contacts.
- Descriptive geology.
- Determination of SG of mineralised intersections and selected parts of wall rock.
- Intensity of various alteration types.
- Structural features, such as foliation (with angles), fracture, and brecciated zones.
- Core diameter.
- Down hole orientation, including azimuth and inclination.
- Total core recovery. If recorded, this was amongst text descriptions of the lithology logging.
- Photographic record of the core with a digital camera prior to and post logging.

### 8.6.3 Geotechnical Logging

During 2014-2015, Itasca completed a geotechnical project, which necessitated the recording of geotechnical data, including rock quality designation (RQD) measurements, point load testing adjacent and within mineralized intervals, and destructive testing (ICCI) of a selected suite of 30 samples from the deposit area. In the same period downhole televiewer surveys were also conducted on selected drill holes.

As part of the drill hole logging procedures, CFI carried out geotechnical logging, which included recording geomechanical observations on drill core. In total, CFI carried out geotechnical logging on 5,946m of drill core recovered from 84 holes. This work was completed under the supervision of Itasca. The parameters recorded in this phase of logging included, TCR, RQD, number of joints, joint condition rating, and the frequency of fractures. Based on the parameters logged, rock mass rating (RMR) and rock quality (Q) were determined. In general, CFI recorded the characteristic geotechnical data on three main rock types. These were, the AGS Vein structure (GZ0), meta-sedimentary rocks (MS), and rhyolite (RHY).

The data indicates that the mean Q values in drill core are within a short range, from a low of 4.6 in rhyolitic rocks, to a high of 7.4 in meta-sedimentary rocks.

*Comment: This geotechnical logging, laboratory tests were supervised by Itasca (CFL–N4, 2015a), of 5,946m of core logged for TCR, RQD, No. of joints, joint condition rating, and the frequency of fractures for the AGS Vein structure (GZ0) is extremely useful.*

CFI geologists also collected a set of samples from each rock type, which Itasca tested for Unconfined Compressive Strength (UCS), Young's Modulus, and Poisson Ratio at Queen's University, Kingston, Ontario (2015).

From November 4 to 5, 2014, CFI contracted DGI Geoscience Inc. (DGI) to carry out downhole televiewer surveys for five of the drill holes. The goal of the project was to acquire in-situ 3D (true dip and orientation) information to assist in the geotechnical study for the future open pit mine design. To facilitate this, optical televiewer (OTV) and acoustical televiewer (ATV) data were acquired.

In October 2015, DGI was again retained to complete surveys of eight additional holes for the same purpose as in 2014. The data acquired by these two methods was as follows:

- ATV: Drill hole azimuth, inclination, acoustical amplitude, and travel time. ATV data provides important information regarding the geotechnical competency of rock formations. This ability has made the ATV probe an important component for precise geotechnical studies (DGI, 2014 and 2015); and
- OTV: Drill hole azimuth, inclination (360°), true colour high resolution image of drill hole wall. The OTV data provide an oriented image of the drill hole wall for the entire length of the drill hole. This 360° high resolution image can be used to identify, measure, and orient bedding, folding, faulting, and lithological changes in the drill hole.

The purpose of the down hole surveys was to obtain orientation data from the joint sets present in the rocks. This data will aid in the development of a geomechanical model of a future mine site, in particular, establishing slope stability for an open pit mine, and ground support requirements and stope stability assessment for an underground mine. Four of the five drill holes were oriented at Azimuth 035°, while the fifth was oriented at Azimuth 220°. Since four of the five holes have the same orientation, this may cause a bias in the data collection, and it is possible that other joints may not have been recorded. DGI planned to use another hole oriented at Azimuth 052°, but was not successful, because the hole was blocked by debris, and the survey could not be carried out. For all five holes, the Azimuth (Alpha) and inclination (Beta) were recorded.

In 2015, DGI also carried out a pit slope stability study for the conceptual AGS open pit. Each wall was examined in detail with the most relevant joint set orientations. Pit wall stability assessments were ongoing.

# 9 SAMPLE PREPARATION, ANALYSES AND SECURITY

## 9.1 Sample Preparation

### 9.1.1 Alcan, 1940 to 1977

Detailed information on the Alcan sampling method and approach for its mining and exploration programs is not available. Nevertheless, it is believed that sampling procedures were comparable to industry standards of that time. Sample preparation, assaying, and quality assurance/quality control (QA/QC) procedures used by Alcan are also not available. It is understood that the procedures used during the exploration and production phase, with assaying using the Willard and Winter Distillation Method, were consistent with industry standards at the time (BML, 2009).

### 9.1.2 BML and CFI, 1999 to 2021

Sampling and sample preparation procedures used by CFI personnel during the 2008 to 2016 drill programs were the same as those used in earlier drilling campaigns by BML. Mineralized drill core intervals to be sampled were identified and marked by core logging geologists, as originally described in Core Logging Guide procedures outlined by CFI Senior Geologists, Messrs. Reeves and Sparkes in 2014. Sample intervals were identified from mineralization structure and generally measured at one metre intervals, with variation occurring based on mineralization style or estimated $CaF_2$ grade. Sample lengths were adjusted to segregate samples from massive veining as opposed to stockwork breccia style mineralization.

A typical sample sequence throughout an interval of massive veining included 1m of waste wall rock on either side of mineralization and 1m samples throughout the vein. As sampling is based on mineralization there is some variation to sample lengths, ranging from 0.5m to 1.5m. Visual indicators of the intervals to be sampled included lithologic contacts, vein material, and structures, such as brecciated and altered zones. Drill core was sampled by CFI Geologists while CFI Technicians were responsible for RQD measurements, sample cutting and preparation. CFI used the following sampling procedures:

- Drill core is brought by authorized exploration personnel one or more times per shift from the drill rig directly to the core shack. At the core shack, the drill core is laid out sequentially on core logging benches where a quick log is documented and sent out for email reference and program progress purposes;
- Once core is laid out, CFI Geotechnicians measure the core by metre and then complete RQD and TCR measurements. Core depths are identified, documented, and marked on the core box end so they are visible in photographs;
- CFI Geologists then begin logging the drill hole which includes identifying the lithology, mineralization, and structure of the drill core. Core is logged, sampled, and photographed. Samples are then transferred to the cutting room, where marked samples are cut by a rock saw and placed into samples bags for assay analysis;
- Upon completion of the lithologic logging, drill core is laid in the core boxes with the same orientation to the extent possible, except for strongly fractured and fragmented core;
- For mineralized intersections, prior to sampling, the drill core is marked by a line drawn along the core, so that systematically one side of the core is sampled;
- The core is then cut by a diamond saw. One half is cut again (always the same half) and the quarter core is sampled and sent for assay analysis. The other quarter core is left in

the core box for future reference. Samples were either sent to SGS in Lakefield, Ontario, Eastern, or the onsite CFI laboratory;

- Sample intervals are marked by sample tags in the core box and are normally extended for one metre into un-mineralized rock;
- Half core is also kept in the core for future metallurgical test work;
- Sample tags are inserted in plastic bags at the beginning of each sample. Sample tags are inserted in the same bags only after the samples are collected;
- A second sample bag with a sample tag is fastened (with a stapler) to the core box at the end of each sample, together with flagging tape for visual identification;
- Sample bags are numbered prior to sampling. Each sample is assigned a unique sample number that allows it to be traced through the sampling and analytical procedures, for validation against the onsite CFI laboratory, the quarter core of the assay sample is dried in an oven at 110°C. It is then crushed in a jaw crusher and passed through a riffle. One half of the riffled material (approximately 0.5kg) is put in the first bag and sent for $CaF_2$ assay, and the other half is stored at the site for possible future check sampling. Samples sent to Eastern, included placing the quarter core into marked sample bags and Eastern would undertake the crushing, pulverising, and splitting of the sample for analysis;
- A permanent marker is used to mark sample intervals on the core boxes in addition to the flagging tape;
- Samples are collected in medium sized 24cm x 36cm sealed polyethylene bags. At the assay laboratories, standards were inserted after every ten samples. In addition, a blank determination was conducted with each batch. Samples were placed in five-gallon pails marked with the range of sample numbers. A list of the sample numbers was included with each shipment. Pails containing samples were stored in a separate room in the core storage area and only authorized personnel were allowed to handle them.

SLR were of the opinion that the drill core sampling procedures employed by CFI are consistent with industry standards.

## 9.2 Analysis

### 9.2.1 Up to 2008

Prior to 1999, RPA reports the assaying being done using the Willard & Winter Distillation Method, and that they were in keeping with industry standards at the time.

From 1999-2008, samples were prepared and assayed by Lakefield (subsequently SGS), using the Ion Selective Electrode (ISE) determination method.

### 9.2.1 SGS Lakefield, ISE and DCT Analysis, 2013 to 2015

From 2013 to 2015, the chemical analysis for $CaF_2$ and $CaCO_3$ was carried out by SGS Lakefield, on the AGS drill core samples. Analyses employed were the ISE method, for samples that were expected to contain relatively lower grade fluorite (10% $CaF_2$) and, for higher grade samples, the Dual Calcium Titration (DCT) method was used. These methods are referred to as wet chemical methods.

Based on an internal study, carried out by CFI, it was determined that the ISE method was better suited for low grade fluorite mineralization, whereas the DCT method provides more accurate determination for mineralized intersections >10% $CaF_2$ (Wilson, 2008).

### 9.2.2 Eastern, 2015

In 2015, Eastern completed $CaF_2$ assay analysis during the geomechanical drilling program. The analyses carried out was ISE method for $CaF_2$. Additionally, in 2015, CFI sent a limited number of samples to Eastern to be assayed for lead, zinc, and silver since several samples exhibited base metal mineralisation, such as galena and sphalerite. Values from this sampling returned values ranging from 0.23% Pb to 0.36% Pb, 0.38% Zn to 3.30% Zn, and 10.2 g/t Ag to 17.9 g/t Ag. No further base metal analysis was completed since 2015.

*Comment: In the data available for the current study, only very limited Pb/Zn assays were available for the TF data. The reasons for this temporary interest in sulphide grades are not clear. This needs to be clarified to ensure that Pb/Zn assays are not required at any time in the future.*

### 9.2.3 CFI - 2016 to 2017 – Internal Analysis

During the latter part of the 2015 exploration program, CFI commenced using a new method of determining fluorite content in rocks by the nuclear magnetic resonance (NMR) technique. When fluorine (F19) nuclei are placed in a magnetic field they resonate (precess) as they are irradiated with radio waves of the correct frequency. This energy is of a frequency specific to the nuclei being examined (called “resonance frequency”) and depends on the magnetic field strength as well as the magnetic properties of the nuclei.

From 2016 to 2017, CFI tested and used an onsite NMR analysis for the determination of % $CaF_2$ content in samples. CFI used the NMR method during the 2016 drill programs at Iron Springs and AGS. This method was also used on the re-sampling program in 2017. The objective was to develop a rapid analysis methodology onsite, to facilitate drilling program guidance, and reduce time and cost from using an outside laboratory. This method was discontinued in 2017, however, due to the ramping up of mine operations that reduced capacity at the CFI laboratory and that the turnaround time at the onsite lab could not keep up with the demand of the operations. It was also noted that, for several duplicate samples completed at SGS for comparison, discrepancies of greater than two standard deviations were apparent, mainly in lower grade samples (< 10% $CaF_2$).

The NMR assays in the databases for resource evaluation have since been superseded by assays obtained from external labs during the resampling campaigns, generally measured using ISE.

*Comment: It is recommended that future master database enhancements record where preparation steps and analysis was done, for all finally accepted samples.*

### 9.2.4 Eastern, 2019 to 2021

During the AGS and North/South Ridge South 2019 to 2021 drill programs, all samples were analysed at Eastern for $CaF_2$ and $CaCO_3$. Samples were analysed using the ISE method with an ICP finish.

*Comment: Acceptable standard assay methodology.*

## 9.3 Density Measurements

In 1999, BML carried out in excess of 100 density measurements on mineralized and host rocks. The results of these measurements were used in the current study for Tarefare resource estimation.

In 2013, CFI carried out 126 specific gravity measurements on mineralized intersections and wall rock material in drill core from the AGS and North/South Ridge deposits. The density measurement technique and procedures were as follows:

- Weighing the dry sample on an accurate beam balance (Wair);
- Weighing the sample in water (Wwater) by hanging the sample with a thread attached to the bottom of the balance. The difference in the two weights is the displaced volume of water; and
- Density is calculated as: Density = [Wair] / [Wair - Wwater]

Systematic density measurements conducted by CFI in 2013 resulted in a density reference for the North/South Ridge and the AGS deposit areas. The samples were not wax coated or sealed in cellophane.

Between 2013 and 2015, CFI carried out approximately 587 specific gravity measurements on mineralized intersections and wall rock material from diamond drill core from the AGS and North/South Ridge deposits. Additional core density measurements were also carried out in 2017. Density averages from these measurements by deposit and lithology were applied in the current study.

*Comment: These include:*

- *These measurements showed quite low variability, so although the application of global averages is very simplistic, it is unlikely to represent a major risk. Another concern is that these methods do not reflect density changes due to fault intersections. This is discussed in more detail in Section 5.4.2. No proper reconciliation data, from the pit production period, appears to exist, which would also be of use with respect density verification;*
- *In the existing data, there appears to be no means of analysing density with respect to position and/or grade. It is recommended that in future density variation with respect to coordinates and grade are considered; and*
- *The absence of wax or cellophane from the density procedure means measurements have no allowance for vugs, which do exist. It is recommended that density measurements in the future make use of a cellophane wrapper on the density billets.*

## 9.4 Sample Security

The core storage areas were formerly enclosed by locked fences, but at the present time they are not secure.

*Comment: It is highly recommended that the core storage area is within a lockable boundary, and is regularly checked by security staff. As the primary source of data associated with the resources, not having these facilities secure could be assigned as a Fatal Flaw in any external audits.*

Samples were handled only by CFI authorized personnel as noted previously. Drill core is stored in the vicinity of the Clarke's Pond office, in a warehouse (old cold storage building) used specifically to store core boxes with significant intersections, a warehouse which serves as the core logging facility with temporary storage for some drill core, and a lay down area behind these warehouses to store palettes of country rock/waste rock drill core. The palettes of core boxes are laid down crisscross, covered on top with plywood, and strapped.

There are three core racks outside the main storage warehouse, with drill core from AGS (2015 and 2017). These are open to the elements and are beginning to lose their aluminium tags and permanent marker labels. There are crisscrossed stacks of recent drill core from a drill program on AGS North that remain outside the core logging facility. Boxes stored outside contain waste rock from the recent AGS North drilling program, while mineralized intersections are presently stored inside the Clarke's Pond Core Shack. Most mineralized sections are awaiting sample cutting and preparation. Sample bags that have been prepared are stored in labelled sample bags in the old laboratory (near the Clarke's Pond office).

## 9.5 Quality Assurance/Quality Control

### 9.5.1 Up to 2008

The QA/QC procedures and assay protocols up to 1999 were not available to RPA. The QA/QC procedures used by CFI-NL for the 1999 and 2008 drill core samples were reviewed by RPA in 2011.

These procedures included a set of 23 samples being also sent for check assaying at the XRL laboratory, with very correlation results. In 2008 a suite of old pulp samples was also sent to SGS for analysis using double titration, which reported higher grades (12% for high grade intersections).

RPA were of the opinion that CFI-NL's check assay program was in keeping with industry standards, and that the Lakefield/SGS check assay results are reliable, so the assay data (from 1999-2008) is suitable for the estimation of Mineral Resources.

### 9.5.2 AGS and North/South Ridge, 2013 to 2016

The following is taken from Lycopodium (2016) and Agnerian (2013). The QA/QC procedures used by CFI for the 2013, 2014, 2015, and 2016 AGS drill programs are the same as those for the 1999 and 2008 drilling programs and have been reviewed by AGP. QA/QC procedures for 2016 in house NMR assaying had an increased frequency of control samples. Data verification was carried out by CFI personnel and included comparing the list of samples sent to the laboratory and sampling results from the laboratory.

In particular, the CFI QA/QC program includes:

- Insertion of a blank sample at the frequency of approximately one in every 20 regular samples. Blank material taken from local granite quarry;
- Insertion of an internal standard, also at the frequency of approximately one in every 20 regular samples. This was prepared by mixing visibly high fluorite content material with SLG material; and
- Insertion of duplicate samples at a frequency of one in every 20 regular samples.

***Standard Samples, 2013-2016***

- In 2013, CFI inserted 27 samples of an in-house standard;
- In 2014, CFI inserted 82 samples of the same in-house standard, with a mean concentration of 59.2% $CaF_2$, within the batches of regular drill core samples; and
- In 2015, CFI inserted 10 samples of in-house Standard A, 11 samples of in-house Standard B, and 7 samples of in house Standard C, with mean concentrations of 22.2% $CaF_2$, 47.6% $CaF_2$, and 73.6% $CaF_2$, respectively.

*Comment:*

- *There does not appear to be any reports available describing or certifying the standards' preparations done in the past. It is recommended that in future, standards are prepared so that reports are available to support the homogeneity of these*

*samples, round-robin assays etc. Or consideration should be given to purchase externally prepared samples;*

- *Reported standards represents only 2% of the actual samples assayed during 2013-2016 much lower than the reported target 5% frequency. Particularly low in 2015; and*
- *Previous reports have almost no data or plots to support the acceptability of the standards' results.*

***Coarse Duplicate Sampling, 2013 - 2016***

Assays results for the 43 duplicate samples in 2013, 68 samples in 2014, and 41 samples in 2015 indicate good assay reproducibility, with a correlation coefficient of 0.999; i.e., the 153 duplicate assays are comparable to the original assays.

Also, a report of 37 duplicate assays carried out at SGS Lakefield, indicating that there was very good assay reproducibility, i.e., the original and duplicate assays are comparable.

*Comment:*

- *Acceptable reproducibility; and*
- *Reported coarse duplicates represents only 2% of the actual samples assayed during 2013-2016 =>much lower than the reported target 5% frequency*

***External Lab Duplicate Assays, SGS***

Results of 37 duplicate assays carried out at SGS Lakefield indicate that there is very good assay reproducibility, i.e., the original and duplicate assays are comparable.

*Comment: Acceptable reproducibility*

### 9.5.3 AGS, 2017

The 2017 drilling and re-sampling program used the onsite laboratory for $CaF_2$ and $CaCO_3$ analysis. QA/QC procedures varied from previous drill programs by analyzing samples by drill holes and increasing the number of standards used per drill hole. The CFI QA/QC program for this period is reported as:

- Insertion of standard samples at the frequency of one in every five regular samples. Some standard samples were duplicated per drill hole: and
- Insertion of coarse duplicate samples at one in every 10 regular samples.

Blank materials were not used during these analyses. Repeated measurements taken on several QA/QC control plots for the 2017 drilling and re-sampling program were not available for review. Assay analysis certificates indicate that control samples used were greater than 50% of the total analyses recorded.

For the onsite laboratory, CFI used several standards for its QA/QC program, 16 different standards for $CaF_2$ and eight standards for $CaCO_3$.

In October 2017, CFI submitted 209 samples from the 2017 re-sampling program to Eastern for duplicate analysis for $CaF_2$. Results indicated inaccuracies in the lower grade $CaF_2$ results (<10% $CaF_2$). These lower grades were considered below cut-off grade at the time and were

allowed to be used in the database. With the ramping up of mine operations at AGS at the time, however, resources were reduced for maintaining the onsite laboratory. CFI suspended the onsite laboratory in favour of using Eastern for all subsequent analyses from exploration programs.

*Comment:*

- *As a result of the Eastern findings, it brings into question the validity of the lower grade samples, which could affect both the 2022 and 2023 resource estimations. However, it is very difficult to assess without documentation for the standards' preparation;*
- *Much higher frequency of standards and coarse duplicates, which is commendable; and*
- *Apparently no blanks assayed, so no quality control on possible contamination. This increases the risk of using low grade results from this sampling period in the current resource update.*

### 9.5.4 AGS, 2019 to 2021

The QA/QC procedures used by CFI for the 2019 to 2021 drill programs, are similar to those used for the 2013 to 2015 drill programs and have been reviewed by AGP. QA/QC data verification was carried out regularly by CFI personnel, including comparing the list of samples sent to the laboratory and sampling results from the laboratory.

The CFI QA/QC program included:

- Insertion of a blank sample at a frequency of one per drill hole or one in every 20 regular samples;
- Insertion of standard samples at a frequency of one per drill hole or one in every 20 regular samples; and
- Insertion of coarse duplicate samples at a frequency of one per drill hole or one in every 10 regular samples.

For the 2019 to 2021 drilling programs CFI collected 1,892 samples and inserted a total of 308 control samples.

*Comment:*

- *The overall insertion rate of control samples is only 6%, which is much too low for adequate QA/QC and far less than their apparent frequency; and*
- *In the SLR 2022 report, there is also no breakdown of the 308 control samples.*

***Coarse Blanks***

Coarse blanks, as for all drill programs, were sourced from a Precambrian Granite from the Swift Current Batholith (circa 577Ma ± 3Ma) collected from a road cut on the Burin Peninsula, near Sandy Harbour River. Coarse blanks were inserted into the sample stream at one per drill hole or, for longer drill holes, at one per 20 samples. During the 2019 to 2021 drill programs, no failures were encountered in the blank samples.

***Standard Samples, 2019, 2020, 2021***

Two standards were used for QA/QC control during the AGS drill programs, Standard A and Standard B, which represent a medium $CaF_2$ grade standard and a higher $CaF_2$ grade standard, respectively. A standard was deemed suspect as a failure if the result fell outside three standard deviations (± 3STDEV) from its expected value as defined by the standard's certificate. Any assays outside of this threshold were reviewed on a case-by-case basis to determine if any corrective action was required.

In 2019, there were five failures out of 54 standard samples early in the sample analysis. These samples were reviewed by CFI, and it was determined that no re-sampling was required. There were no failures in the standard results for the 2020 to 2021 drill program.

In this period, reference standards had been prepared on site. Documentation supporting these standards' preparation are not currently available. However, for on-going resource work, material for two standards' have been prepared, and subsequently certified externally by Laboratory Quality Services International. The reference values are 20.5% and 58.7% $CaF_2$.

*Comment:*

- *The overall insertion rate of control samples is only 6%, which is much too low for adequate QA/QC and far less than their apparent frequency;*
- *It is curious why no further measures appear to have been taken as a result of the reported 2019 failures in sample analysis;*
- *In the SLR 2022 report, there is also no breakdown of the 308 control samples.*
- *It is recommended that for ongoing work, any standard materials used on-site should be certified externally; and*
- *It is recommended that additional low-grade samples (<10%CaF2) should also be prepared and used in subsequent QAQC resource work.*

**Duplicate Assays, 2019, 2020, 2021**

Duplicate samples were used as part of the QA/QC program for the AGS drill programs. CFI created its own split of the crushed core duplicates at the mine site and submitted these as separate samples. The duplicate data demonstrates expected similarities in grades, however, only in lower grade material of less than 10% $CaF_2$ are their differences of greater than ±20% between samples. These are not considered failures as the absolute difference at lower grades tends to indicate higher percentage differences.

*Comment: It is still noteworthy that failures occurred at lower grades.*

### 9.5.5 North/South Ridge South, 2019 to 2020

The QA/QC procedures used by CFI for the South Ridge drill programs, between 2019 and 2020, are similar to those used during the 2013 to 2015 drill programs and have been reviewed by AGP. QA/QC data verification was carried out regularly by CFI personnel, including comparing the list of samples sent to the laboratory and sampling results from the laboratory. The CFI QA/QC program included:

- Insertion of a blank sample at a frequency of one per drill hole or one in every 20 regular samples. Insertion of standard samples at a frequency of one per drill hole or one in every 20 regular samples; and
- Insertion of duplicate samples at a frequency of one per drill hole or one in every 10 regular samples.

For the drilling programs between 2019 and 2020, CFI collected 1,378 samples and inserted a total of 232 control samples (6%).

***Blank Sample Check Assays***

Coarse blanks were inserted into the sample stream at one per drill hole or, for longer drill holes, at one per 20 samples. During the 2019 and 2020 drill programs, no failures were encountered in the blank samples.

*Comment: Good results.*

***Standard Samples***

Two standards were used for the QA/QC control during the South Ridge drill programs, Standard A and Standard B, which represent a medium CaF2 grade standard and a higher $CaF_2$ grade standard, respectively. A standard was deemed suspect as a failure if the result fell outside ± 3STDEV from its expected value as defined by the standard's certificate. Any assays outside of this threshold were reviewed on a case-by-case basis to determine if any corrective action was required. There were no failures encountered in either standard in either drill program.

Again, the standards from were created by CFI on-site.

*Comment: Good results*

***Duplicate Assays***

Duplicate samples were used as part of the QA/QC program for the South Ridge drill programs. CFI created its own split of the crushed core duplicates at the mine site and submitted these as separate samples. The duplicate data demonstrated expected similarities in grades, however, only in the lower grade material of less than 10% $CaF_2$, are their differences of greater than ±20% between samples. These are not considered failures as the absolute difference at lower grades tends to indicate higher percentage differences.

*Comment: Again, noteworthy failures occurred at lower grades.*

### 9.5.6 Internal QAQC Measurements

In addition to the QAQC steps taken directly by CFI, the Eastern assaying company has completed their own internal QAQC programs and sent the results back to CFI. These include:

- Assaying of fine blanks; and
- Assaying of standards for 2.5%, 5%, 10%, 25%, 50% and 80% $CaF_2$.

These data have been checked for acceptable results by the QP, and relate to assaying from sampling of the AGS, MS and NS drilling programs from 2019-2021.

### 9.5.7 Summary

There are some shortcomings associated with the previous QA/QC programs, which include:

- Limited QAQC data available for the underground channel data (at NS) and older (pre-1999) drilling data for NS and TF;
- Very low frequencies of control samples taken over some time periods;
- The control samples taken are primarily coarse blanks, coarse duplicates and standards. Best practice would also include fine blanks (to test contamination during assaying), and pulp duplicates (for a test of assay reproducibility or precision);
- Some control sample failures associated with lower grade samples;
- Some of these shortcomings are partly addressed by the additional internal QAQC done by Eastern, but these results have not generally been reported; and
- Because of the re-sampling campaigns, and lack of detail in the available databases, it is very difficult to collate the origin of some samples.

The QP considers the assay results acceptable for Mineral Resource estimation. However, some of the shortcomings described above are taken into account with respect to resource classification criteria.

*Comment: Recommendations by the QP include:*

- *For future assaying, additional instructions to be issued to the assaying company, to systematically take and report results for fine blanks and pulp duplicates;*
- *Stricter management of QAQC, so that any control sample frequency targets are consistently met, and measures taken immediately with any control sample failures;*
- *Additional lower grade standards to be introduced, so as to monitor lower grades more closely with respect to QAQC; and*
- *To drill some twin-holes in NS and TF, so as to help verify the historical data being used at these deposits.*

# 10 DATA VERIFICATION

## 10.1 Drillhole Collars and Survey Data

The topography data comes mainly from drone surveys completed in various phases during 2020 - 2022.

Drillhole collars and traces were checked in plan, section and 3D against updated topographical data, as well as underground data.

Selected drillhole collars were checked by the author during a site visit in August 2023. The surface areas of all the evaluated deposits were also visited.

The current drillhole collar data were provided as of 31st August 2023.

Downhole survey data were also checked with processing in Datamine, so that any abrupt changes in azimuth or dip were checked against the original source data. Any errors with data cross-references from the different drillhole tables were also found and corrected.

## 10.2 Geological Data

The main source of geological data were the drillhole lithological logs. Core was examined by the author during the site visit, for a series of main intersections along strike extent. The core checked came from:

AGS 11 holes, 680m;
MS 5 holes, 150m; and
DS 6 holes, 145m.

The main observations from this core check include:

- For the most part, the core inspected broadly matches the lithological logs, and the assays correspond with observations of fluorite mineralization;
- Many detailed lithology/structural changes, with faults and/or rubbilised zones, have not been picked up in the lithology logs;
- Some observed core losses were not recorded in digital log data;
- Some unsampled parts appear to be within bounds of overall mineralisation – discussed in more detail in Section 10.4; and
- Many rubbilised zones, from where fault gouge has probably been washed out, again discussed in more detail below. This is also not reflected in logs, with respect to core recovery, which is not recorded digitally.

Since 2018, all of the drillhole lithological logging has used a standardised set of geologic codes. Lithological code data from previous campaigns were analysed so as to set the most logically equivalent codes according to the updated system. In the AGS area, the drillhole lithology data were plotted against a previous lithological model and surface outcrop data.

## 10.3 Assay Data

The assay data has been validated using the following checks:

- Comparison of example assay database grades with assay certificates;
- Reference to available QA/QC data;
- Plotting and examination of systematic sections through all deposit areas; and
- Comparison of older with more recent drilling data.

Assays certificates were checked from 23 holes from AGS, MS and NS, covering periods from 2017 – 2021.

## 10.4 Drillhole Sampling

Examination of selected drill cores, and referenced to drillhole data, showed in general good agreement and a logical selectin of samples for assays. However, other conclusions from this check included:

- In some cases, core lengths adjacent to very good intersections have not been assayed, presumably due to the geologist believing that there was little or no mineralisation present. However, in some instances, even some intersections logged as “Vein” have not been sampled. This approach is conservative, and some lower grade intersections might not have been picked up. An example is shown for a North/South Ridge South drillhole – DS-2015-134, as shown in Figure 10-1 and Figure 10-2; and

- Some core has been reduced to broken fragments and is often associated with the washing out of clay gouge. Production experience with clay in-fill material, and associated problems, have also been recorded from previous AGS mining. Broken fragments from the core are also shown in Figure 10-1. Clearly some samples taken from such intersections will not be as reliable as when taken from intact core.

**Figure 10-1. Holes DS-2015-134, 235m to 247m**

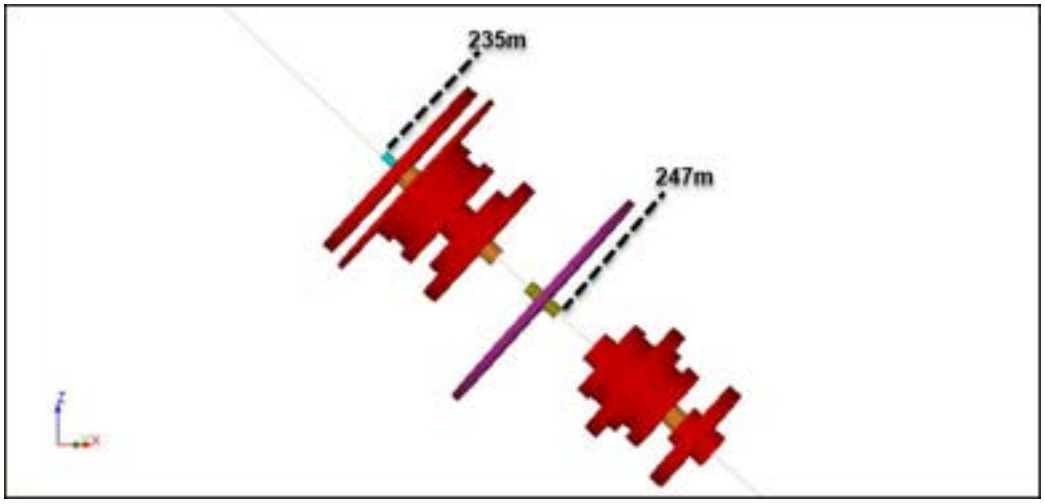


**Figure 10-2. Hole DS-2015-134 – Downhole Bars by $CaF_2$ Assays**

While undertaking a review of core on site and relating it to the core logs, it was noticeable that in some zones of very broken core, no attempt had been made to sample these sections. Small lengths of core can still be saw cut and where core in the same drill run consists only of rubble, a spoon can be utilised to take a sub-sample of material, all of which should be included in the sample run.

*Comment:*

- *It is an international standard that all core runs through the mineralised section of each hole, regardless of anticipated grade or quality of recovery, should be sampled where possible. It must be highlighted that loss of sample and/or sections not being sampled very likely could result in over-estimation of grade as a consequence;*

- *It is recommended that, where possible, all core should be reviewed again, with any un-sampled sections assayed to improve assay profile of the lower grade material; and*

- *Future drilling programs may be better conducted (albeit more expensive) by utilising a triple tube core barrel to reduce recovery loss and improve identification of the cut-off boundary. Cost savings could be made by drilling the upper barren section of the holes using RC techniques rather than coring. This method could only be employed where depth to target depth is well established.*

## 10.5 Core Recovery

As noted above in Section 8.6.2, the drillhole logging has not generally included a digital record of recovery. Although core recoveries of 95% have been stated in previous reports, there is very little digital data available to back this up. This is a major information gap with respect to industry standards. One other complication to this are rubbilised zones from fault intersections.

*Comment: It is strongly recommended that in future the following additional steps are added to CFI logging procedures:*

- *Specific recording of total core recovery (TCR) for all drilling, and conversion into digital form;*
- *Specific recording of solid core recovery (SCR) for all drilling, and conversion into digital form. This is related to the proportion of core with an intact core diameter; and*
- *A rigidly applied lithology code for any fault zones and rubbilised zones.*

*Rubbilised zones also make difficulty in taking representative samples. The above recommended steps will also help with assessing the effect of fault intersections on grade estimation.*

## 10.6 Underground Data

The underground topographic data for NS and TF have been imported and used as a reference of all the modelling work in the current study. This has provided another degree of verification with respect to the drilling and channel sample data.

## 10.7 Databases

From a review of the various excel databases provided by the client in the Dropbox, it is noted that the data available would be more comprehensive, and much easier to update, verify and maintain, if combined into a single database. It is understood that CFI have recently rehired a geologist who worked there previously, and who is currently working on this database consolidation.

## 10.8 Summary

The QP has inspected the Project and mine site and has reviewed drill logging, sampling, handling procedures and is satisfied that CFI personal have taken reasonable measures to ensure that the sampling completed is accurate and precise.

Some shortcomings have been noted and corresponding recommendations made.

# 11 MINERAL RESOURCE ESTIMATES

## 11.1 Introduction

Data sets for all available samples were supplied for the following deposit areas:

- Arthur Gordon Stollery (AGS)
- AGS North (MS)
- North/South Ridge (NS)
- Tarefare (TF)

An overall plan of the sample data for these four areas is shown in Figure 11-1. The data were supplied in the form of Excel files, with separate tables for drillhole collars, survey, assays and lithology data.

Table 11-1 lists all of the supplied drillhole data, summarised by deposit area. The assayed variables $CaF_2$ and $CaCO_3$ were estimated into the different block models for each deposit area.

**Table 11-1. Summary of CFI Diamond Drilling Data**

| Deposit | Holes | Total Length | Avg. Length | Holes Sampled | Length Sampled | Number of $CaF_2$ Samples | Proportion of Holes Sampled |
|---|---|---|---|---|---|---|---|
| | | m | m | | m | | % |
| **AGS** | 365 | 65,282 | 179 | 316 | 8,306 | 9,514 | 87% |
| **MS** | 118 | 17,009 | 144 | 49 | 940 | 1,012 | 42% |
| **DS** | 102 | 15,187 | 149 | 84 | 1,488 | 1,570 | 82% |
| **TF** | 77 | 25,120 | 326 | 65 | 529 | 831 | 84% |
| **Total** | **662** | **122,598** | **185** | **514** | **11,263** | **12,927** | **78%** |

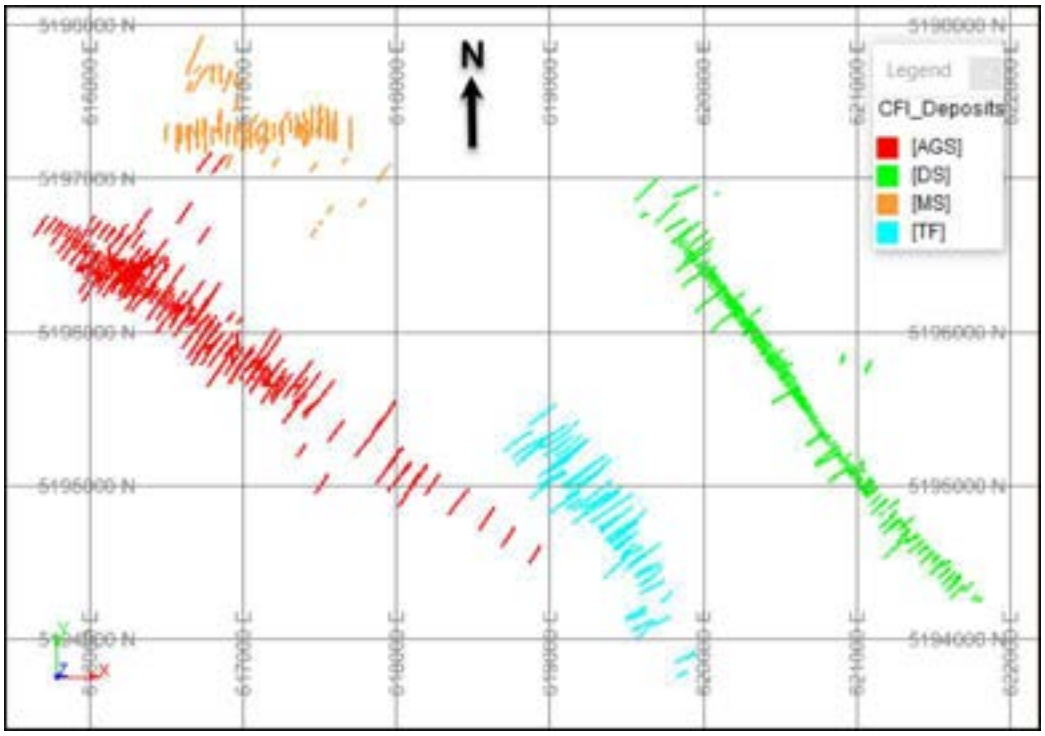


**Figure 11-1. Overall Plan of Estimated CFI Areas' Sample Data**

## 11.2 Methodology

In the current study, resource estimation has been based on conventional 3D block modelling. These resources are considered as potentially amenable to both open-pit and underground mining.

For resource estimation purposes, separate block models were developed for each area, as the mineralised areas are quite separate and have different orientations. The same modelling approach has been used for each one, with the methodology covering the following steps:

a) **Data Validation.** Drillholes and underground sample data were imported, along with available strings and wireframe data from previous evaluations. These were all viewed in 3D and cross-section to check for any data inconsistencies. The drillhole processing also enabled a series of checks.

b) **Interpretation.** Updated sectional interpretations were developed for each area, primarily focussed on +5%$CaF_2$ intersections. These were then converted into three-dimensional wireframe models, with logical attributes for the veins and vein systems.

c) **Volumetric Block Models** were built up for each area, based on the wireframe models from the previous steps, as well as topography, waste dump and mined excavation models. The parent block size was 10m x 10m x 10m. In each area, the model prototype was rotated around the z-axis, so as to align blocks approximately along the strike of the local mineralisation.

d) **Sample Processing** entailed samples being allocated according to the mineralised vein models and converted into 1m composites. Grade capping was also applied, following outlier analysis and the grades were capped before compositing. The composites were also categorised by grade category, according to statistical analysis.

e) **Estimation.** Following geostatistical analysis, grades were estimated into the block models, using ordinary kriging (OK) for the principal $CaF_2$ and $CaCO_3$ grades. Global density values by lithology were assigned, based on average core density measurements.

f) **Model Validation** steps were completed, including the generation of long-section and cross-section plots, comparison with historical estimates, comparison of global average sample and model grades, as well as swath plots describing local grade variation along strike for composites and the block model.

g) **Resource Classification.** This final step involved developing a resource risk matrix, defining class criteria and then assigning class categories using wireframes and control strings, to define logical zones representing sample coverage.

## 11.3 AGS Deposit

### 11.3.1 Database

This database results from several different phases of drilling, as well as a limited number of trenches. A summary of the drillholes and trenches currently available, and used for this current AGS resource estimate, is shown in Table 11-2.

**Table 11-2. Summary of AGS Sample Database**

| Sample Type | CAMPAIGN | Holes Total | Total Length | Avg. Length | Holes/Lines Sampled | Length Sampled | Number of Samples | Proportion of Holes Sampled | Proportion of Lengths Sampled |
|---|---|---|---|---|---|---|---|---|---|
| | | | m | m | | m | | % | % |
| Drillholes | AA-2017 | 18 | 1,187 | 66 | 1 | 16 | 20 | 6% | 1% |
| | AM-2016 | 16 | 1,237 | 77 | 14 | 388 | 363 | 88% | 31% |
| | GC-GNPN | 4 | 39 | 10 | 4 | 39 | 41 | 100% | 100% |
| | GM-2015 | 9 | 1,278 | 142 | 8 | 268 | 290 | 89% | 21% |
| | GS-2013 | 48 | 9,331 | 194 | 46 | 1,496 | 1,737 | 96% | 16% |
| | GS-2014 | 112 | 23,362 | 209 | 99 | 2,706 | 3,229 | 88% | 12% |
| | GS-2015 | 58 | 16,457 | 284 | 47 | 1,288 | 1,526 | 81% | 8% |
| | GS-2017 | 24 | 2,928 | 122 | 23 | 624 | 695 | 96% | 21% |
| | GS-2019 | 43 | 4,220 | 98 | 43 | 697 | 766 | 100% | 17% |
| | GS-2020 | 8 | 1,101 | 138 | 7 | 123 | 138 | 88% | 11% |
| | GS-2021 | 25 | 4,141 | 166 | 24 | 661 | 709 | 96% | 16% |
| Trenches | TRENCH | 4 | 24 | 6 | 4 | 24 | 24 | 100% | 100% |
| **Total** | | **369** | **65,306** | **177** | **320** | **8,330** | **9,538** | 87% | 13% |

A plan of these samples is shown in Figure 11-2. For reference purposes, this plan also includes:

- The topography of the mined Center and Grebes pit excavations;
- The north and south waste dumps; and
- The principal AGS mineralised vein structures.

Most of the drillhole sections are approximately 40-50m apart. The deepest drillholes are over 400m in depth. Most of the drillhole have collar elevations of approximately 120mRL. For modelling and mine planning purposes, the elevation coordinates of all drillholes and modelling data have then had 1000m added to them, so that all the model and resultant pit bench elevations are positive. This elevation shift has been applied to all the of the resource models described in this report.

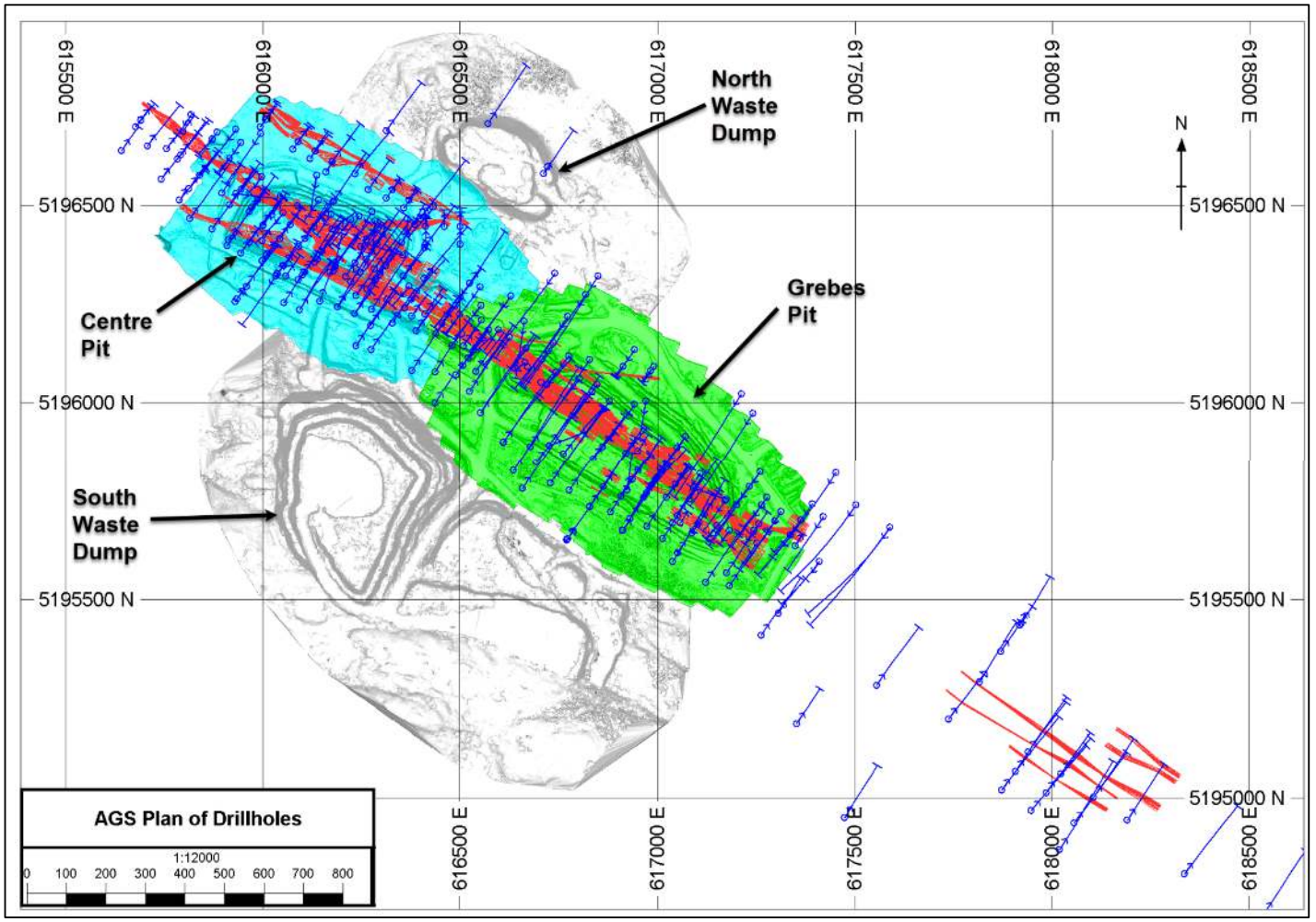


**Figure 11-2. Plan of AGS Drillholes**

### 11.3.2 Interpretation

Consistent with previous estimation work for AGS, five major vein systems have been identified, as summarised in Table 11-3 with their approximate dimensions. Plan and 3D views of the updated interpretations are shown in Figure 11-3 and Figure 11-4. Example cross-sections are shown in Figure 11-5 to Figure 11-8.

The sample support for each mineralised vein system has been reviewed and is summarised in Table 11-4. This table summarises the number of drillholes intersecting each vein system, the number of drillholes which have been assayed for a particular variable and the proportion of these drillhole intersections which have been assayed. The summary shows that, in general, over 90% of the intersections in all the mineralised vein intersections have been sampled for both $CaF_2$ and $CaCO_3$.

Each vein system is made of a number of adjacent individual veins. The veins are effectively sub-zones of the main vein systems and are summarised with respect to hole intersections in Table 11-5.

**Table 11-3. AGS Vein System Dimensions**

| Vein System | | Strike Length | Overall Horizontal Width | Minimum Base Elevation | Maximum Elevation | Maximum Depth | Dip Range |
|---|---|---|---|---|---|---|---|
| | | *m* | *m* | *m* | *m* | *m* | |
| **AGSE** | **AGS East** | 620 | 200 | 830 | 1,100 | 280 | 80° - 90° |
| **GP** | **Grebes Nest Pond** | 1,200 | 120 | 635 | 1,120 | 490 | 65° - 90° |
| **NV** | **North Vein** | 600 | 250 | 800 | 1,120 | 320 | 65° - 90° |
| **OC** | **Open Cut Pit** | 369 | 40 | 885 | 1,105 | 215 | 75° - 90° |
| **SV** | **South Vein** | 660 | 120 | 890 | 1,115 | 225 | 50° - 90° |

**Table 11-4. AGS – Summary of Drillhole Intersections - Main Vein Systems**

| VEIN System - AZONE | Holes Total | Total Length | Avg. Length | Holes/Lines Sampled | Length Sampled | Number of Samples | Proportion Sampled |
|---|---|---|---|---|---|---|---|
| | | m | m | | m | | % |
| **AGSE** | 11 | 93 | 8 | 10 | 75 | 95 | 81% |
| **GP** | 128 | 3,645 | 28 | 128 | 3,269 | 3,821 | 90% |
| **NV** | 100 | 2,041 | 20 | 97 | 1,860 | 2,145 | 91% |
| **OC** | 16 | 185 | 12 | 16 | 185 | 209 | 100% |
| **SV** | 67 | 888 | 13 | 65 | 802 | 955 | 90% |

**Table 11-5. AGS - Summary of Drillholes Intersections – By Vein**

| Veins - AZ_VEIN | Holes Total | Total Length | Avg. Length | Holes Sampled | Length Sampled | Number of Samples | Proportion Sampled |
|---|---|---|---|---|---|---|---|
| | | *m* | *m* | | *m* | | *%* |
| **AGSE_1** | 5 | 10 | 2 | 5 | 9 | 11 | 95% |
| **AGSE_2** | 6 | 18 | 3 | 5 | 12 | 17 | 65% |
| **AGSE_3** | 9 | 54 | 6 | 8 | 43 | 54 | 79% |
| **AGSE_4** | 2 | 5 | 2 | 2 | 5 | 6 | 100% |
| **AGSE_5** | 2 | 6 | 3 | 2 | 6 | 7 | 100% |
| **GP_1** | 55 | 725 | 13 | 55 | 683 | 808 | 94% |
| **GP_2** | 98 | 2,015 | 21 | 96 | 1,730 | 1,997 | 86% |
| **GP_3** | 6 | 70 | 12 | 6 | 70 | 81 | 100% |
| **GP_4** | 5 | 31 | 6 | 5 | 28 | 33 | 91% |
| **GP_5** | 10 | 72 | 7 | 10 | 66 | 83 | 92% |
| **GP_6** | 10 | 114 | 11 | 10 | 111 | 137 | 97% |
| **GP_7** | 10 | 164 | 16 | 10 | 146 | 159 | 89% |
| **GP_8** | 4 | 63 | 16 | 4 | 63 | 81 | 100% |
| **GP_9** | 15 | 251 | 17 | 15 | 236 | 274 | 94% |
| **GP_10** | 8 | 46 | 6 | 8 | 46 | 57 | 100% |
| **GP_11** | 5 | 95 | 19 | 5 | 92 | 111 | 98% |
| **NV_1** | 17 | 191 | 11 | 17 | 184 | 192 | 96% |
| **NV_2** | 18 | 85 | 5 | 17 | 80 | 106 | 95% |
| **NV_3** | 24 | 176 | 7 | 24 | 162 | 188 | 92% |
| **NV_5** | 11 | 75 | 7 | 11 | 70 | 81 | 93% |
| **NV_6** | 26 | 348 | 13 | 25 | 284 | 332 | 81% |
| **NV_7** | 43 | 537 | 12 | 40 | 470 | 536 | 87% |
| **NV_8** | 3 | 19 | 6 | 3 | 19 | 21 | 100% |
| **NV_9** | 32 | 350 | 11 | 31 | 342 | 390 | 98% |
| **NV_10** | 10 | 59 | 6 | 9 | 56 | 72 | 95% |
| **NV_11** | 3 | 21 | 7 | 3 | 21 | 26 | 100% |
| **NV_12** | 4 | 44 | 11 | 4 | 41 | 47 | 93% |
| **NV_13** | 4 | 12 | 3 | 4 | 12 | 13 | 100% |
| **NV_14** | 3 | 10 | 3 | 3 | 10 | 13 | 100% |
| **NV_16** | 2 | 11 | 6 | 1 | 10 | 11 | 90% |
| **NV_18** | 6 | 101 | 17 | 6 | 100 | 117 | 98% |
| **OC_1** | 16 | 180 | 11 | 16 | 180 | 204 | 100% |
| **OC_2** | 1 | 5 | 5 | 1 | 5 | 5 | 100% |
| **SV_1** | 63 | 696 | 11 | 61 | 632 | 744 | 91% |
| **SV_2** | 16 | 165 | 10 | 15 | 143 | 175 | 87% |
| **SV_3** | 2 | 14 | 7 | 2 | 14 | 18 | 100% |
| **SV_5** | 1 | 4 | 4 | 1 | 4 | 5 | 100% |
| **SV_6** | 2 | 9 | 5 | 2 | 9 | 13 | 100% |

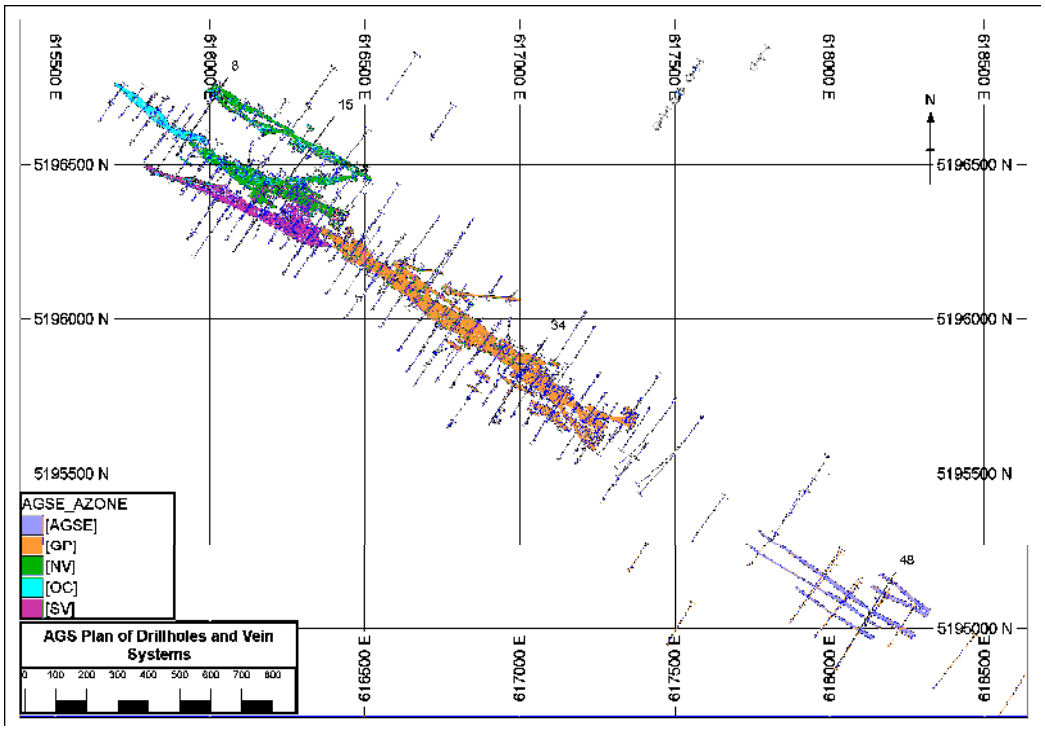


**Figure 11-3. Plan of AGS Vein Systems**

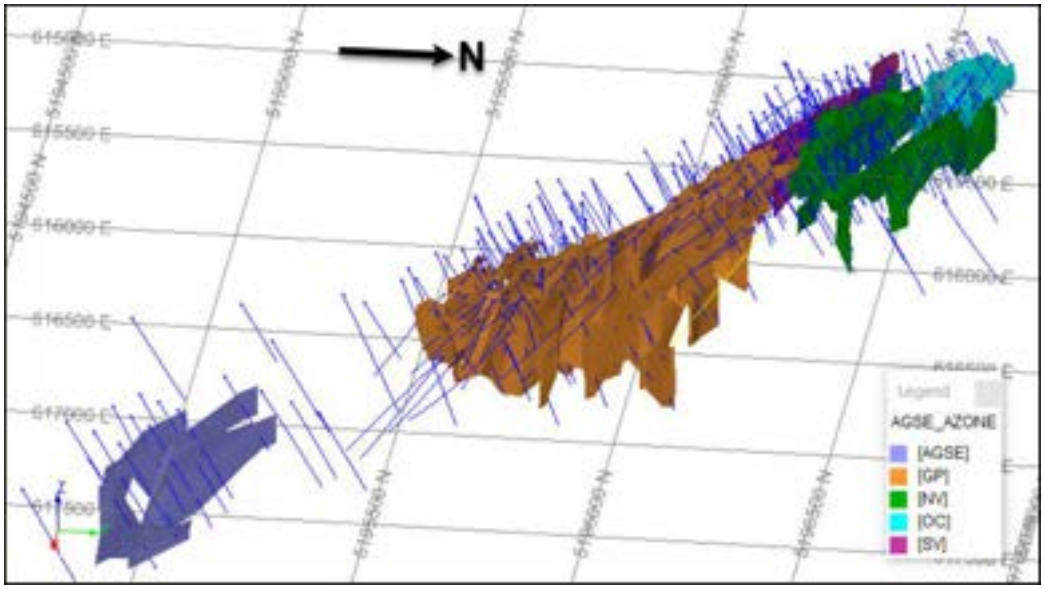


**Figure 11-4. 3D View of Vein Systems**

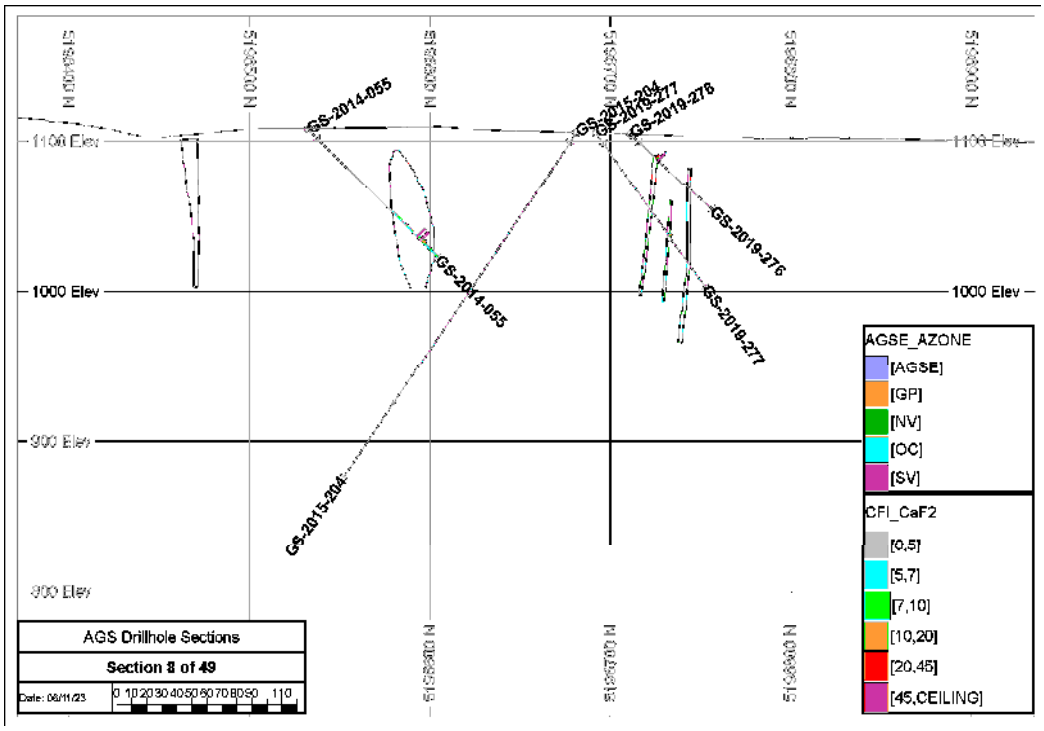


**Figure 11-5. Example AGS Section #8**

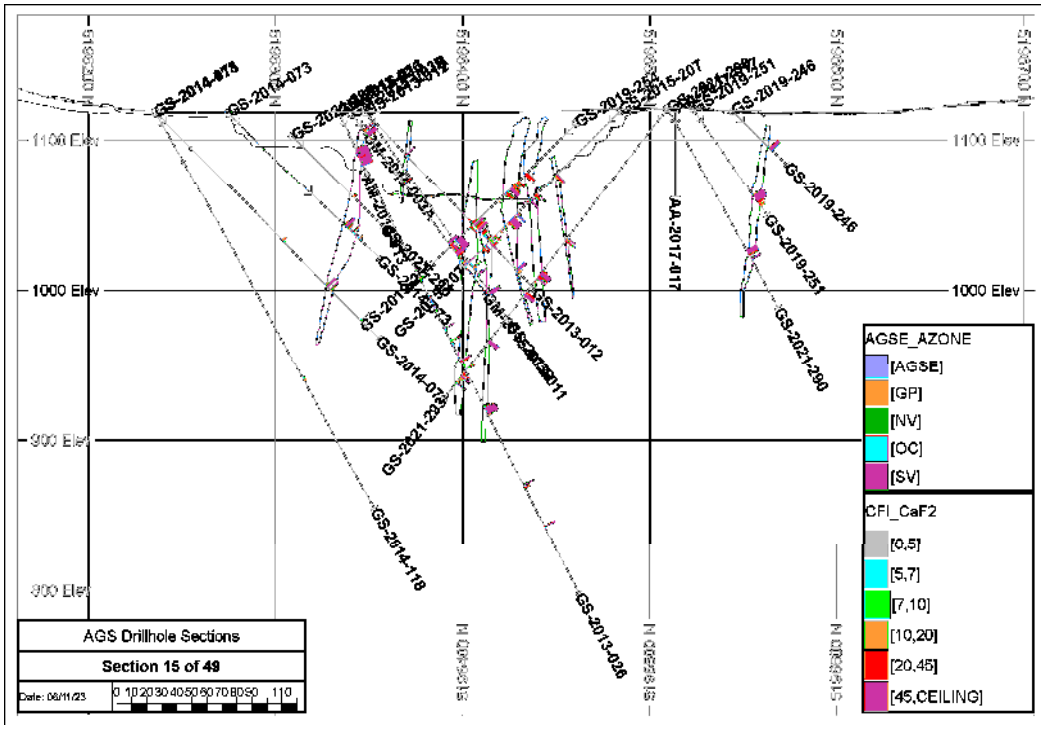


**Figure 11-6. Example AGS Section #15**

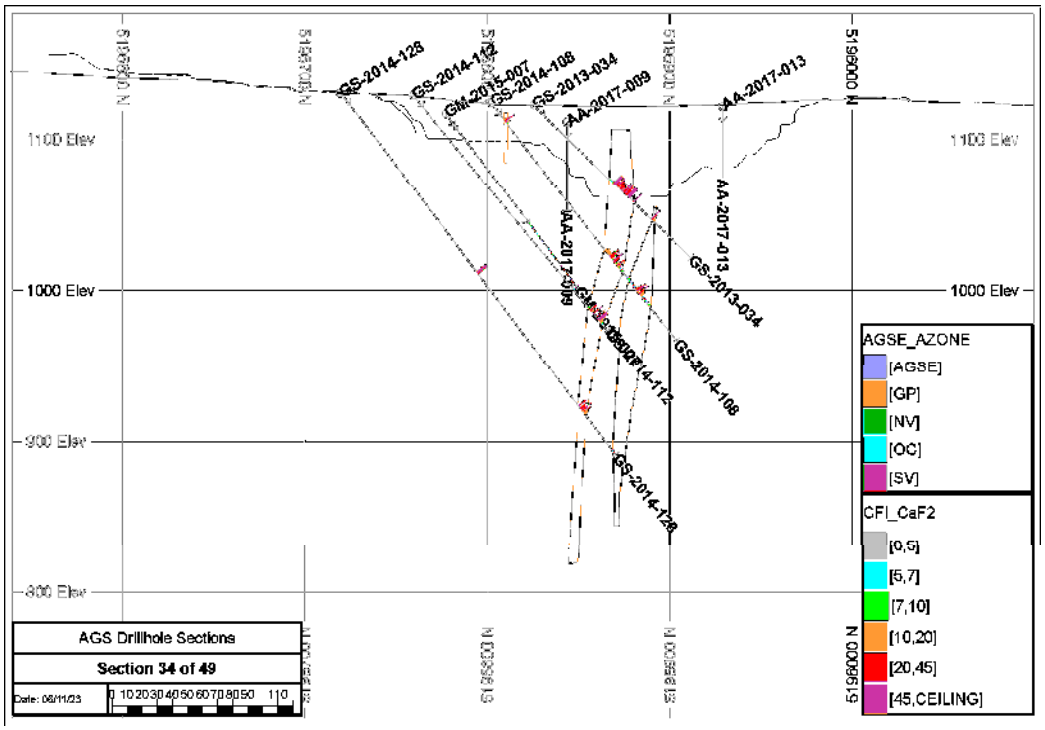


**Figure 11-7. Example AGS Section #34**

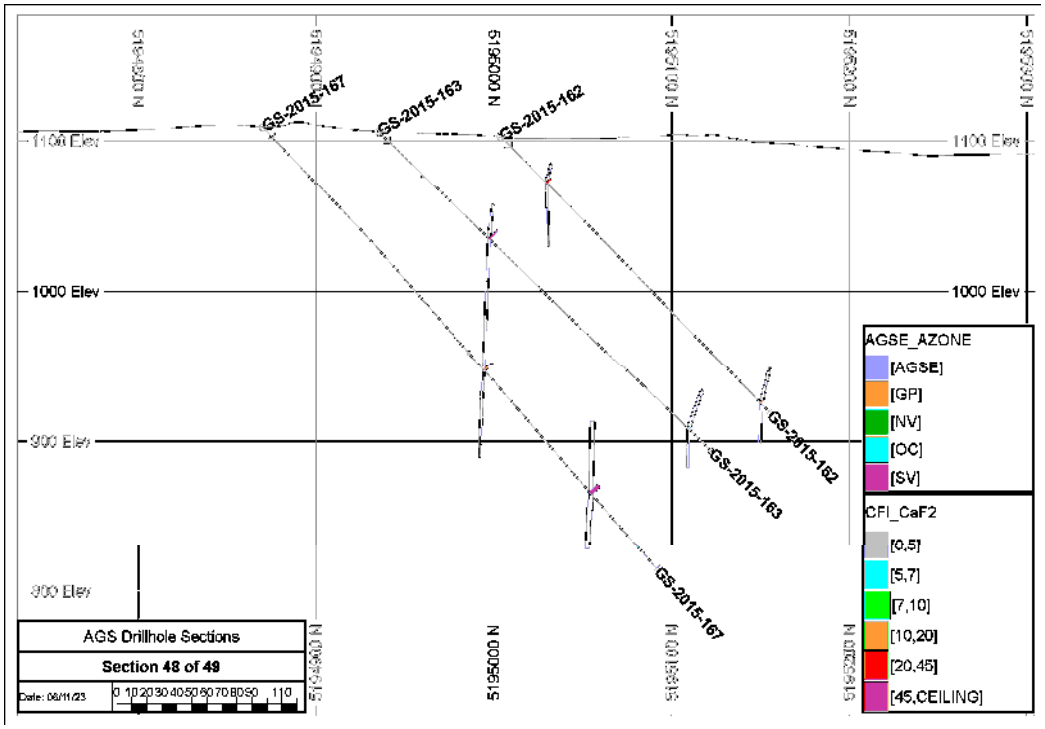


**Figure 11-8. Example AGS Section #48**

### 11.3.3 Statistics- Samples

The interpreted wireframe models were used to select and allocate the drilling data according to interpreted veins. A statistical summary of those samples selected are shown in Table 11 6. Log-probability plots of $CaF_2$ grades, by vein system, are shown in Figure 11-10. These show that within each vein system, the $CaF_2$ grades are approximately log-normally distributed. However, there are some natural breaks present, which correspond with splits and banding seen on cross-sections. When considering all the captured vein samples, the two apparent splits are at approximately 5% and 10% $CaF_2$.

**Table 11-6. Statistics of Raw Samples within Mineralised Veins – AGS**

| AZONE | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AGSE | $CaF_2$ | 99 | 0 | 97.6 | 21.5 | 10.5 | 28.9 | 837.87 | 135 | 0.5 | 77.9 |
| GP | $CaF_2$ | 3,790 | 0 | 99.2 | 18.1 | 9.0 | 21.3 | 452.22 | 118 | 1.7 | 54.7 |
| NV | $CaF_2$ | 2,216 | 0 | 98.9 | 22.8 | 10.5 | 26.8 | 720.04 | 118 | 1.6 | 72.4 |
| OC | $CaF_2$ | 225 | 0 | 97.2 | 15.4 | 8.2 | 18.7 | 349.12 | 121 | 1.5 | 42.5 |
| SV | $CaF_2$ | 968 | 0 | 99.8 | 25.8 | 9.7 | 30.0 | 897.31 | 116 | 1.9 | 80.6 |
| AGSE | $CaCO_3$ | 99 | 0 | 13.0 | 2.4 | 1.5 | 2.6 | 6.58 | 108 | 0.5 | 6.5 |
| GP | $CaCO_3$ | 3,599 | 0 | 95.0 | 8.4 | 4.5 | 12.9 | 165.82 | 153 | 1.0 | 20.4 |
| NV | $CaCO_3$ | 2,125 | 0 | 76.7 | 5.4 | 3.4 | 7.3 | 53.64 | 136 | 0.8 | 12.3 |
| OC | $CaCO_3$ | 225 | 0 | 16.2 | 2.4 | 1.6 | 2.2 | 4.64 | 90 | 0.5 | 4.7 |
| SV | $CaCO_3$ | 947 | 0 | 83.3 | 5.8 | 3.7 | 9.1 | 82.14 | 156 | 0.8 | 12.4 |

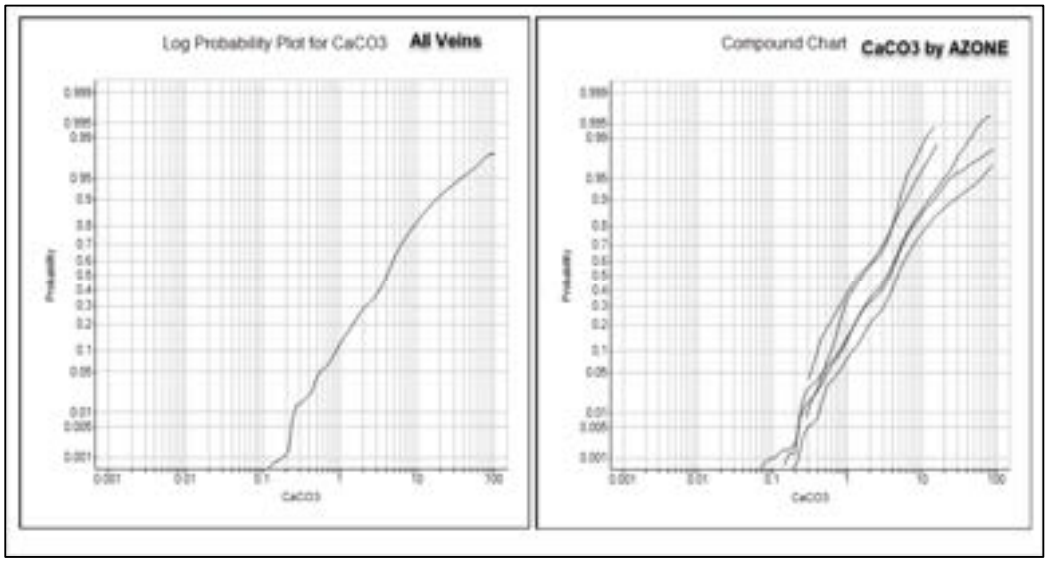


**Figure 11-9. Log Probability Plots of $CaCO_3$ Samples within Vein Systems**

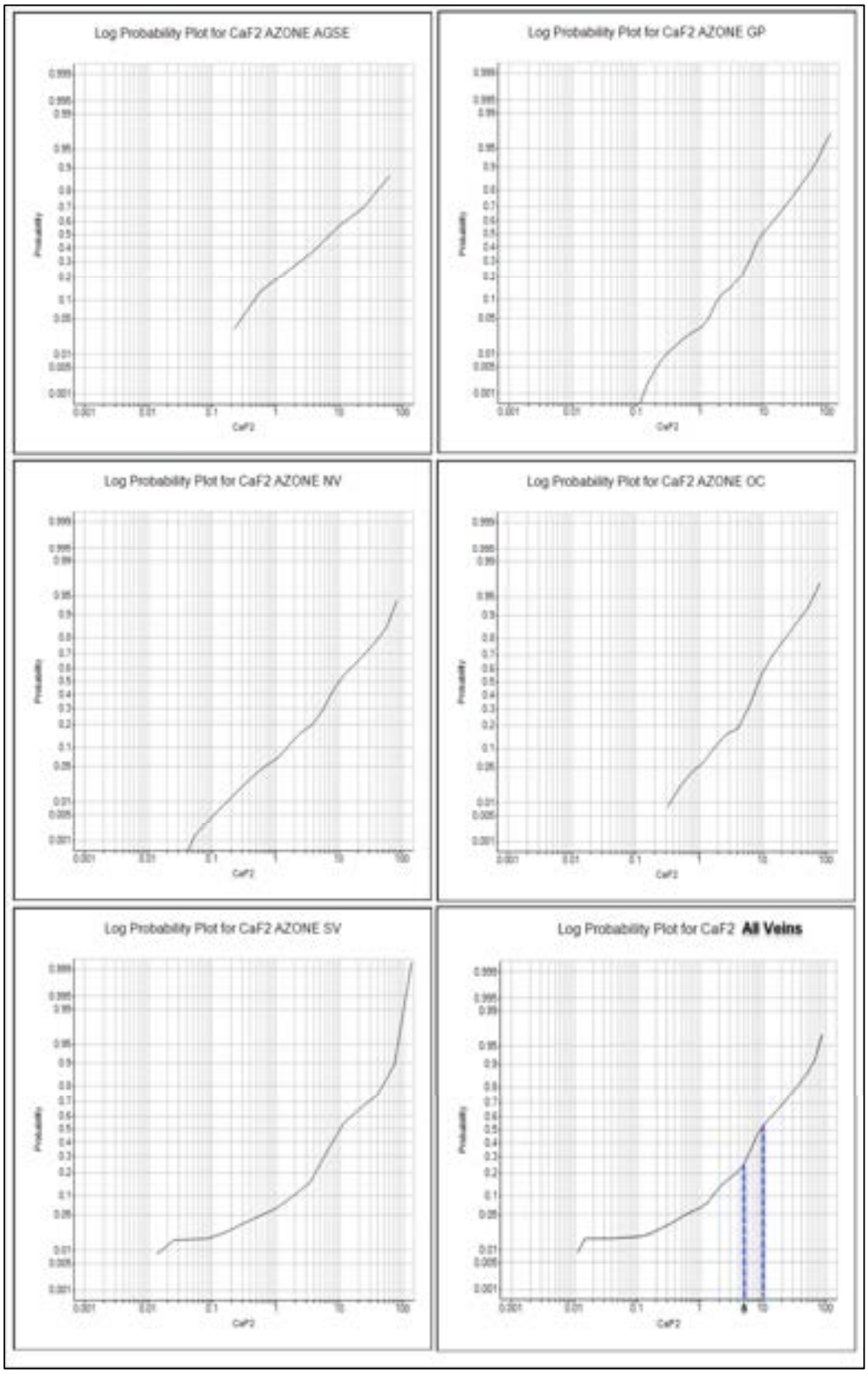


**Figure 11-10. Log Probability Plots of $CaF_2$ Samples within Vein Systems**

### 11.3.4 Drillhole Data Processing

A histogram of mineralised samples lengths for AGS is shown in Figure 11-11. This clearly shows that the majority of samples have a 1m length or less. From this it was decided to composite samples onto 1m composite length, so as to provide consistent sample support in geostatistical analysis.

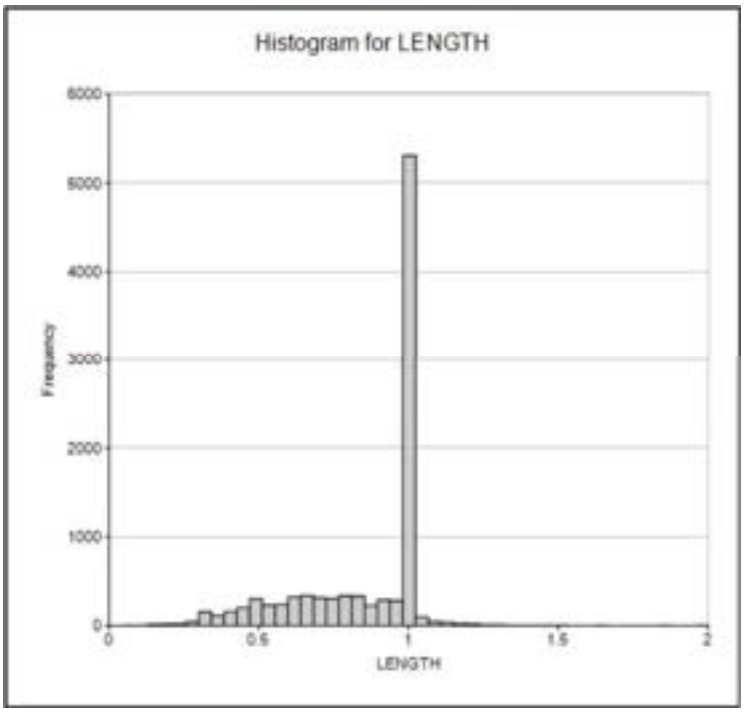


**Figure 11-11. Histogram of Mineralised Sample Lengths - AGS**

The mineralised vein wireframes were based on definition of overall mineralisation limits. However, within these limits, quite different populations of low-grade samples (<5% $CaF_2$) as well as medium grades samples (>=5% and <10% $CaF_2$) and higher grades are apparent. These parts have been consequently modelled by assignment and extrapolation of these grade categories during the overall grade estimation process. This system is flexible and allows very detailed modelling. To facilitate this procedure, the following drillhole data processing steps took place:

1. **Initial Sample Selection** within mineralised vein envelopes.

2. **Capping**. Top-cut levels were applied before compositing. The selection of top-cut levels is described below.

3. **Compositing** was then done, with composites being separated across each change in vein system (AZONE) as well as individual vein (AZ_VEIN). A compositing length of 1m was applied; and this length was allowed to be slightly variable, so that composites are of equal length across each intersection. This avoids excessively small composites being created through rigidly applied composite lengths. A minimum composite length of 0.5m was applied.

4. **Grade Categories** were allocated within each overall vein intersection, with the field MINZ. This was based on the following break points, as derived from the sample log-probability plots. Unsampled parts were set as MINZ=1 i.e., internal waste.

**Table 11-7. AGS Grade Categories**

| MINZ | Description |
|---|---|
| 1 | $CaF_2$<5% |
| 2 | $CaF_2$>=5% and $CaF_2$<10% |
| 3 | $CaF_2$>=10% |

As a preparation for compositing, an analysis of outlier grades was based on analysis of log-probability plots, decile analyses and coefficient of variation (CoV) analyses. Example graphs from CoV analysis are shown in Figure 11-12. These graphs depict the change in CoV variation in rank order for grades in the top decile. The CoV values represent the Coefficient of Variation (Standard Deviation/Mean) of all sample grades in the top decile, up to the particular sample grade being analysed.

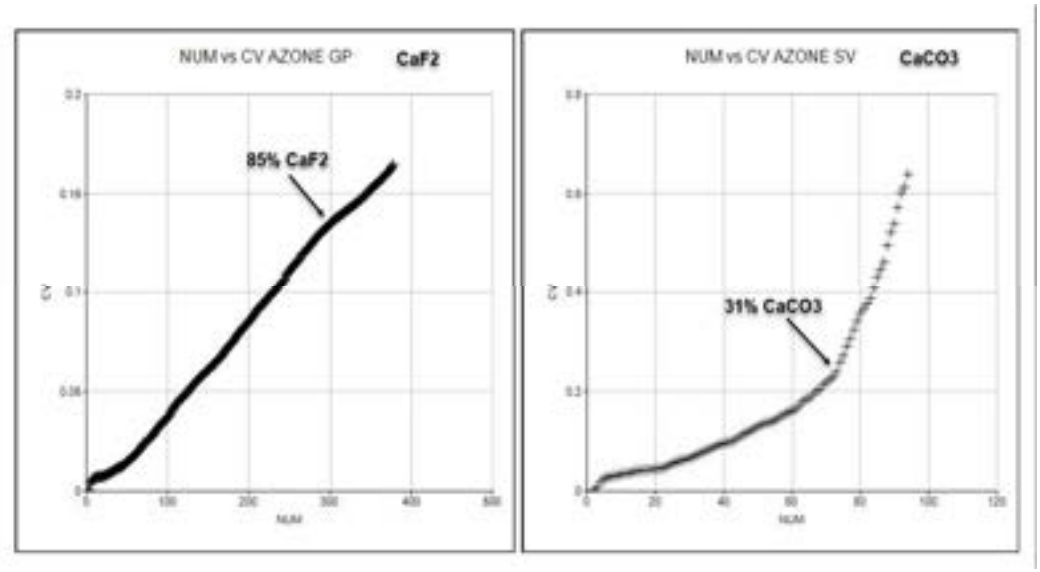


**Figure 11-12. Example Coefficient of Variation Analysis Plots – AGS**

The capping levels determined for all the samples sets within each mineralised vein system are summarised in Table 11-8. The effect of these capping levels on overall AGS grade means is shown in Table 11-9. CoV plots for all zones are shown in Appendix A.

.

**Table 11-8. Summary of Capping Levels - AGS**

| AZONE | $CaF_2$ % | $CaCO_3$ % |
|---|---|---|
| AGSE | 88 | 9 |
| GP | 85 | 60 |
| NV | 91 | 31 |
| OC | 67 | 6 |
| SV | 96 | 31 |

**Table 11-9. Effect of Applied Capping Levels – AGS**

| AZONE | Grade Field | Number of Composites | Number Affected by TC | Proportion Affected % | Uncut Mean | Mean with TC |
|---|---|---|---|---|---|---|
| AGSE | $CaF_2$ | 76 | 7 | 9.2 | 20.8 | 20.6 |
| GP | $CaF_2$ | 3,245 | 127 | 3.9 | 18.1 | 18.0 |
| NV | $CaF_2$ | 1,861 | 116 | 6.2 | 22.8 | 22.6 |
| OC | $CaF_2$ | 185 | 15 | 8.1 | 15.5 | 15.0 |
| SV | $CaF_2$ | 797 | 38 | 4.8 | 25.9 | 25.8 |
| AGSE | $CaCO_3$ | 76 | 3 | 3.9 | 2.3 | 2.2 |
| GP | $CaCO_3$ | 3,055 | 111 | 3.6 | 8.4 | 8.2 |
| NV | $CaCO_3$ | 1,752 | 59 | 3.4 | 5.4 | 5.2 |
| OC | $CaCO_3$ | 185 | 15 | 8.1 | 2.4 | 2.3 |
| SV | $CaCO_3$ | 773 | 35 | 4.5 | 5.8 | 5.3 |

### 11.3.5 Statistics - Composites

A statistical summary of 1m composites within the AGS mineralised vein systems is shown in Table 11-10. Log-probability plots for the 1m composites' data sets are shown in Figure 11-13 and Figure 11-14. Features apparent from these statistics include:

- No major changes to grade distributions with generation of 1m composites.
- General decrease in coefficient of variation from typically around 120% to around 100%, with conversion from raw samples to 1m composites for $CaF_2$.

**Table 11-10. Statistics of 1m Composites – AGS – By Vein System**

| AZONE | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AGSE | $CaF_2$ | 76 | 0.1 | 88.0 | 21.0 | 9.5 | 24.7 | 609.0 | 117.5 | 0.5 | 61.1 |
| GP | $CaF_2$ | 3245 | 0.0 | 85.0 | 18.0 | 9.9 | 18.9 | 358.2 | 105.3 | 2.7 | 45.9 |
| NV | $CaF_2$ | 1861 | 0.0 | 91.0 | 22.6 | 11.9 | 24.1 | 581.6 | 106.5 | 2.6 | 62.0 |
| OC | $CaF_2$ | 185 | 0.3 | 66.9 | 15.0 | 8.3 | 15.2 | 232.4 | 101.8 | 2.9 | 39.7 |
| SV | $CaF_2$ | 797 | 0.0 | 96.0 | 25.7 | 11.1 | 27.4 | 751.6 | 106.5 | 3.5 | 73.4 |
| AGSE | $CaCO_3$ | 76 | 0.3 | 8.2 | 2.3 | 1.6 | 1.9 | 3.4 | 81.3 | 0.5 | 4.6 |
| GP | $CaCO_3$ | 3055 | 0.0 | 60.0 | 8.2 | 4.6 | 10.9 | 118.1 | 132.4 | 1.1 | 19.1 |
| NV | $CaCO_3$ | 1752 | 0.0 | 31.0 | 5.2 | 3.7 | 5.5 | 29.9 | 105.5 | 0.9 | 11.7 |
| OC | $CaCO_3$ | 185 | 0.3 | 6.0 | 2.3 | 1.6 | 1.6 | 2.7 | 71.8 | 0.6 | 4.7 |
| SV | $CaCO_3$ | 773 | 0.0 | 31.0 | 5.3 | 3.8 | 5.6 | 31.0 | 105.1 | 0.9 | 11.6 |

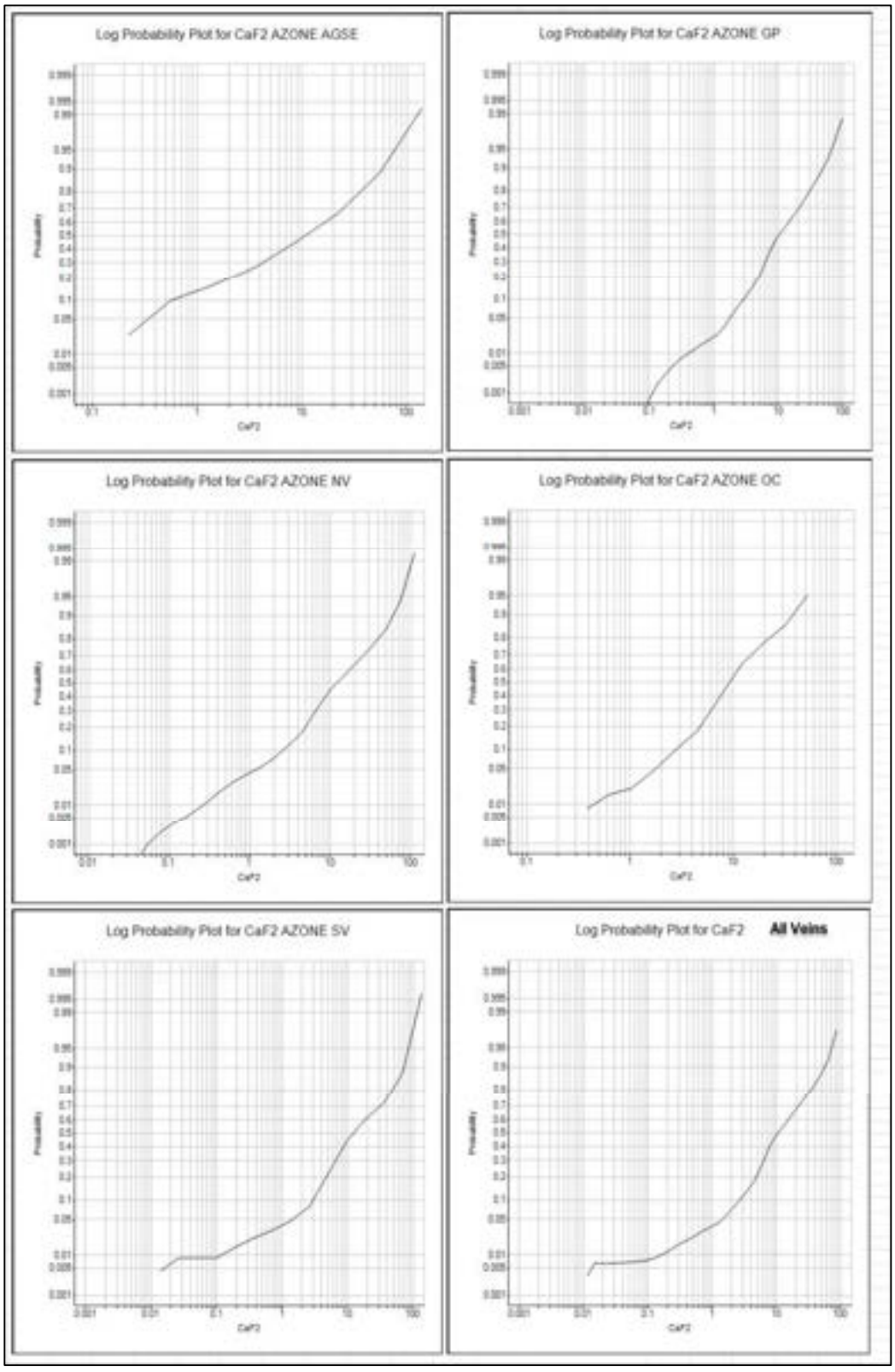


**Figure 11-13. Log-Probability Plots – Composites- $CaF_2$ AGS**

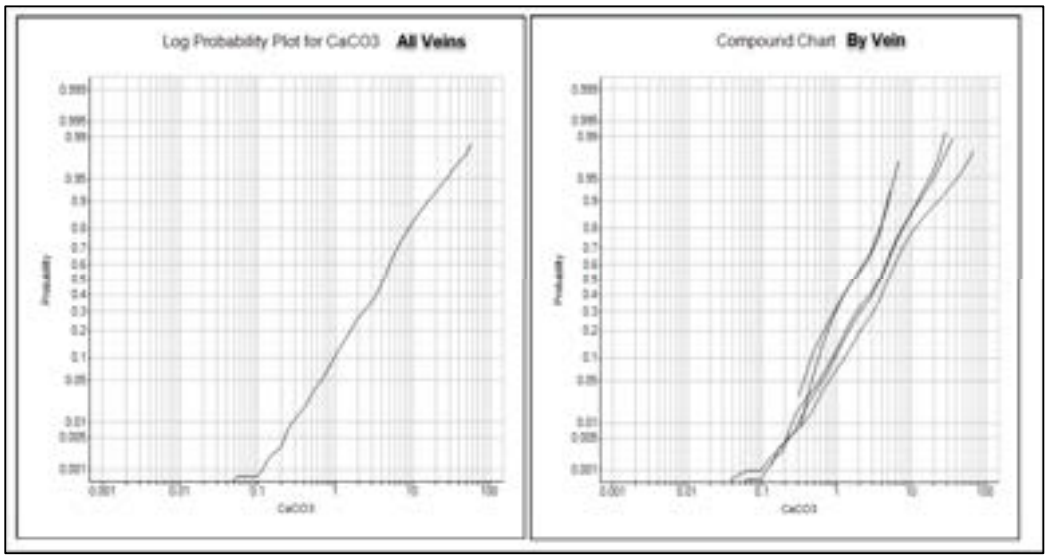


**Figure 11-14. Log-Probability Plots – Composites- $CaCO_3$ AGS**

### 11.3.6 Density

Bulk density values were assigned on the basis of rock type, as summarised in Table 11-11. These are the same values as used in the SLR 2022 study. They stem from 665 measurements taken between 2013 and 2017. Of these measurements, 363 were rejected as being not representative of individual lithologies, or outliers (density >3.12 t/m$^3$) for vein material.

**Table 11-11. Summary of Assigned Density Values – AGS**

| Rock/Material Type | Density t/m$^3$ |
|---|---|
| Rhyolite | 2.64 |
| Granite (SLG) | 2.61 |
| Metasediments | 2.75 |
| Vein Material | 2.91 |
| Overburden | 1.8 |
| Waste Dump Material | 1.94 |

A statistical summary of the density measurements is shown in Table 11-12, with corresponding histograms in Figure 11-15. It can be seen the degree of density variation is very small.

**Table 11-12. Statistics of Density Measurements – AGS**

| Lithology | NUMBER | MINIMUM | MAXIMUM | MEAN | VARIANCE | STANDDEV | COVARTN% | PCTL10 | PCTL50 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|
| Rhyolite | 43 | 2.32 | 3.1 | 2.64 | 0.01 | 0.12 | 4.46 | 2.529 | 2.63 | 2.748 |
| Granite | 7 | 2.59 | 2.62 | 2.61 | 0.00 | 0.01 | 0.38 | 2.587 | 2.61 | 2.62 |
| Meatsediments | 205 | 2.33 | 2.94 | 2.75 | 0.01 | 0.07 | 2.70 | 2.67 | 2.76 | 2.84 |
| Vein material | 47 | 2.62 | 3.12 | 2.91 | 0.02 | 0.16 | 5.32 | 2.7 | 2.97 | 3.11 |

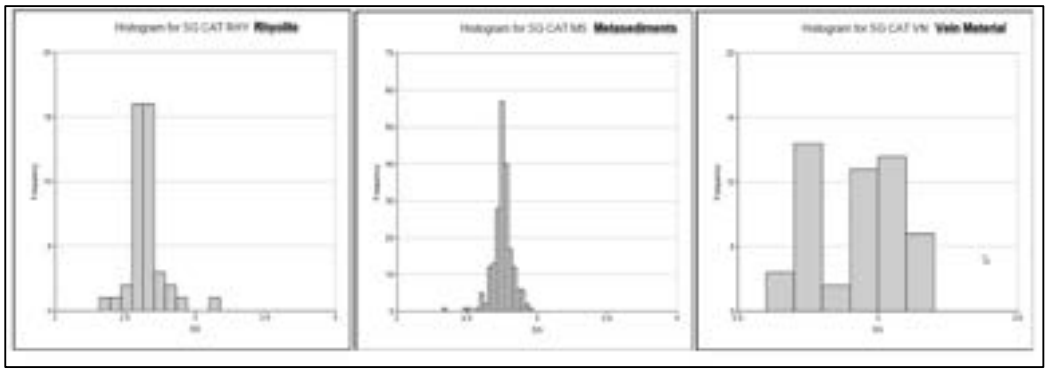

**Figure 11-15. Histograms of Density Measurements - AGS**

*Comment: It is of concern that the density measurements and implementation of a single global vein density value do not take into account some intersections of very poor recovery, which are often likely caused by washing out of clay gouge material. The remaining core fragments left in these intersections cannot be used for density measurement, and there are no measurements that assist with the estimation of the amount of this clay-gouge-affected material. The current vein density applied is quite conservative, given the high proportion of high density outliers that were rejected.*

### 11.3.7 Geostatistical Analysis

A geostatistical study was completed for $CaF_2$ and $CaCO_3$, according to the mineralised vein data sets at AGS. This was done in order to understand spatial relationships for different types of grades within the various mineralised veins, and to assist with parameters for block grade estimation and resource classification.

The following steps were completed for the geostatistical study:

1. **Composites**. For analysis of the variography, 1m capped composites were filtered by vein system groups and grade category (+/- 10% $CaF_2$). The vein groupings used were NV/SV/OC and GP/AGSE, based on similar grade distributions.

2. **Downhole Variograms**. For each filtered data set, downhole variograms with a lag of 1m. The experimental variograms produced by this step were used to help determine the nugget variance.

3. **Experimental Variograms**. Directional experimental variograms were now produced, for three orthogonal directions, typically aligned within the plane of then vein as well as cross-strike directions of the particular mineralised vein groups. Lag distances of 40m applied within the plane of the vein. Much shorter lag distances, of 1m were applied in the cross-strike direction.

4. **Model Variograms** were fitted to the experimental variograms, so as to obtain sill and range values in three principal orthogonal directions.

Experimental and model variograms are shown for $CaF_2$ in Figure 11-16 and for $CaCO_3$ in Figure 11-17. The model variogram parameters are shown for AGS are shown in Table 11-13.

**Table 11-13. Model Variogram Parameters – AGS**

| | | | | | | | 1st Structure | | | | 2nd Structure | | | | 3rd Structure | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Field | Vein | Grade | Rotation Angles | | | Nugget | Range | | | | Range | | | | Range | | | |
| | | Category | 1 | 2 | 3 | C0 | X' | Y' | Z' | C1 | X' | Y' | Z' | C2 | X' | Y' | Z' | C3 |
| $CaF_2$ | GP/AGSE | <10% $CaF_2$ | 225 | - | 88 | 3 | 16 | 17 | 3.5 | 2 | 34 | 35 | 5 | 2.1 | - | - | - | - |
| $CaF_2$ | GP/AGSE | >10% $CaF_2$ | 225 | - | 85 | 97 | 19 | 19 | 1.5 | 175 | 35 | 35 | 4 | 29 | 48 | 48 | 9,999 | 115 |
| $CaF_2$ | NV/SV/OC | <10% $CaF_2$ | 225 | - | 88 | 3 | 12 | 12 | 10 | 2 | 52 | 62 | 11 | 1.4 | - | - | - | - |
| $CaF_2$ | NV/SV/OC | >10% $CaF_2$ | 225 | - | 85 | 94 | 42 | 32 | 6 | 174 | 87 | 55 | 10 | 196 | 92 | 9,999 | 9,999 | 185 |
| $CaCO_3$ | GP/AGSE | <10% $CaF_2$ | - | - | - | 4 | 13 | 13 | 13 | 7 | 51 | 51 | 51 | 4.9 | - | - | - | - |
| $CaCO_3$ | GP/AGSE | >10% $CaF_2$ | 225 | - | 88 | 10 | 11 | 11 | 3.1 | 53 | 35 | 35 | 7 | 73 | - | - | - | - |
| $CaCO_3$ | NV/SV/OC | <10% $CaF_2$ | - | - | - | 1 | 8 | 8 | 8.2 | 8 | 40 | 40 | 40 | 7.1 | - | - | - | - |
| $CaCO_3$ | NV/SV/OC | >10% $CaF_2$ | 225 | - | 85 | 3 | 16 | 16 | 3.5 | 18 | 67 | 67 | 11 | 22 | - | - | - | - |

The $CaF_2$ variograms for the +10% $CaF_2$ material have ranges of approximately 70m. As would be expected, the cross-strike ranges are much shorter, corresponding with orientation of higher-grade intersections parallel with the overall vein structures.

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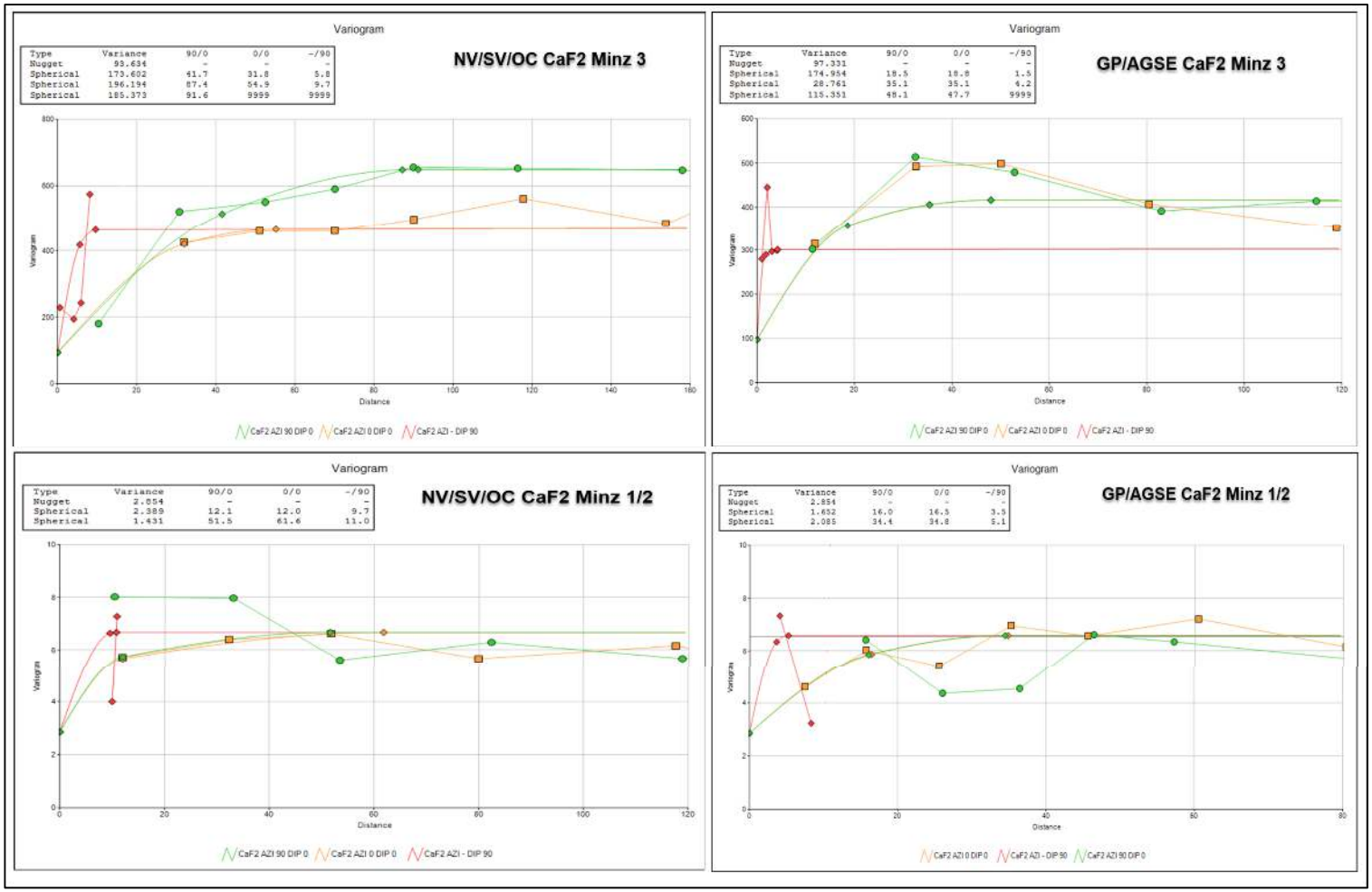



**Figure 11-16. $CaF_2$ Variograms - AGS**

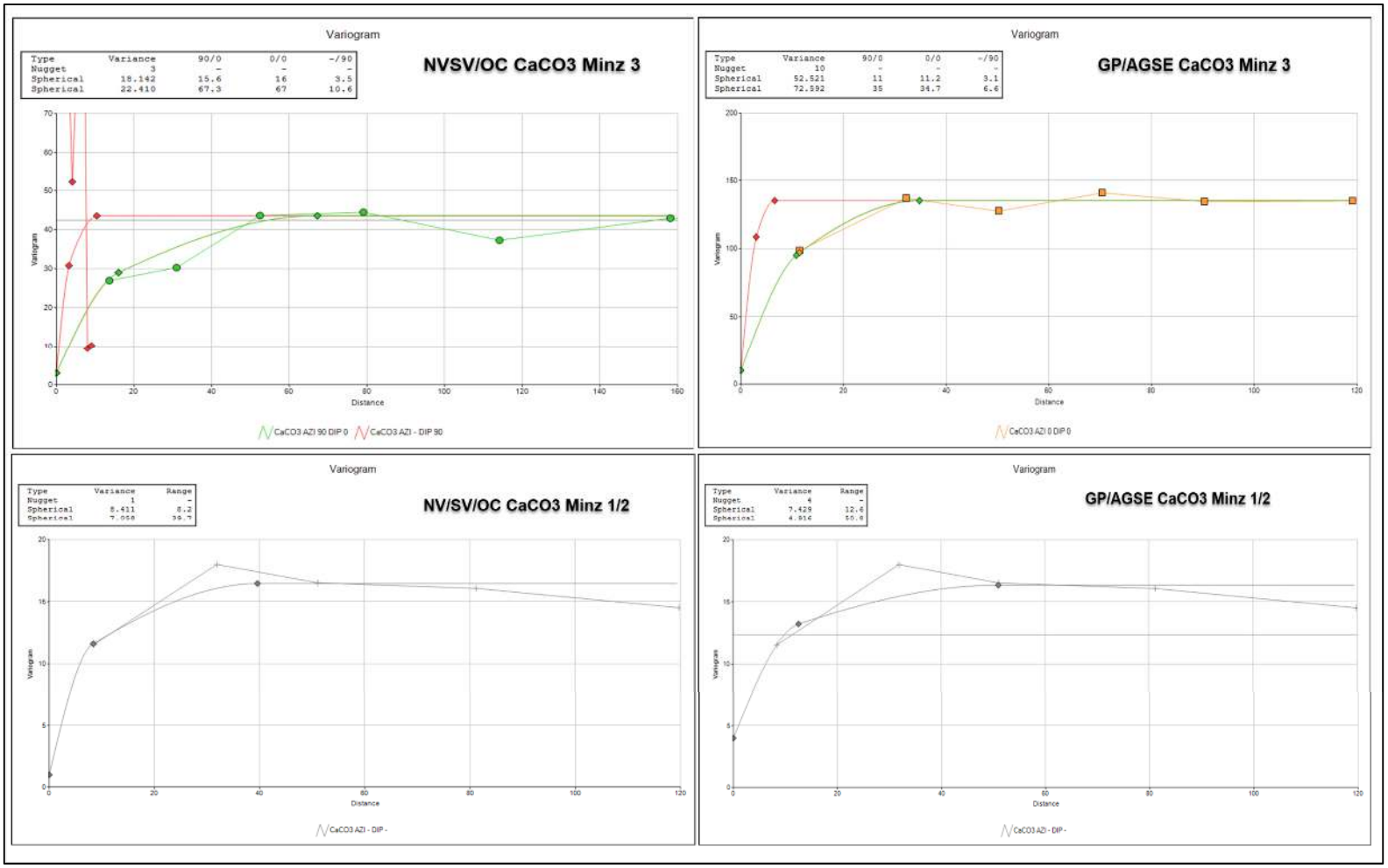



**Figure 11-17. $CaCO_3$ Variograms - AGS**

### 11.3.8 Volumetric Modelling

The initial block model prototypes used for the current resource estimation are summarised in Table 11-14, and are depicted in plan in Figure 11-18. The prototype was set up so as to include enough waste beyond the extents of the deposit, to enable a model coverage sufficient for potential open pit planning. The parent block height of 10m was selected so as to correspond with the planned pit bench height. Within the mineralised domains, sub-cells were created measuring 2m cross-strike, so as to allow more detail in grade estimation.

**Table 11-14. Block Model Prototypes**

| | Size | Number | Extent |
|---|---|---|---|
| | *m* | | *m* |
| **X** | 10 | 400 | 4,000 |
| **Y** | 10 | 150 | 1,500 |
| **Z** | 10 | 60 | 600 |

**Notes**

**. Rotation 35° around Z-axis**

**. Origin at**

| | |
|---|---|
| **X** | **615,143** |
| **Y** | **5,196,262** |
| **Z** | **600** |

**. Grade categories extrapolated on basis of 5m x 1m x 5m sub-cells**

**. Grade estimation on basis of of 10m x 2m x 10m sub-cells**

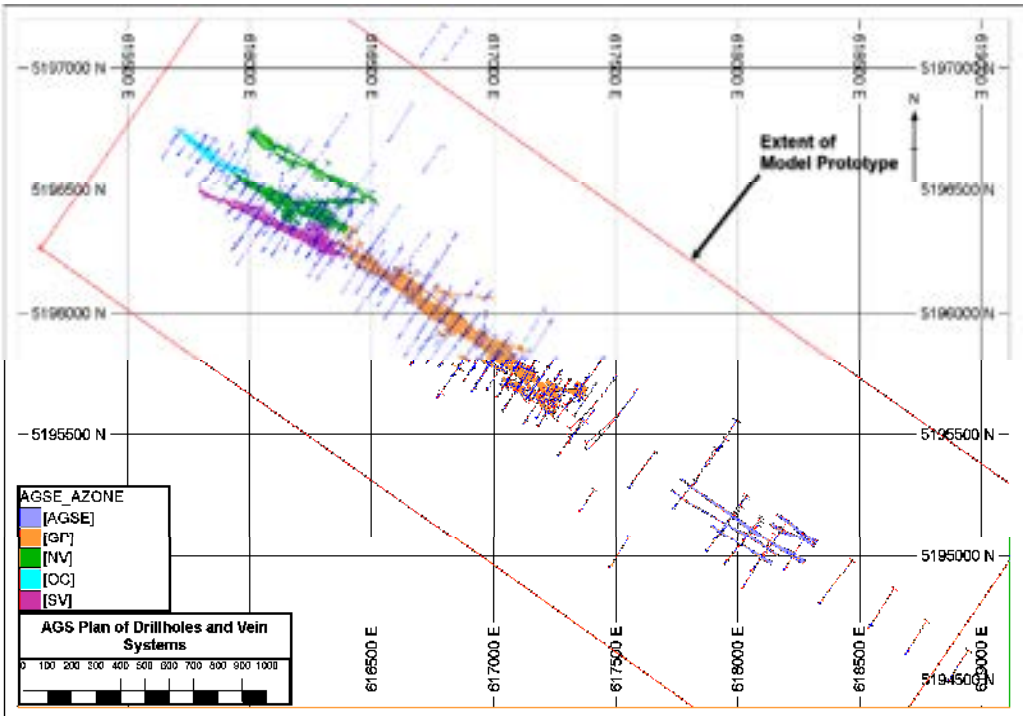



**Figure 11-18. Extent of AGS Model Prototype**

During creation of the volumetric block models, blocks were split into sub-cells laterally near surface edges, down to a minimum size of 1.25m x 1.25m. The wireframe models used in the generation of the volumetric block models, and the resultant fields created, are summarised in Table 11-15.

**Table 11-15. Volumetric Model Fields**

| Wireframes | Field | Values/Notes |
|---|---|---|
| Mineralised Veins | AZONE | Parent zone ID: AGS, GP, SV, NV, OC |
| | VEIN | Vein number |
| | AZ_VEIN | Combination AZONE+VEIN |
| | LITH | VEIN |
| Original Topography | SOLID | 1 |
| Overburden | LITH | OB |
| Rhyolite | LITH | RHY; outside => MS for meta-sediments |
| Granite | LITH | SLG |
| South Dump | LITH | DUMP |
| North Dump | LITH | DUMP |
| Centre Pit | MINED | 1 |
| Grebes Pit | MINED | 1 |

### 11.3.9 Grade Estimation

With respect to grade estimation, the interpreted mineralised vein structures were used as hard boundaries. Therefore, only composites created from samples physically within each mineralised domain were used for the estimation of grades within each domain.

Although the mineralised domain wireframes do properly represent overall the mineralised vein envelopes, there are clearly still alternating zones of different grade categories within them, as discussed in Section 11.3.3. To represent these internal zonations, the following procedure was applied:

1. **Composites**. As described in Section 11.3.4, the 1m composites within each mineralised zone were flagged with the MINZ field (1: <5%$CaF_2$, 2: >=5<10% $CaF_2$ and 3: >=10% $CaF_2$). The lowest grade category (MINZ=1) can be thought as effectively internal waste.

2. **Orientation**. Vein orientation vectors were derived from the vein wireframes. These were then employed by dynamic anisotropy processes in Datamine, so as to assign values in TRDIPDIR and TRDIP (true dip direction and true dip) fields throughout all modelled blocks within the mineralised veins.

3. **Cell Slicing**. Blocks within the mineralised domains were sliced using an alternative model prototype with 5m x 1m x 5m. This size essentially represents the resolution of the internal waste zone extrapolation.

4. **Interpolation**. The 1/2/3 values in the MINZ field of composite file were then extrapolated into the sliced model, within each vein domain, using nearest neighbour estimation, and controlled through dynamic anisotropy. A flat search ellipsoid was applied with ratio of 6:1, with initial dimensions of 60m x 60m x 10m.

5. **Model Resolution**. The extrapolated vein sub-cells were then simplified and resolved onto a former 10m x 2m x 10m cell structure. An example cross-section showing the net result of this internal grade category extrapolation is shown in Figure 11-19.

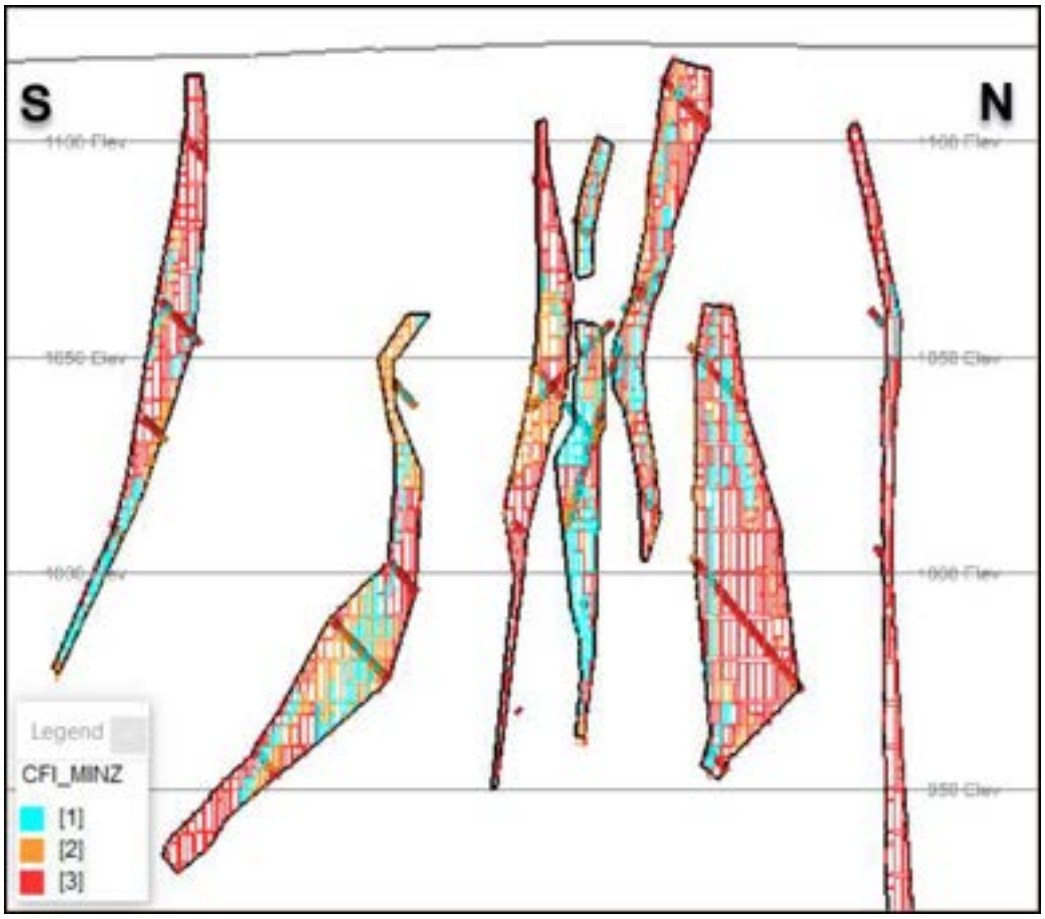



**Figure 11-19. Example AGS Cross-Section #17 of Extrapolated Grade Category MINZ**

A summary of the search and other estimation controls for grade estimation are shown in Table 11-16. The first and second search ellipses extend approximately as far as the $CaF_2$ variogram ranges. An example cross-section of the resultant grade estimation is shown in Figure 11-20.

**Table 11-16. Grade Estimation Parameters**

| Distances (m) | | | Factor for | Factor for |
|---|---|---|---|---|
| X | Y | Z | 2nd | 3rd |
| 30 | 30 | 5 | 2 | 3 |

**Notes:**

**. Maximum number of composites/hole = 2**

**. Min/Max Controls by Search Number:**

| Search | Minimum Composites | Maximum Composites | Minimum Drillholes |
|---|---|---|---|
| 1 | 6 | 20 | 3 |
| 2 | 6 | 20 | 3 |
| 3 | 1 | 8 | - |

**. Directions determined locally using dynamic anisotropy:**

**X: Along-Strike**

**Y: Down-Dip**

**Z: Cross-Strike**

**. Discretisation 5 x 5 x 1**

**. Parent block size for grade estimation: 10m x 2m x 10m**

**. $CaF_2$ and $CaCO_3$ estimated using ordinary kriging (OK),**

**. Grades also estimated using ID and NN, for validation purposes**

**. Estimation controlled by AZONE and MINZ**

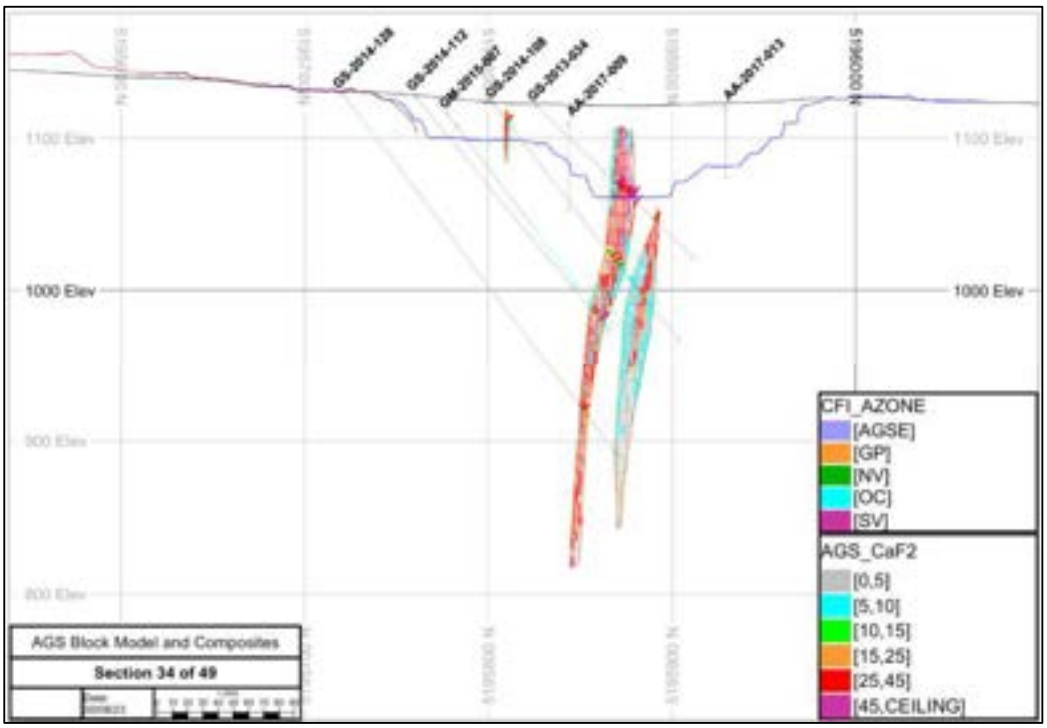



**Figure 11-20. Example Cross-Section (#34) of $CaF_2$ Grade Estimation**

### 11.3.10 Mineral Resource Classification

The resource estimate data determined in this study have been prepared, as far as possible, in accordance with the terminology, definitions and requirements of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM 2014) Standards on Mineral Resources and Reserves, Definitions and Guidelines.

In developing the appropriate classification criteria, the following factors have been considered:

- Input data quality.
- Quantity, density and spacing of available sample data.
- Geological understanding and grade continuity.
- Quality of geostatistical analysis, estimation methodology and validation results.
- Experience related to similar deposits.

A resource classification risk matrix has been developed for the MRE work described in the current study for AGS, as shown in Table 11-18. In turn, this supports the resource classification criteria summarised in Table 11-17.

**Table 11-17. Resource Classification Criteria - AGS**

| Category | Description |
|---|---|
| **Indicated** | Within interpreted veins, covered by a drilling grid of at least 70m approximately. |
| **Inferred** | Within interpreted veins, max extrapolation approximately 100m. |

No material has been classified as Measured, due to reasons which include:

- Lack of drilling recovery support.
- QAQC results adequate but not best practice.
- Lack of data related to fault gouge material.

The drilling grid threshold of 70m for Indicated resources is supported by the in-plane variograms ranges for the +10%$CaF_2$ grade grouping.

Inferred resource categories have been defined in those volumes within the extent of the Mineralised Veins, but outside the volumes defined as Indicated resources. In general, the maximum extent of extrapolation from drillhole intersections within Mineralised Veins, and therefore Inferred resources, has been 100m.

The resource criteria have been applied by determining average intersection spacings, and then viewing each vein on long section, where resource class polygons have been defined to assign the final classifications. An example for the largest AGS vein, vein GP_2, is shown in Figure 11-21. Appendix C contains long sections for all the veins which contain Indicated resources.

## Table 11-18. Resource Classification Risk Matrix

| | FACTORS | Risk (E/H/M/L) | Comments |
|---|---|---|---|
| | **1. SAMPLING TECHNIQUES & DATA** | | |
| 1.1 | Sampling Techniques | L | Surface diamond drill hole samples used in estimation, with a very small number of trench samples. |
| 1.2 | Drilling Techniques | L | Core drilling by standard wireline diamond drilling. Core drilling has been mostly NQ. |
| 1.3 | Drill sample Recovery | M | Sporadically recorded as part of logging descriptions. Total core recovery described previously as +95%, but this is does not appear to be backed up by actual numeric data. Solid core recovery (SCR) not recorded. |
| 1.4 | Drillcore Logging | M | Consistent logging of lithology and mineralisation. Lack of detailed lithology logs, recovery measurements and recording of fault gouge intersections. |
| 1.5 | Sub-sampling Techniques and Sample Prep | L | Samples from cut core, selected by geologist's opinion on what is mineralised. Uv lights available. |
| 1.6 | Quality of Assay Data and Laboratory Tests | M | One blank, one standard and one coarse duplicate. Not best practice. Some poor results, particularly for lower grades. No twin sampling, no fine duplicates, no fine blanks, although some of these are done internally by the assaying company. Different assaying methods have also been used : ISE, DCT, NMR. |
| 1.7 | Verification of Sampling and Assaying | L | Check logging of a number of holes. Check of various collar coordinates. Check of hole intersections vs pit exposures. |
| 1.8 | Location of Data Points | L | Drillhole collars geodetically surveyed. Drillhole collar elevations checked against topography and selected check in field. |
| 1.9 | Data Spacing and Distribution | L | Drillhole spacing mostly 40-50m along strike-length. Vertically also a major part of the veins are covered by drillhole intersections up to 70m spacing. |
| 1.1 | Orientation of Data cf Geological Structure | L | Holes on regular section lines, perpendicular to overall strike length. Some steep intersections due to near vertical nature of many of the veins. |
| 1.11 | Sample Security | H | Core held on site in core shack facility. Former lab facility exists, but in need of maintenance and proper inventory update. Core facility **not** within a secure locked boundary. |
| | **2. REPORTING OF EXPLORATION RESULTS** | | |
| 2.1 | Mineral Tenement and Land Tenure Status | L | Appears ok, as documented by SLR. |
| 2.2 | Geology | L | Fluorspar veins, predominantly within granitic rocks, metasediments and rhyolites and sills. |
| 2.3 | Drillhole Information | L | Delivered as Excel files. |
| 2.4 | Data Aggregation Methods | L | Drillhole data composited downhole into 1m lengths. |
| 2.5 | Diagrams | L | Extensive cross-sections produced for all section lines. |
| 2.6 | Balanced Reporting | L | Consistent drilling scheme along strike, covering 5 main vein systems. |
| 2.7 | Other Substantive Data | L | Previous open pits, trenching and geophysical surveys. |
| | **3. ESTIMATION AND REPORTING OF MINERAL RESOURCES** | | |
| 3.1 | Database Integrity | M | Multiple Excel files available from previous operation/ownership need consolidation into proper mine database. Needs also proper referencing of assaying method, assaying company, core recoveries. Also needs flagging to clearly show final accepted samples. |
| 3.2 | Site Visits | L | QP visited in August 2023 |
| 3.3 | Geological Interpretation | L | Sectional interpretation update in Datamine, building on previous interpretation from CFI geologists. |
| 3.4 | Dimensions | L | Overall, the AGS the deposit covers an approximately 3km strike length, 300-450m depth. 5 vein systems occupy an overall width of approximately 350m. |
| 3.5 | Estimation and Modeling Techniques | L | Three main CaF2 grade categories extrapolated within overall vein envelopes. |
| | | L | CaF2 and CaCO3 by ordinary kriging (OK). |
| 3.6 | Cut-off Parameters | H | Further process testing required to support mill recovery assumptions. |
| 3.7 | Mining Factors/Assumptions | L | No dilution applied for reporting of resources. |
| 3.8 | Metallurgical Factors or Assumptions | H | Previous milling operations shut in February 2002. Crusher, ore feed arrangements and other aspects being reviewed for improvements, prior to potential restart. |
| 3.9 | Environmental Factors or Assumptions | L | According to the SLR 2022 43-101, CFI does not have a formal environmental and social management system, however there are several environmental management plans in place. |
| 3.10 | Bulk Density | H | Previous milling operations shut in February 2002. Crusher, ore feed arrangements and other aspects being reviewed for improvements, prior to potential restart. |
| 3.11 | Classification | L | Physical controls applied, so that **Indicated** resource areas are blocked out within Mineralised Veins covered by drilling grid of at least 70m, approximately. Remaining material within interpreted veins classified as **Inferred** resources. |
| 3.12 | Audits or Reviews | L | SLR prepared updated 43-101 study in 2022. Site visited by SLR metallurgist and geotechnical engineer, and AGP geologist, during 2022. |
| | | | |
| **Notes** | | | |
| | . Not compliant and significant project risk | E | **Extreme Risk** |
| | . Current status does carry some project risk | H | **High Risk** |
| | . Improvements required for best practice | M | **Medium Risk** |
| | . Current reporting/information acceptable | L | **Low Risk** |

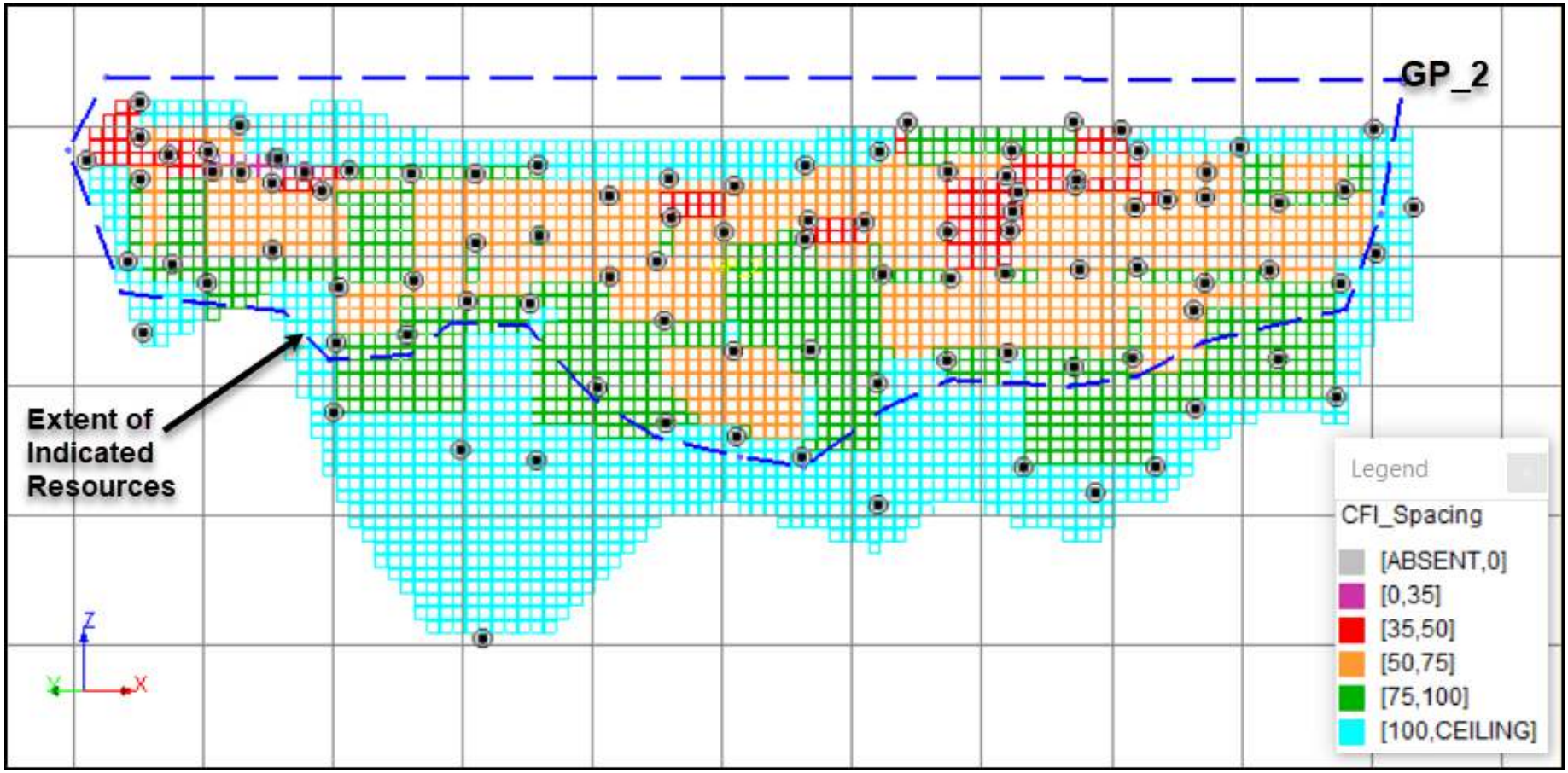



**Figure 11-21. Example Resource Class Long Section GP_2**

The approximate volumetric split of resource categories at AGS, by vein system, is summarised in Table 11-19. This evaluation has cut-off of 5% $CaF_2$ applied and relates to in-situ resources.

**Table 11-19. Resource Category Split by Volume – AGS**

| Vein System | Indicated | Inferred | Total | Proportion By Vein | | Proportion of Total | |
|---|---|---|---|---|---|---|---|
| | Volume $m^3$ x 1000 | Volume $m^3$ x 1000 | Volume $m^3$ x 1000 | Ind % | Inf % | Ind % | Inf % |
| AGSE | 0 | 251 | 251 | 0% | 100% | 0% | 9% |
| GP | 2,402 | 1,857 | 4,258 | 56% | 44% | 64% | 69% |
| NV | 747 | 415 | 1,162 | 64% | 36% | 20% | 15% |
| OC | 164 | 31 | 195 | 84% | 16% | 4% | 1% |
| SV | 447 | 133 | 580 | 77% | 23% | 12% | 5% |
| **TOTAL** | **3,759** | **2,688** | **6,447** | **58%** | **42%** | **100%** | **100%** |

**Notes**

**. In-Situ Resources >=5% $CaF_2$**

### 11.3.11 Model Validation

The principal methods of model validation were:

- Visual Examination
- Global average comparison
- Local average comparison (swath plot)

Complete sets of cross-sections were made for $CaF_2$, comparing composite and estimated grades. An example of this is shown in Figure 11-20. Examination of such sections was a key aspect of validation and testing of estimation parameters and controls. The patterns of $CaF_2$ grades in the sections appear to reflect properly the banded vein nature of the fluorite mineralisation. The results of the visual comparison through the whole AGS block model show acceptable representations of drillhole composite grades on a local scale.

Global average values by vein were determined from the original sample data, 1m composites, and from the block model, for grades estimated by ordinary kriging (OK), nearest-neighbour estimation (NN) and inverse-distance weighting (ID^2). The comparative average grades, for $CaF_2$, are summarised in Table 11-20. The model average grades have been derived for all resource model blocks in each domain, regardless of their resource classification and grade category.

Most of these global grade averages correspond quite closely, even though the spacing of resultant drillhole intersections can be quite irregular.

**Table 11-20. Global Average Grade Comparisons by Vein**

| | | | | Average Block Model Grades | | |
|---|---|---|---|---|---|---|
| FIELD | AZ_VEIN | Samples | Composites | OK | ID | NN |
| CaF2 | AGSE_1 | 15.3 | 15.5 | 17.4 | 16.9 | 16.8 |
| CaF2 | AGSE_2 | 22.7 | 22.6 | 23.4 | 16.7 | 16.3 |
| CaF2 | AGSE_3 | 26.1 | 25.2 | 27.1 | 25.1 | 20.5 |
| CaF2 | AGSE_4 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| CaF2 | AGSE_5 | 9.8 | 9.8 | 10.5 | 10.5 | 10.5 |
| CaF2 | GP_1 | 17.6 | 17.4 | 16.0 | 16.4 | 16.4 |
| CaF2 | GP_2 | 19.3 | 19.2 | 17.6 | 18.0 | 17.7 |
| CaF2 | GP_3 | 22.7 | 22.7 | 24.3 | 24.3 | 23.8 |
| CaF2 | GP_4 | 22.0 | 22.1 | 17.5 | 18.0 | 16.5 |
| CaF2 | GP_5 | 16.0 | 15.9 | 16.1 | 15.7 | 15.1 |
| CaF2 | GP_6 | 12.7 | 12.7 | 12.1 | 11.9 | 11.4 |
| CaF2 | GP_7 | 15.1 | 15.1 | 14.9 | 14.6 | 13.2 |
| CaF2 | GP_8 | 22.4 | 22.4 | 24.9 | 24.5 | 23.5 |
| CaF2 | GP_9 | 15.1 | 14.9 | 14.4 | 14.3 | 13.7 |
| CaF2 | GP_10 | 22.1 | 21.9 | 19.0 | 18.9 | 18.6 |
| CaF2 | GP_11 | 9.9 | 9.9 | 9.4 | 9.3 | 9.0 |
| CaF2 | NV_1 | 20.4 | 20.2 | 20.0 | 20.1 | 21.0 |
| CaF2 | NV_2 | 30.5 | 30.2 | 32.6 | 32.2 | 33.3 |
| CaF2 | NV_3 | 31.6 | 31.5 | 27.9 | 28.2 | 27.8 |
| CaF2 | NV_5 | 15.2 | 15.0 | 16.0 | 16.3 | 15.6 |
| CaF2 | NV_6 | 20.7 | 20.7 | 21.1 | 21.0 | 21.1 |
| CaF2 | NV_7 | 16.0 | 15.9 | 14.4 | 14.5 | 14.5 |
| CaF2 | NV_8 | 15.0 | 15.0 | 16.5 | 17.0 | 15.2 |
| CaF2 | NV_9 | 30.8 | 30.4 | 27.5 | 27.7 | 27.1 |
| CaF2 | NV_10 | 25.2 | 25.1 | 21.5 | 22.0 | 22.0 |
| CaF2 | NV_11 | 9.1 | 9.1 | 11.9 | 11.1 | 8.8 |
| CaF2 | NV_12 | 22.2 | 22.2 | 18.8 | 18.9 | 19.7 |
| CaF2 | NV_13 | 11.1 | 11.1 | 9.8 | 10.8 | 8.3 |
| CaF2 | NV_14 | 15.6 | 15.6 | 12.6 | 13.0 | 13.4 |
| CaF2 | NV_16 | 59.8 | 59.2 | 39.7 | 40.9 | 43.1 |
| CaF2 | NV_18 | 24.4 | 24.4 | 23.5 | 23.8 | 23.6 |
| CaF2 | OC_1 | 15.6 | 15.1 | 13.1 | 13.3 | 13.3 |
| CaF2 | OC_2 | 8.9 | 8.9 | 14.7 | 13.0 | 10.5 |
| CaF2 | SV_1 | 27.4 | 27.4 | 24.6 | 24.9 | 24.4 |
| CaF2 | SV_2 | 18.7 | 18.7 | 14.7 | 15.2 | 15.6 |
| CaF2 | SV_3 | 23.6 | 23.6 | 19.5 | 20.9 | 22.5 |
| CaF2 | SV_5 | 32.5 | 32.5 | 39.2 | 36.9 | 32.6 |
| CaF2 | SV_6 | 24.2 | 24.2 | 25.0 | 25.3 | 25.0 |

A local comparison of average grades, for the +10% $CaF_2$ grade category, was also made, in the form of swath plots, which compare the average grades on successive 50m thick sectional slices. These plots compare for each slice:

- The average drillhole composite grades;
- The average estimated model grades, from different alternative methods of estimation; and
- For reference, the total resource tonnage on each slice used from the model.

An example of the swath plots for vein GP, $CaF_2$, is shown in Figure 11-22. The swath plots generated have not been filtered by resource category.

All of the swath plots for both $CaF_2$ and $CaCO_3$ grades are shown in Appendix B. These show an acceptable comparison in all veins, particularly on those parts with higher tonnages. Overall, there appears to be a good correlation between the block model and underlying sample data. The average composite grades shown were declustered.

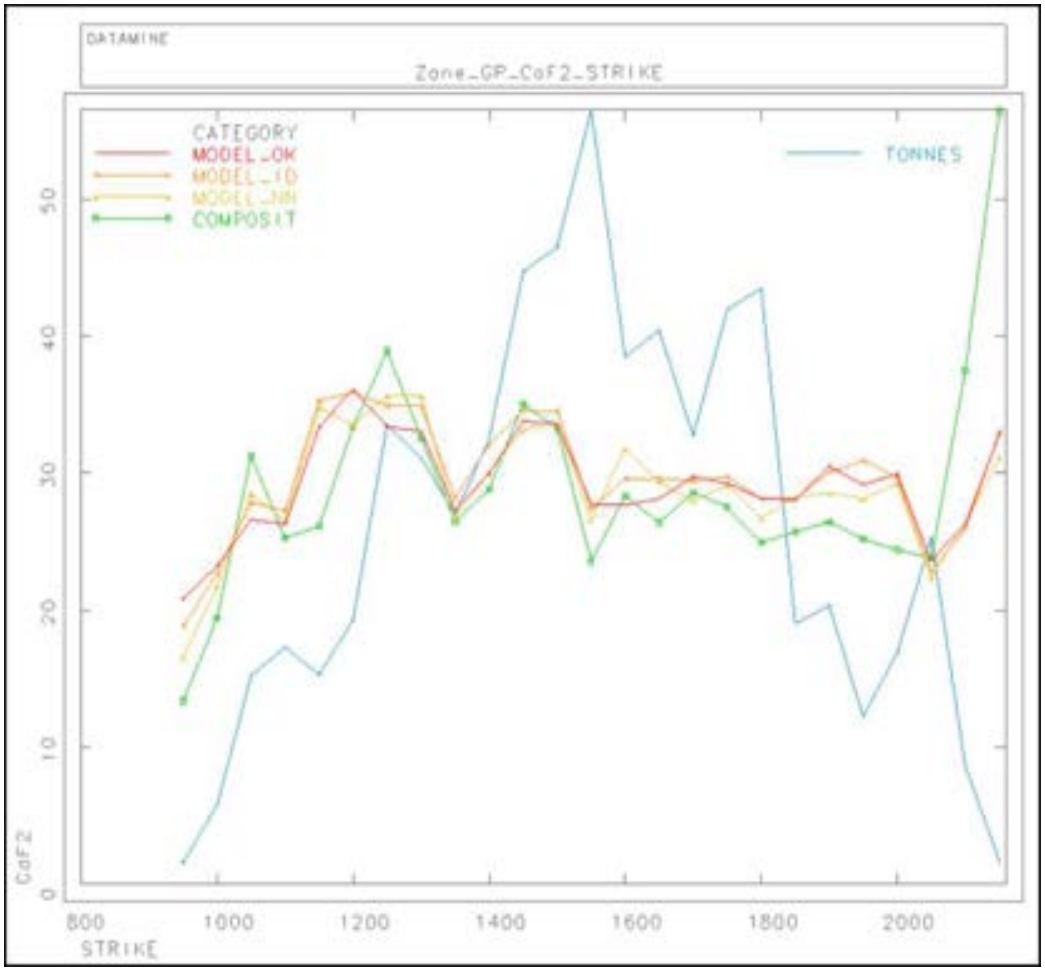



**Figure 11-22. Along-Strike Swath Plots – AGS - GP - $CaF_2$**

### 11.3.12 Mineral Resources

It is considered that these validation steps have demonstrated that the blocks models provide an acceptable basis for the calculation and subsequent declaration of Mineral resources.

The AGS resource block model was initially evaluated overall, effectively providing a resource inventory. This block model was used as the basis for an open pit optimisation, so as to provide a reasonable open-pit constraint. A constrained evaluation then provided the data for the principal Mineral Resource statement.

An in-situ evaluation of the whole AGS resource block model is shown in Table 11-21.

*In-Situ Evaluation*

**Table 11-21. In-Situ Resource Summary**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | Indicated | | | Inferred | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| AGSE | 0 | | | 730 | 34.0 | 2.7 |
| GP | 6,989 | 21.5 | 9.8 | 5,403 | 18.9 | 9.4 |
| NV | 2,173 | 27.3 | 5.3 | 1,209 | 27.9 | 4.9 |
| OC | 477 | 15.9 | 2.1 | 90 | 14.2 | 2.1 |
| SV | 1,299 | 28.5 | 6.1 | 388 | 21.0 | 6.6 |
| **TOTAL** | **10,939** | **23.2** | **8.2** | **7,820** | **21.8** | **7.9** |

**Notes**

- **In-Situ Resources, with no constraints**
- **Cut-off 5% $CaF_2$**
- **Inclusive of any subsequent reserves**
- **Rounding as required may result in apparent summation differences between tonnages and grades. Where these occur, they are not considered material.**

*Constrained Pit Evaluation*

A pit optimisation was completed on the available resources, so as to produce open pit shells which provide a 'Reasonable Prospects of Eventual Economic Extraction' (RPEEE) pit constraint. The parameters applied in this pit optimisation are summarised in Table 11-22. This table also shows the derivation of both open and underground resource cut-off grades. No physical limits were placed on the optimisation. An evaluation breakdown of the resources within the constraints of an open pit (maximum cashflow) optimisation is shown in Table 11-23. Corresponding with this constrained pit, this table also shows the available potential underground resources which are below the pit, as a cut-off of 15% $CaF_2$.

Grade tonnage tables for the resources inside the pit constraints are shown in

Table 11-25 and Table 11-26, for Indicated and Inferred resources, respectively.

**Table 11-22. Summary of Optimisation and Cut-Off Parameters**

| | | Open Pit | Underground |
|---|---|---|---|
| Exchange rate | US$1 = CAN | **$1.30** | **$1.30** |
| | US$/C$ | 0.77 | 0.77 |
| Processing Cost | C$/t milled | **16.25** | **16.25** |
| G&A Cost | C$/t milled | **5.50** | **5.50** |
| Total Cost | C$/t milled | 21.75 | 21.75 |
| | US$/t | $16.73 | $16.73 |
| Mining Cost | US$/t rock | $4.28 | $45.00 |
| Processing Recovery | | **80%** | **80%** |
| Concentrate Grade | %CaF2 | **97.0%** | **97.0%** |
| CaF2 Concentrate Price | US$/t con | **550** | **550** |
| | US$/t CaF2 | 567 | 567 |
| Moisture Content | | 8% | 8% |
| Concentrate Transport Cost | C$/t con | 4.5 | 5.2 |
| | US$/t CaF2 | 3.9 | 4.5 |
| Cut-Offs Without Mining Costs | | | |
| Un-Diluted Cut-Off Grade | | 3.7% | |
| Dilution | | **15%** | |
| Diluted Cut-Off Grade | | 4.3% | |
| Cut-Off With Mining Costs | | | |
| Diluted Cut-Off Grade | | 5.4% | 13.7% |
| Overall Slope Angle | | 45° | |

**Key**

| | |
|---|---|
| **Bold** | **Supplied** |
| Normal | Derived |
| | Use in COG Calc/ optimisation |

**Table 11-23. Constrained Open Pit Resources Summary - AGS**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | Indicated | | | Inferred | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| GP | 4,572 | 22.5 | 8.86 | 774 | 17.6 | 3.94 |
| NV | 1,882 | 28.9 | 5.59 | 569 | 29.2 | 5.24 |
| OC | 100 | 18.2 | 1.57 | 25 | 18.1 | 1.42 |
| SV | 905 | 32.3 | 6.28 | 75 | 20.6 | 6.15 |
| **TOTAL** | **7,459** | **25.2** | **7.62** | **1,443** | **22.3** | **4.52** |

**Notes**

**. Constrained Potential Open Pit Resource**

**. Cut-off 5% $CaF_2$**

**. Inclusive of reserves**

**. Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

**Table 11-24. Potential Underground Resources Summary – AGS**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | Indicated | | | Inferred | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| AGSE | 0 | | | 569 | 41.3 | 2.55 |
| GP | 1,341 | 29.5 | 14.68 | 2,537 | 28.7 | 13.00 |
| NV | 136 | 28.4 | 4.23 | 415 | 37.2 | 5.09 |
| OC | 159 | 25.0 | 1.74 | 18 | 21.0 | 2.12 |
| SV | 165 | 38.2 | 7.11 | 166 | 33.7 | 8.14 |
| **TOTAL** | **1,800** | **29.8** | **12.06** | **3,704** | **31.8** | **10.24** |

**Notes**

**. Below Open Pit Constraint**

**. Cut-off 15% $CaF_2$**

**. Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

**Table 11-25. Grade-Tonnage Table –Indicated Open Pit Resources - AGS**

[Constrained Open Pit Resources Only]

| CaF2 Cut-Off % | Tonnes Mt | CaF2 % | CaCO3 % |
|---|---|---|---|
| 5 | 7.46 | 25.2 | 7.6 |
| 10 | 4.88 | 34.9 | 8.9 |
| 15 | 4.80 | 35.2 | 8.9 |
| 20 | 4.40 | 36.8 | 9.0 |
| 25 | 3.66 | 39.6 | 9.0 |
| 30 | 2.82 | 43.2 | 8.8 |
| 35 | 2.02 | 47.5 | 8.4 |
| 40 | 1.43 | 51.7 | 7.7 |
| 45 | 0.99 | 56.0 | 6.9 |
| 50 | 0.65 | 60.4 | 6.0 |

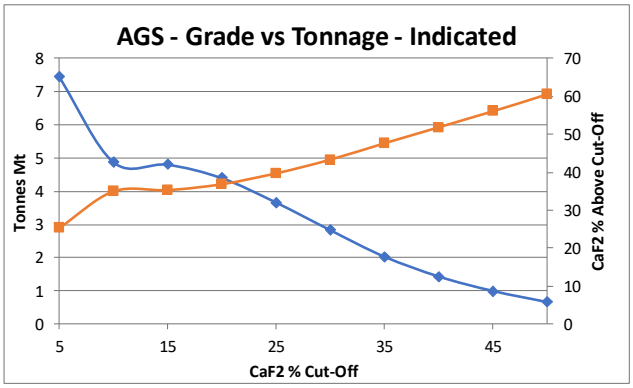
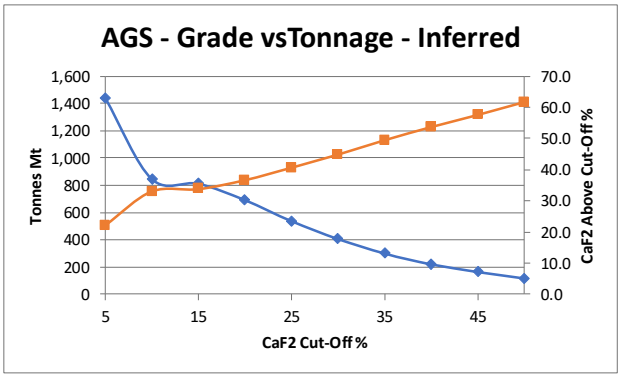



**Table 11-26. Grade-Tonnage Table –Inferred Resources - AGS**

[Constrained Open Pit Resources Only]

| CaF2 Cut-Off % | Tonnes Mt | CaF2 % | CaCO3 % |
|---|---|---|---|
| 5 | 1,443 | 22.3 | 4.5 |
| 10 | 848 | 33.1 | 5.2 |
| 15 | 815 | 33.9 | 5.2 |
| 20 | 693 | 36.7 | 5.3 |
| 25 | 539 | 40.7 | 5.3 |
| 30 | 409 | 44.9 | 5.3 |
| 35 | 301 | 49.4 | 5.4 |
| 40 | 223 | 53.7 | 5.3 |
| 45 | 167 | 57.6 | 5.3 |
| 50 | 118 | 61.6 | 4.9 |



## 11.4 AGS North Deposit

### 11.4.1 Database

The AGS North (AGSN) database results from different phases of drilling, and many of the samples taken from these AGSN holes have not yet been assayed. A coherent set of Excel files for the current AGSN data have been difficult to assemble, partly due to different drillhole naming conventions in different files.

A summary of the drillholes and samples currently available and used for this current AGSN resource estimate, is shown in Table 11-27. It can be seen from this table that over 50% of the holes drilled have still not yet been assayed.

The majority of the holes that do not have assay data and therefore are of limited use to the current AGSN estimation.

**Table 11-27. Summary of AGSN Sample Database**

| CAMPAIGN | Holes Total | Total Length m | Avg. Length m | Holes Sampled | Length Sampled m | Number of Samples | Proportion of Holes Sampled % |
|---|---|---|---|---|---|---|---|
| **MS-2019** | 27 | 3,156 | 117 | 19 | 268 | 307 | 70% |
| **MS-2021** | 72 | 10,809 | 150 | 30 | 672 | 705 | 42% |
| **MS-2022** | 19 | 3,045 | 160 | | | | 0% |
| **Total** | **118** | **17,009** | **144** | **49** | **940** | **1,012** | 42% |

A plan of these samples is shown in Figure 11-23.

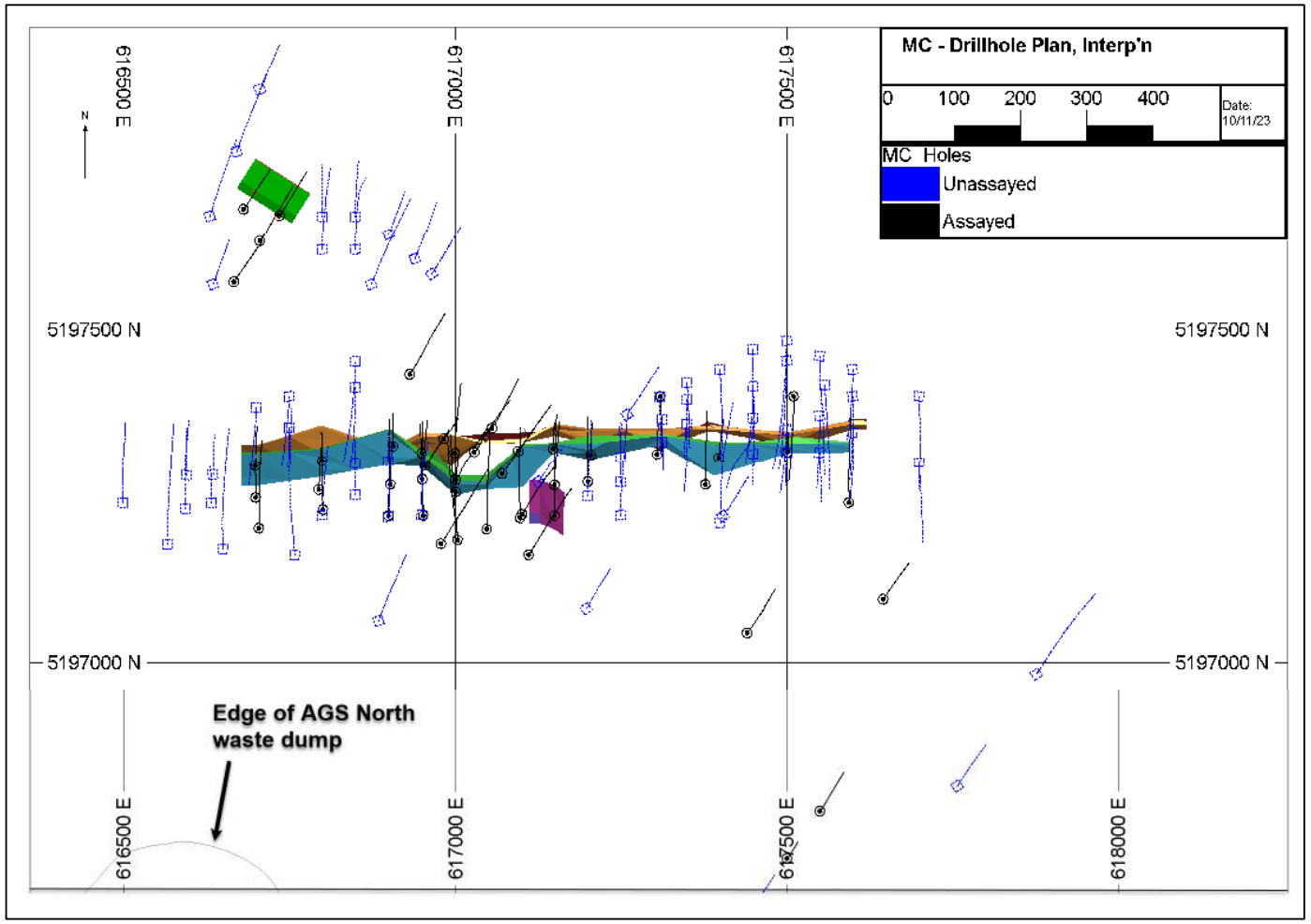



**Figure 11-23. Plan of AGSN Deposit and Sample Data**

For reference purposes, this plan also includes:

- The topography of the waste dump to the north of the AGS pits.
- The principal AGSN mineralised vein structures.
- Colour-coding to show which holes have been assayed, distinct from those unassayed.

Most of the drillhole sections, related to assayed holes, are approximately 50m apart. The deepest drillholes are over 200m in depth. Most of the drillhole have collar elevations of approximately 90mRL. For modelling and mine planning purposes, the elevation coordinates of all drillholes and modelling data have then had 1000m added to them, so that all the model and resultant pit bench elevations are positive. This elevation shift has been applied to all the of the resource models described in this report.

### 11.4.2 Interpretation

The veins which have been interpreted for the Mine Cove area are shown in Figure 11-24 and Figure 11-25. The main veins are aligned approximately west-east. The vein dimensions are summarised below.

**Table 11-28. Vein Dimensions - AGSN**

| Vein | Strike Length | Overall Horizontal Width | Minimum Base Elevation | Maximum Elevation | Maximum Depth | Dip Range |
|---|---|---|---|---|---|---|
| | *m* | *m* | *m* | *m* | *m* | |
| **1** | 940 | 50 | 890 | 1,100 | 205 | $60^{o}$ - $90^{o}$ |
| **2** | 920 | 60 | 975 | 1,090 | 100 | $40^{o}$ - $80^{o}$ |
| **3** | 60 | 50 | 980 | 1,075 | 110 | $40^{o}$ - $50^{o}$ |
| **4** | 100 | 50 | 980 | 1,070 | 105 | $50^{o}$ - $60^{o}$ |

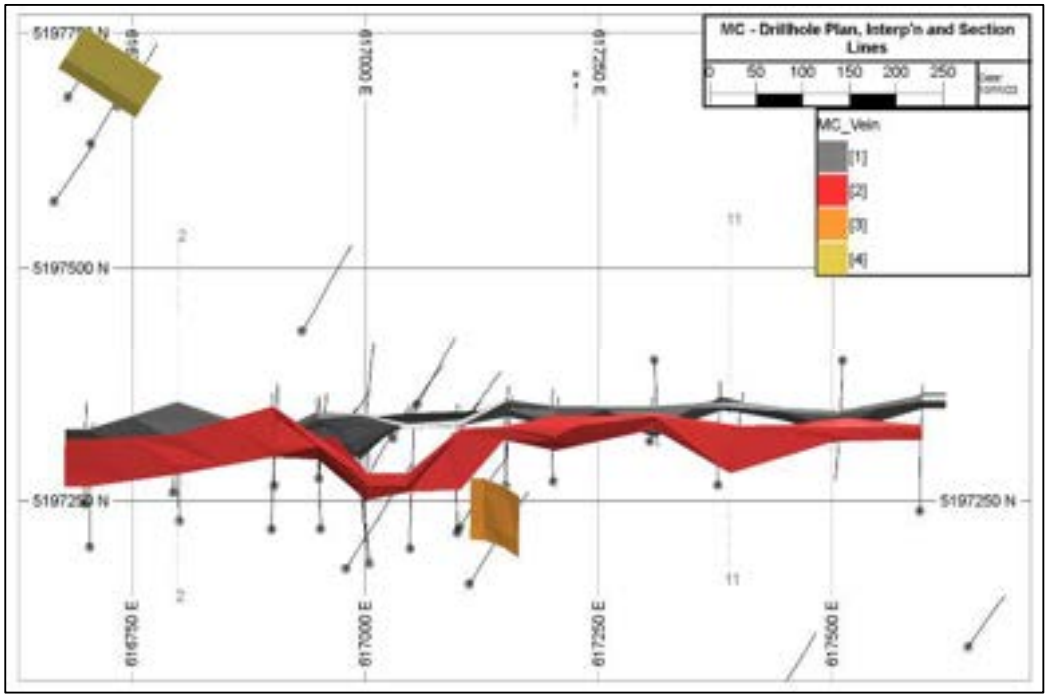



**Figure 11-24. Plan of AGSN Interpreted Zones**

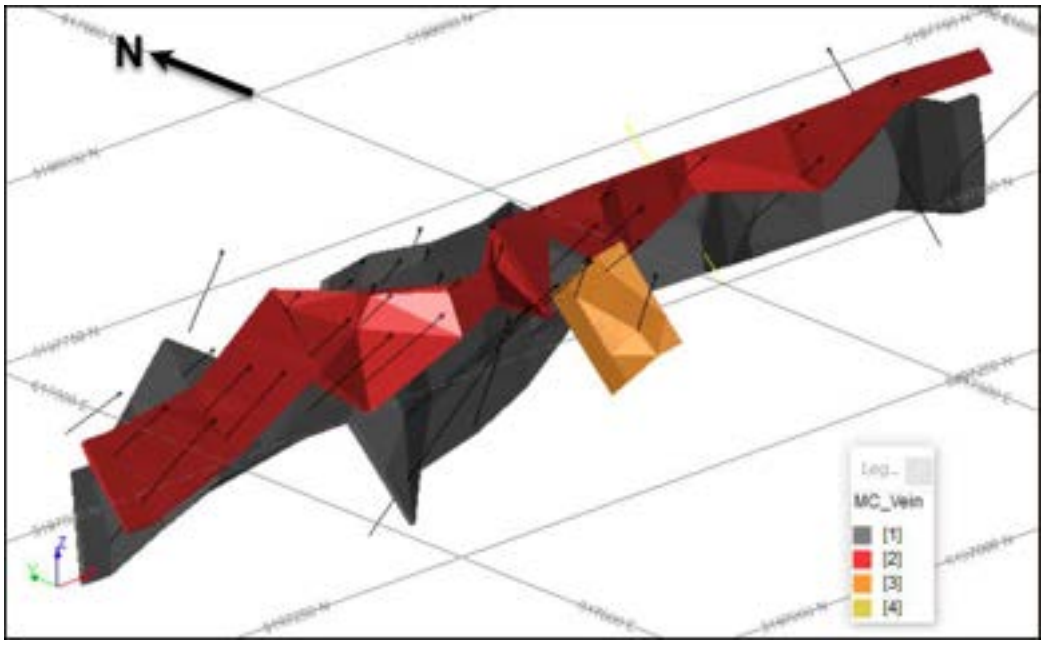



**Figure 11-25. 3D View of AGSN Interpreted Zones**

Example AGSN cross-sections are shown in Figure 11-26 and Figure 11-27.

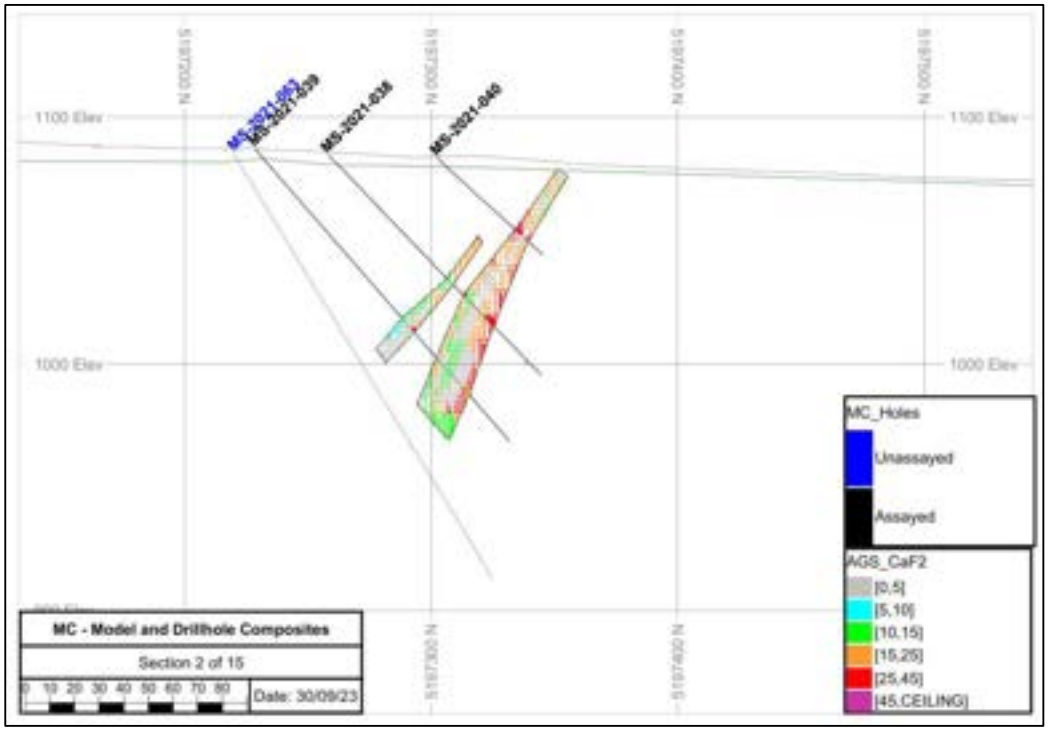



**Figure 11-26. Example AGSN Section #2**

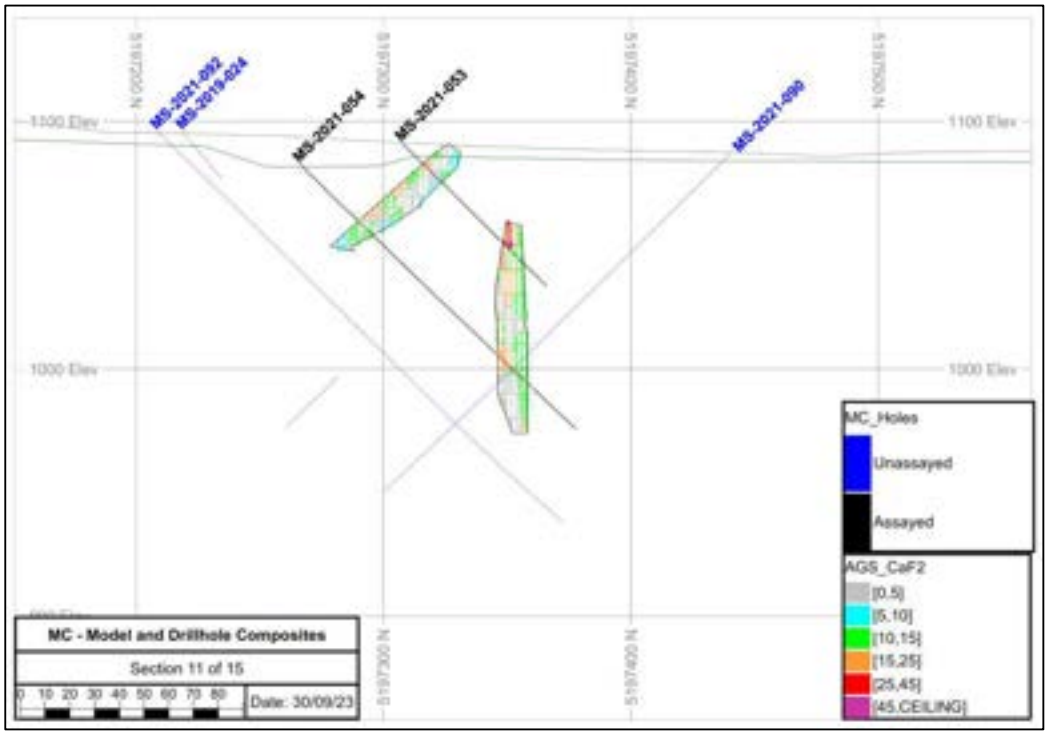



**Figure 11-27. Example AGSN Section #11**

### 11.4.3 Statistics- Samples

The interpreted wireframe models were used to select and allocate the drilling data according to interpreted AGSN veins. A statistical summary of those samples selected are shown in Table 11-29 Log-probability plots of $CaF_2$ grades, by vein system, are shown in Figure 11-28. These show that within each vein system, the $CaF_2$ grades are approximately log-normally distributed. However, there are some natural breaks present, which correspond with splits and banding seen on cross-sections. When considering all the captured vein samples, the two apparent splits are at approximately 0.4% and 4% $CaF_2$.

**Table 11-29. Statistics of Raw Samples within Mineralised Veins – AGSN**

| VEIN | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $CaF_2$ | 389 | 0.01 | 97.7 | 15.5 | 8.7 | 19.3 | 371.0 | 124.0 | 0.5 | 51.0 |
| 2 | $CaF_2$ | 149 | 0 | 68.5 | 14.4 | 8.8 | 15.2 | 231.5 | 105.7 | 0.5 | 37.0 |
| 3 | $CaF_2$ | 7 | 0.6 | 60.5 | 33.4 | 30.2 | 21.2 | 450.8 | 63.5 | | 54.0 |
| 4 | $CaF_2$ | 9 | 2.75 | 49.1 | 10.9 | 5.7 | 12.8 | 162.7 | 116.7 | 2.7 | 30.3 |
| 1 | $CaCO_3$ | 389 | 0.7 | 71.7 | 10.5 | 6.3 | 12.4 | 154.9 | 118.3 | 1.6 | 25.2 |
| 2 | $CaCO_3$ | 150 | 0.5 | 72.3 | 7.8 | 3.7 | 12.0 | 145.2 | 154.7 | 1.6 | 13.4 |
| 3 | $CaCO_3$ | 7 | 0.8 | 18.9 | 7.9 | 6.1 | 6.4 | 40.9 | 80.6 | 0.6 | 13.0 |
| 4 | $CaCO_3$ | 9 | 1.4 | 12.7 | 3.3 | 2.9 | 2.9 | 8.2 | 85.7 | 1.4 | 5.2 |

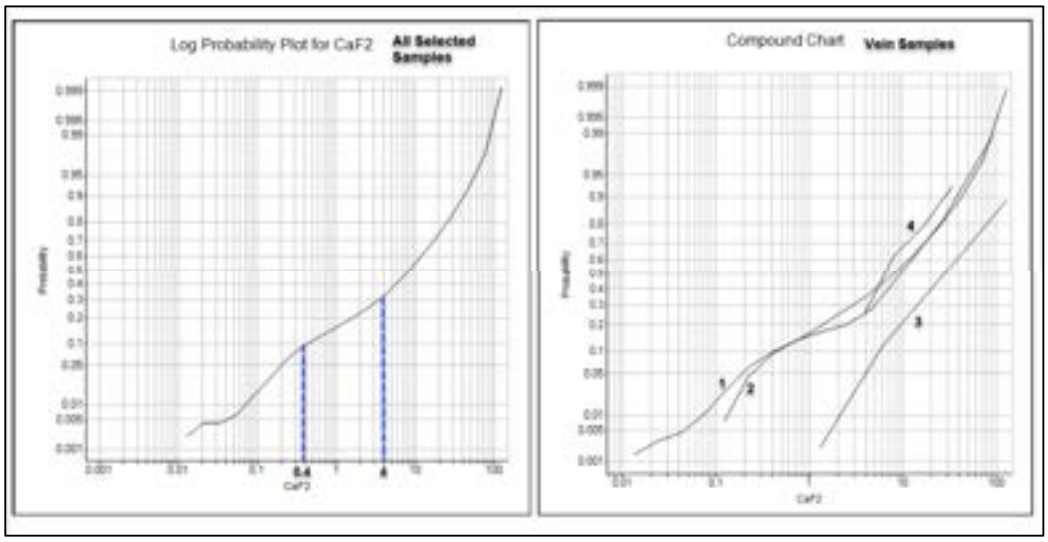



**Figure 11-28. Log Probability Plots of $CaF_2$ Samples within AGSN Vein Systems**

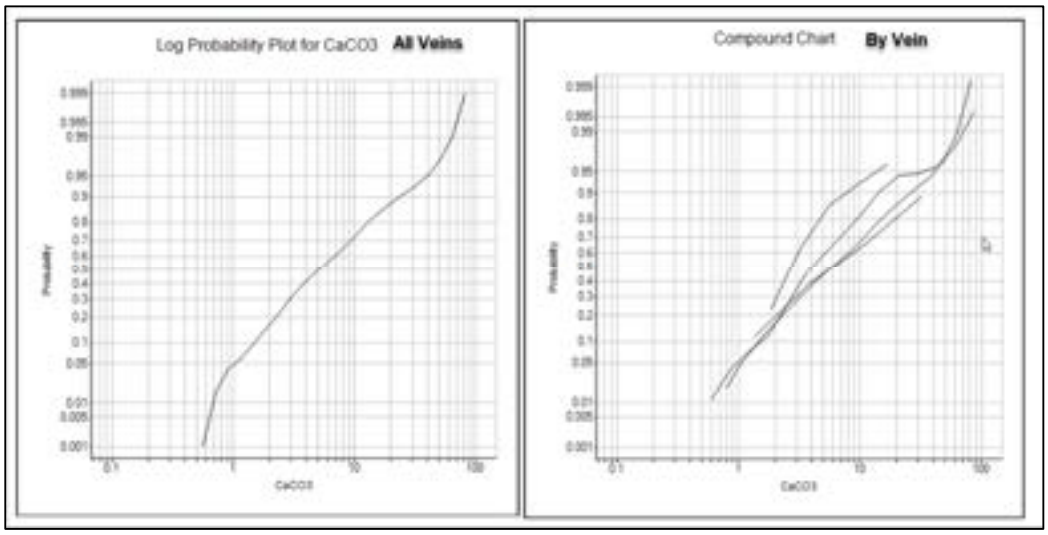



**Figure 11-29. Log Probability Plots of $CaCO_3$ Samples within AGSN Vein Systems**

### 11.4.4 Drillhole Data Processing

A histogram of mineralised samples lengths for AGS is shown in Figure 11-30. This clearly shows that the majority of samples have a 1m length or less. From this it was decided to composite samples onto 1m composite length, so as to provide consistent sample support for geostatistical analysis.

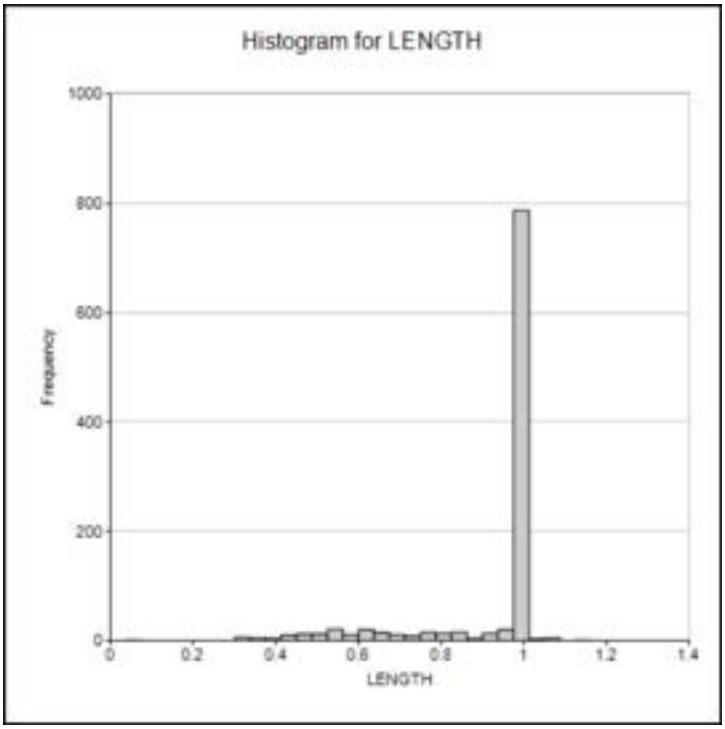



**Figure 11-30. Histogram of Mineralised Sample Lengths - AGSN**

The mineralised vein wireframes were based on definition of overall mineralisation limits, using an overall cut-off of 5% $CaF_2$.The following drillhole data processing steps took place:

1. **Initial Sample Selection** within mineralised vein envelopes.

2. **Capping**. Top-cut levels were applied before compositing. The selection of top-cut levels is described below.

3. **Compositing** was then done, with composites being separated across each different individual vein (AZ_VEIN). A compositing length of 1m was applied; and this length was allowed to be slightly variable, so that composites are of equal length across each intersection. This avoids excessively small composites being created after rigidly applied composite lengths. A minimum composite length of 0.5m was applied.

4. **Grade Categories** were allocated within each overall vein intersection, with the field MINZ. This was based on the following break points, as derived from the sample log-probability plots.

**Table 11-30. AGSN Grade Categories**

| MINZ | Description |
|---|---|
| 1 | $CaF_2$<0.4% |
| 2 | $CaF_2$>=0.4% and $CaF_2$<4% |
| 3 | $CaF_2$>=4% |

Outlier grades were analysed using log-probability plots, decile analyses and coefficient of variation (CoV) analyses. Graphs from CoV analysis for AGSN are shown in Figure 11-31.

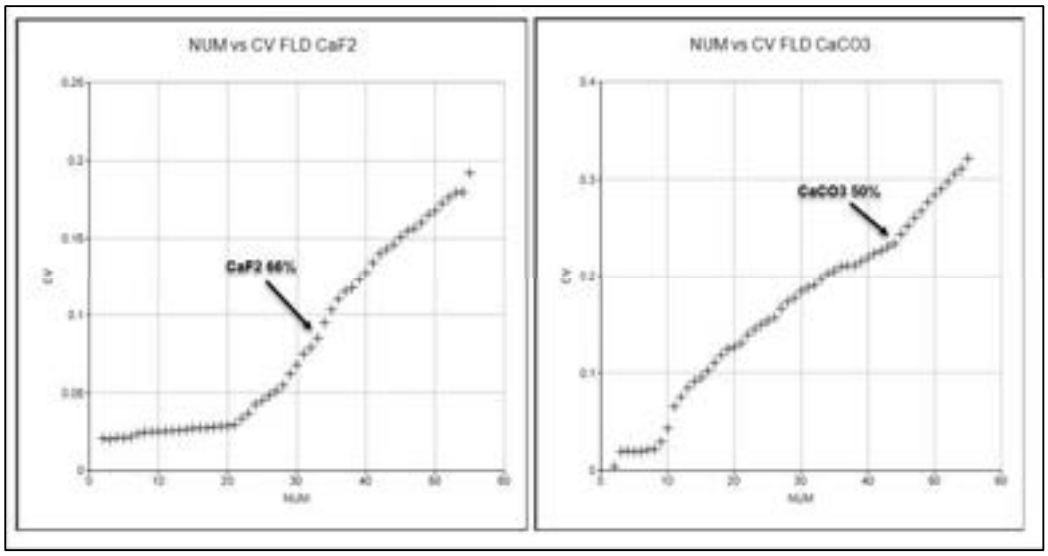



**Figure 11-31. Example Coefficient of Variation Analysis Plots – AGSN**

The capping levels were determined for all the samples sets within the interpreted AGSN vein system and are summarised in Table 11-31. The effect of these capping levels on overall AGSN grade means is shown in Table 11-32.

**Table 11-31. Summary of Capping Levels - AGSN**

| $CaF_2$ % | $CaCO_3$ % |
|---|---|
| 66 | 50 |

**Table 11-32. Effect of Applied Capping Levels – AGSN**

| Grade Field | Number of Composites | Number Affected by TC | Proportion Affected % | Uncut Mean | Mean with TC |
|---|---|---|---|---|---|
| $CaF_2$ | 479 | 27 | 5.6 | 15.4 | 15.1 |
| $CaCO_3$ | 480 | 15 | 3.1 | 9.6 | 9.4 |

### 11.4.5 Statistics - Composites

A statistical summary of 1m composites within the AGSN mineralised vein systems is shown in Table 11-33. Log-probability plots for the 1m composites' data sets are shown in Figure 11-13 and Figure 11-14. Features apparent from these statistics include:

- No major changes to grade distributions with generation of 1m composites.
- General decrease in coefficient of variation from typically around 120% to around 100%, with conversion from raw samples to 1m composites for $CaF_2$.

**Table 11-33. Statistics of 1m Composites – AGSN – By Vein System**

| VEIN | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $CaF_2$ | 335 | 0.0 | 66.0 | 15.1 | 8.7 | 16.8 | 283.8 | 111.8 | 0.6 | 43.0 |
| 2 | $CaF_2$ | 132 | 0.0 | 66.0 | 14.5 | 9.1 | 14.6 | 213.3 | 101.1 | 0.6 | 36.1 |
| 3 | $CaF_2$ | 4 | 10.8 | 59.4 | 33.4 | 35.3 | 18.1 | 328.4 | 54.2 | 0.2 | 52.5 |
| 4 | $CaF_2$ | 8 | 2.8 | 35.4 | 10.9 | 5.7 | 10.5 | 110.1 | 96.0 | 2.7 | 25.9 |
| 1 | $CaCO_3$ | 335 | 0.7 | 50.0 | 10.3 | 6.5 | 11.1 | 122.7 | 107.1 | 1.7 | 24.5 |
| 2 | $CaCO_3$ | 133 | 0.5 | 50.0 | 7.4 | 3.9 | 9.9 | 98.9 | 134.8 | 1.7 | 13.2 |
| 3 | $CaCO_3$ | 4 | 3.1 | 18.6 | 7.9 | 5.9 | 5.9 | 34.4 | 73.9 | 1.7 | 13.7 |
| 4 | $CaCO_3$ | 8 | 1.4 | 6.5 | 3.3 | 3.0 | 1.8 | 3.2 | 53.3 | 1.4 | 6.1 |

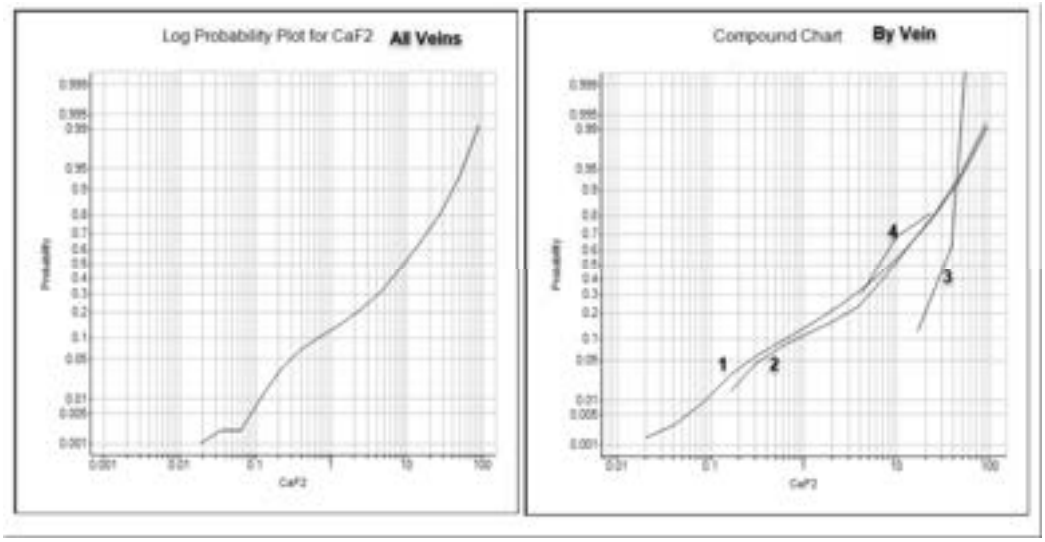



**Figure 11-32. Log-Probability Plots – Composites- $CaF_2$ AGSN**

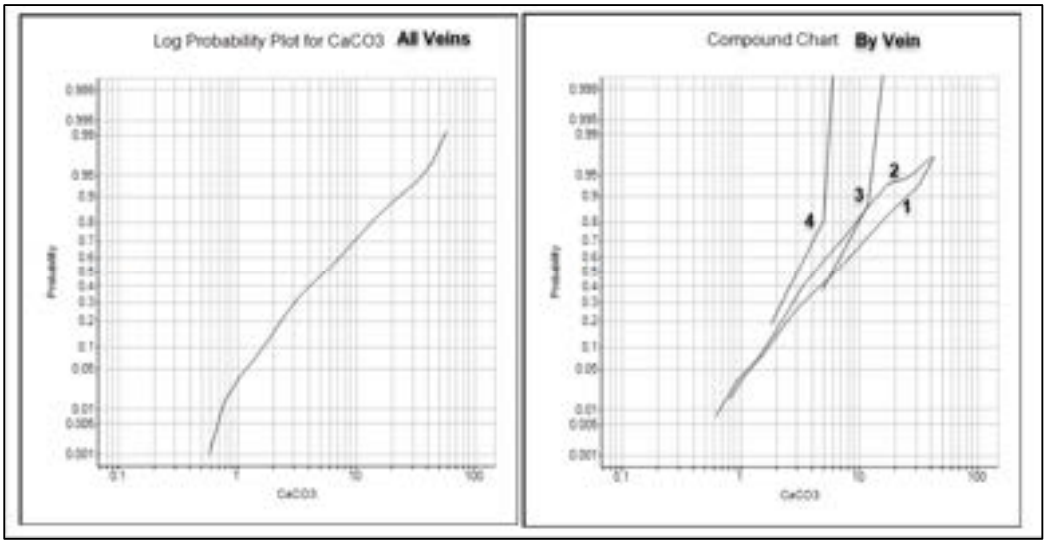



**Figure 11-33. Log-Probability Plots – Composites- $CaCO_3$ AGSN**

### 11.4.6 Density

There are no specific density values available for AGSN, so the same global values by lithology were applied as was used for the AGS block model. These are summarised in Table 11-11.

As with AGS, it is of concern that in some of the AGSN core, there appears to be core fragments over certain intervals, implying the washing out of clay gouge material.

### 11.4.7 Geostatistical Analysis

A geostatistical study was completed for $CaF_2$ and $CaCO_3$, according to the mineralised vein data sets at AGSN, completed with the following steps:

1. **Composites**. For analysis of the variography, 1m capped composites were filtered by grade category.

2. **Downhole Variograms**. For each filtered data set, downhole variograms with a lag of 1m. The experimental variograms produced by this step were used to help determine the nugget variance.

3. **Experimental Variograms**. Directional experimental variograms were now produced, for three orthogonal directions, typically within the plane of the veins and down-dip. Lag distances of 50m applied along-strike and down-dip. Much shorter lag distances, of 1m were applied in the cross-strike direction.

4. **Model Variograms** were fitted to the experimental variograms, so as to obtain sill and range values in three principal orthogonal directions.

Experimental and model variograms are shown for $CaF_2$ and $CaCO_3$ in Figure 11-34. The model variogram parameters are shown for AGSN are shown in Table 11-34.

**Table 11-34. Model Variogram Parameters – AGS**

| | | | 1st Structure | | | | 2nd Structure | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Field | Grade | Nugget | Range | | | | Range | | | |
| | Category | C0 | X' | Y' | Z' | C1 | X' | Y' | Z' | C2 |
| $CaF_2$ | <4% $CaF_2$ | 0.5 | 6.2 | 6.2 | 6.2 | 0.39 | 50 | 50 | 50 | 0.4 |
| $CaF_2$ | >4% $CaF_2$ | 101 | 7.1 | 7.1 | 7.1 | 113 | 60 | 60 | 60 | 83.8 |
| $CaCO_3$ | All | 15 | 6.6 | 6.6 | 6.6 | 66.3 | 39 | 39 | 39 | 15.9 |

The $CaF_2$ variograms have ranges of approximately 60m. The quality of these variograms should improve when the outstanding assays data has been received.

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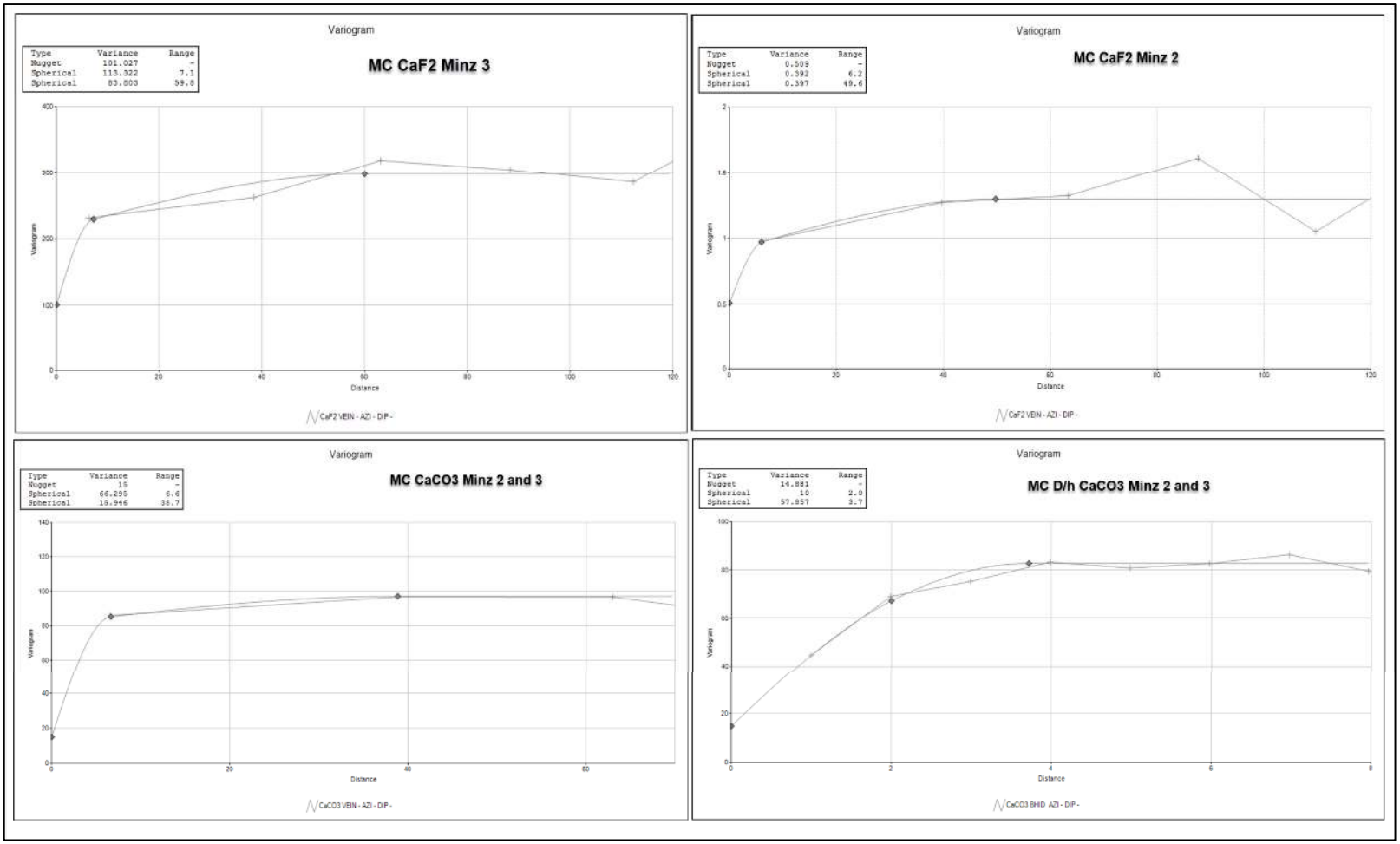



**Figure 11-34. $CaF_2$ and $CaCO_3$ Variograms – AGSN**

### 11.4.8 Volumetric Modelling

The initial block model prototype used for the current AGSN resource estimation is summarised in Table 11-35. The parent block height of 10m was selected so as to correspond with the planned pit bench height. Within the mineralised domains, sub-cells were created of 5m height, so as to allow more detail in grade estimation. The model was unrotated, due to its W-E orientation.

**Table 11-35. Block Model Prototype – AGSN**

| | Origin | Size | Number | Range |
|---|---|---|---|---|
| | *m* | *m* | | *m* |
| **X** | 616,400 | 10 | 154 | 1,540 |
| **Y** | 5,196,950 | 10 | 100 | 1,000 |
| **Z** | 850 | 10 | 36 | 360 |

**Notes**

**. Model unrotated**
**. Grade categories extrapolated on basis of 2.5m x 1m x 2.5m sub-cells**
**. Grade estimation on basis of of 10m x 2m x 10m sub-cells**

During creation of the volumetric block models, blocks were split into sub-cells laterally, down to a size 2.5m x 2.5m. The volumetric block model was primarily controlled by the topographic and interpreted vein wireframe models. Lithology codes were extrapolated direct from the drillhole data. Most of the veins are in contact with meta-sediments or rhyolite structures.

### 11.4.9 Grade Estimation

With respect to grade estimation, the interpreted mineralised vein structures were used as hard boundaries. Therefore, only composites created from samples physically within each mineralised domain were used for the estimation of grades within each domain.

Similar, grade categories were extrapolated using the following procedure:

1. **Composites**. As described in Section 11.4.511.3.4, the 1m composites within each mineralised zone were flagged with the MINZ field (1: <0.4% $CaF_2$, 2: >=0.4<4% $CaF_2$ and 3: >=4% $CaF_2$). The lower grade categories (MINZ=1 and 2) are effectively internal waste.

2. **Orientation**. Vein orientation vectors were derived from the vein wireframes. These were then employed dynamic anisotropy processes in Datamine, so as to assign values in TRDIPDIR and TRDIP (true dip direction and true dip) fields throughout all modelled blocks within the mineralised veins.

3. **Cell Slicing**. Blocks within the mineralised domains were sliced using an alternative model prototype with 2.5m x 1m x 2.5m. This size essentially represents the resolution of the internal waste zone extrapolation.

4. **Interpolation**. The 1/2/3 values in the MINZ field of composite file were then extrapolated into the sliced model, within each vein domain, using nearest neighbour estimation, and controlled through dynamic anisotropy. A flat search ellipsoid was applied with ratio of 6:1, with initial dimensions of 60m x 60m x 10m.

5. **Model Resolution**. The extrapolated vein sub-cells were then simplified and resolved onto a former 10m x 2m x 10m cell structure.

Apart from the updated variography, the same search and other estimation controls for grade estimation were applied to AGSN as for AGS and summarised in Table 11-16. Example cross-sections of the resultant AGSN grade estimation are shown in Figure 11-26 and Figure 11-27.

### 11.4.10 Mineral Resource Classification

The resource estimate data determined in this study have been prepared, as far as possible, in accordance with the terminology, definitions and requirements of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM 2014) Standards on Mineral Resources and Reserves, Definitions and Guidelines.

A resource classification risk matrix has been developed for the MRE work described in the current study for AGSN, as shown in Table 11-36. For the current AGSN estimation, all of the resources within the veins' interpretation are currently assigned as **Inferred**. For conversion to Indicated resources, for those areas drilled off with at least a 60m spacing, the additional data and information is required:

- Outstanding assays.
- Lithology logs.
- Supporting density measurements.

### 11.4.11 Model Validation

Complete sets of cross-sections were made for $CaF_2$, comparing composite and estimated grades. An example of this is shown in Figure 11-26. The patterns of $CaF_2$ grades in the sections appear to reflect properly the vein nature of the fluorite mineralisation.

Global average values by vein were determined from the original sample data, 1m composites, and from the block model, for grades estimated by ordinary kriging (OK), nearest-neighbour estimation (NN) and inverse-distance weighting (ID). The comparative average grades, for $CaF_2$, are summarised in

Table 11-37. The model average grades have been derived for all resource model blocks in veins 1 and 2. Most of these global grade averages correspond quite closely, even though resultant drillhole intersections are spaced quite irregularly.

A local comparison of average grades, for veins 1 and 2 and the +4% $CaF_2$ grade category, was also made, in the form of swath plots, which compare the average grades on successive 50m thick sectional slices. These are shown in Figure 11-35.

The swath plots produce show an acceptable comparison for both $CaF_2$ and $CaCO_3$. Overall, there appears to be a good correlation between the block model and underlying sample data.

## Table 11-36. Resource Classification Risk Matrix – AGSN

| | FACTORS | Risk (E/H/M/L) | Comments |
|---|---|---|---|
| | **1. SAMPLING TECHNIQUES & DATA** | | |
| 1.1 | Sampling Techniques | L | Surface diamond drill hole samples used in estimation. |
| 1.2 | Drilling Techniques | L | Core drilling by standard wireline diamond drilling. Core drilling has been mostly NQ. |
| 1.3 | Drill sample Recovery | M | As with AGS, total core recovery described previously as +95%, but this is does not appear to be backed up by actual numeric data. Solid core recovery (SCR) not recorded. |
| 1.4 | Drillcore Logging | M | Lack of detailed lithology logs, recovery measurements and recording of fault gouge intersections. No lithology logs for unassayed holes. |
| 1.5 | Sub-sampling Techniques and Sample Prep | H | Samples from cut core, selected by geologist's opinion on what is mineralised. Only 42% of MC holes drilled currently assayed. |
| 1.6 | Quality of Assay Data and Laboratory Tests | M | One blank, one standard and one coarse duplicate. Not best practice. No twin sampling, no fine duplicates, no fine blanks. |
| 1.7 | Verification of Sampling and Assaying | L | Check logging of a number of holes. Check of various collar coordinates. |
| 1.8 | Location of Data Points | L | Drillhole collars geodetically surveyed. Drillhole collar elevations checked against topography and selected holes checked in field with GPS. |
| 1.9 | Data Spacing and Distribution | L | MC drillhole spacing mostly 50m along strike-length. Vertically also a major part of the veins are covered by drillhole intersections up to 50-70m spacing. However, the assayed holes only cover a central area of about 200m along strike. |
| 1.1 | Orientation of Data cf Geological Structure | L | Holes on regular section lines, perpendicular to overall strike length. Some steep intersections due to near vertical nature of many of the veins. |
| 1.11 | Sample Security | H | Core held on site in core shack facility. Former lab facility exists, but in need of maintenance and proper inventory update. Core facility **not** within a secure locked boundary. |
| | **2. REPORTING OF EXPLORATION RESULTS** | | |
| 2.1 | Mineral Tenement and Land Tenure Status | L | Appears ok, as documented by SLR. |
| 2.2 | Geology | M | Fluorspar veins, predominantly within granitic rocks, metasediments and rhyolites and sills. For MC, lack of lithology data had led to a very simple lithological model. |
| 2.3 | Drillhole Information | L | Delivered as Excel files. |
| 2.4 | Data Aggregation Methods | L | Drillhole data composited downhole into 1m lengths. |
| 2.5 | Diagrams | L | Cross-sections produced for all section lines where assayed holes exist. |
| 2.6 | Balanced Reporting | L | Consistent drilling scheme along strike, although some changes in section orientation for MC, as in some parts the vein's orientations were not clear. |
| 2.7 | Other Substantive Data | L | Geophysical surveys. |
| | **3. ESTIMATION AND REPORTING OF MINERAL RESOURCES** | | |
| 3.1 | Database Integrity | H | Multiple Excel files available from previous operation/ownership need consolidation into proper mine database. Needs also proper referencing of assaying method, core recoveries. |
| 3.2 | Site Visits | L | QP visited in August 2023 |
| 3.3 | Geological Interpretation | H | Sectional interpretation in Datamine. No previous interpretation available. Interpretation limited because of logging/assay backlog |
| 3.4 | Dimensions | L | Overall, the AGS the deposit covers an approximately 3km strike length, 300-450m depth. 5 vein systems occupy an overall width of approximately 350m. |
| 3.5 | Estimation and Modeling Techniques | L | Three main $CaF_2$ grade categories extrapolated within overall vein envelopes, reflecting internal waste. |
| | | L | CaF2 and CaCO3 by ordinary kriging (OK). |
| 3.6 | Cut-off Parameters | H | Further process testing required to support mill recovery assumptions. |
| 3.7 | Mining Factors/Assumptions | L | No dilution applied for reporting of resources. |
| 3.8 | Metallurgical Factors or Assumptions | H | Previous milling operations shut in February 2002. Crusher, ore feed arrangements and other aspects being reviewed for improvements, prior to potential restart. |
| 3.9 | Environmental Factors or Assumptions | L | According to the SLR 2022 43-101, CFI does not have a formal environmental and social management system, however there are several environmental management plans in place. |
| 3.10 | Bulk Density | H | No density measurements available from MC drilling. Global average density values by lithology assumed, as from AGS. |
| 3.11 | Classification | M | All MC resources within interpretation currently assigned as **Inferred.** Need outstanding assays, lithology logs and density data for conversion to Indicated. |
| 3.12 | Audits or Reviews | M | SLR prepared updated 43-101 study in 2022. SLR commented on MC interpretation, but no estimation available at that time. |
| | | | |
| **Notes** | | | |
| | . Not compliant and significant project risk | E | **Extreme Risk** |
| | . Current status does carry some project risk | H | **High Risk** |
| | . Improvements required for best practice | M | **Medium Risk** |
| | . Current reporting/information acceptable | L | **Low Risk** |

**Table 11-37. Global Average Grade Comparisons by Vein**

| | | | | Average Block Model Grades | | |
|---|---|---|---|---|---|---|
| FIELD | AZ_VEIN | Samples | Composites | OK | ID | NN |
| CaF2 | MC_1 | 15.5 | 15.1 | 13.3 | 13.4 | 13.4 |
| CaF2 | MC_2 | 14.4 | 14.5 | 12.2 | 12.2 | 12.2 |
| CaF2 | MC_3 | 33.4 | 33.4 | 30.3 | 30.4 | 34.4 |
| CaF2 | MC_4 | 10.9 | 10.9 | 7.3 | 6.6 | 6.5 |
| CaCO3 | MC_1 | 10.5 | 10.3 | 9.8 | 10.1 | 9.8 |
| CaCO3 | MC_2 | 7.8 | 7.4 | 5.3 | 5.5 | 5.6 |
| CaCO3 | MC_3 | 7.9 | 7.9 | 8.6 | 8.2 | 9.6 |
| CaCO3 | MC_4 | 3.3 | 3.3 | 2.2 | 2.0 | 2.0 |

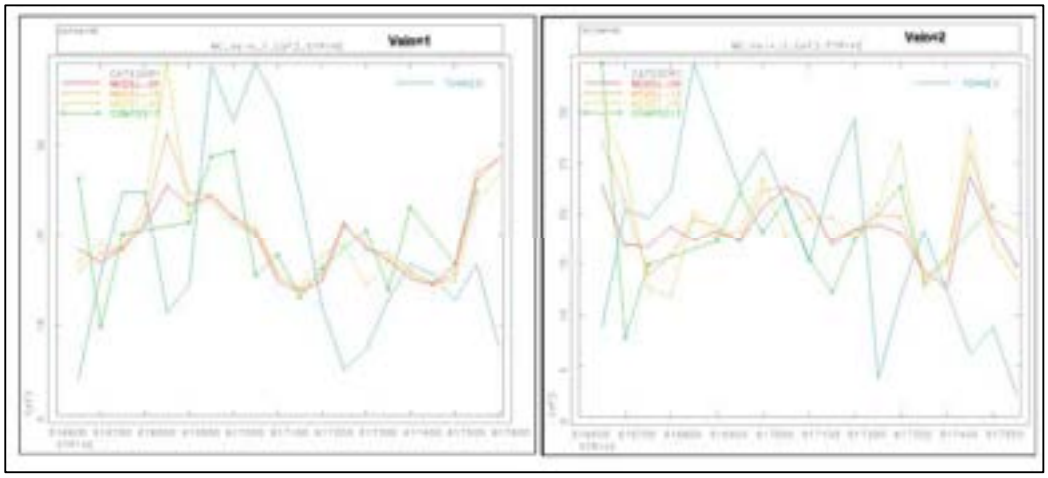


**Figure 11-35. Along-Strike Swath Plots – AGSN- $CaF_2$**

### 11.4.12 Mineral Resources

It is considered that these validation steps have demonstrated that the blocks models provide an acceptable basis for the calculation and subsequent declaration of Mineral resources.

The AGSN resource block models was initially evaluated overall, effectively providing a resource inventory. This block model was used as the basis for an open pit optimisation, so as to provide a reasonable open-pit constraint. A constrained evaluation then provided the data for the principal Mineral Resource statement.

*In-Situ Evaluation*

**Table 11-38. In-Situ Resource Summary - AGSN**

As Of October 31st, 2023

| | Inferred Resources | | |
|---|---|---|---|
| Vein | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| MC_1 | 1,454 | 19.8 | 13.0 |
| MC_2 | 616 | 19.0 | 7.4 |
| MC_3 | 16 | 30.1 | 7.9 |
| MC_4 | 31 | 17.6 | 4.1 |
| **TOTAL** | **2,117** | **19.6** | **11.2** |

**Notes**

- **In-Situ Resources, with no constraints**
- **Cut-off 5% $CaF_2$**
- **Rounding as required may result in apparent summation differences between tonnages and grades. Where these occur, they are not considered material.**

*Constrained Pit Evaluation*

A pit optimisation was completed on the available resources, so as to produce open pit shells which provide a 'Reasonable Prospects of Eventual Economic Extraction' (RPEEE) pit constraint. The parameters applied in this pit optimisation are summarised in Table 11-22. No physical limits were placed on the optimisation. An evaluation breakdown of the potential open pit resources within the constraints of the (maximum cashflow) optimisation is shown in Table 11-39. Potential underground resources beneath this optimised pit are summarised in Table 11-40. A grade tonnage table for the Inferred resources inside the pit constraints is shown in Table 11-41.

**Table 11-39. Constrained Open Pit Resources Summary - AGS**

As Of October 31st, 2023

| | Inferred Resources | | |
|---|---|---|---|
| Vein | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| MC_1 | 732 | 21.5 | 11.9 |
| MC_2 | 581 | 19.2 | 7.4 |
| MC_3 | 7 | 39.1 | 9.9 |
| MC_4 | 5 | 19.4 | 4.1 |
| **TOTAL** | **1,325** | **20.6** | **9.9** |

**Notes**

**. Constrained Potential Open Pit Resource**

**. Cut-off 5% $CaF_2$**

**. Inclusive of reserves**

**. Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

**Table 11-40. Potential Underground Resources Summary - AGSN**

**As Of October 31st, 2023**

| | Inferred Resources | | |
|---|---|---|---|
| Vein | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| MC_1 | 402 | 23.0 | 14.6 |
| MC_2 | 20 | 19.6 | 7.8 |
| MC_3 | 5 | 30.1 | 8.8 |
| MC_4 | 21 | 17.9 | 4.2 |
| **TOTAL** | **449** | **22.7** | **13.8** |

**Notes**

**. Below Open Pit Constraint**

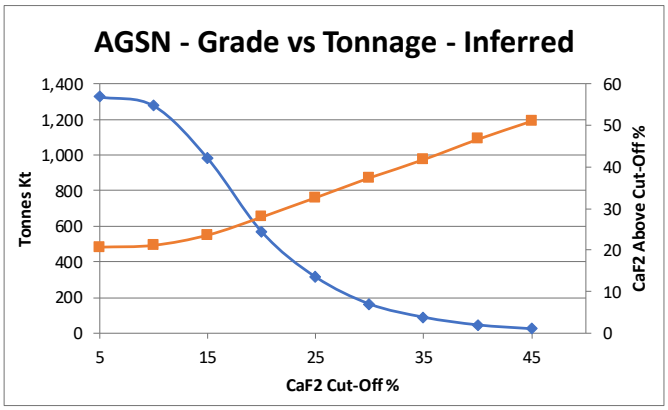
**. Cut-off 15% $CaF_2$**

**. Rounding may result in apparent summation differences between tonnages and grades: not considered material.**

**Table 11-41. Grade-Tonnage Table –Indicated Resources - AGS**

[Constrained Open Pit Resources Only]

| CaF2 Cut-Off % | Tonnes Kt | CaF2 % | CaCO3 % |
|---|---|---|---|
| 5 | 1,325 | 20.6 | 9.9 |
| 10 | 1,276 | 21.1 | 10.0 |
| 15 | 979 | 23.5 | 10.3 |
| 20 | 565 | 27.9 | 11.1 |
| 25 | 312 | 32.6 | 11.6 |
| 30 | 162 | 37.4 | 10.2 |
| 35 | 87 | 41.8 | 9.2 |
| 40 | 44 | 46.7 | 8.7 |
| 45 | 22 | 51.1 | 8.1 |



## 11.5 North/South Ridge Deposit

### 11.5.1 Database

The database for the North/South Ridge (NS) resource results from several different phases of drilling, most of which were drilled from surface, underground channel samples from six levels. As well as a limited number of trenches. A summary of the drillholes, channel lines, and samples are shown in Table 11-42. This demonstrates a lack of $CaCO_3$ assays from all but the last 2 years of drilling.

A plan of these samples is shown in Figure 11-36. Most of the drillhole are on sections spaced approximately 50m apart. Most of the underground channel samples stem from crosscuts spaced approximately 30m apart. The part with $CaCO_3$ assays is the final 950m of the deposit at the south-east end.

The underground channel samples come from the Alcan ownership period (pre-1999).

A long section of the sample data is shown in Figure 11-37. This also shows the mined-out workings, and the extent of the interpreted veins.

The deepest drillholes are over 400m in depth. Most of the drillholes have collar elevations of approximately 150mRL. For modelling and mine planning purposes, the elevation coordinates of all drillholes and modelling data have then had 1000m added to them, so that all the model and resultant pit bench elevations are positive.

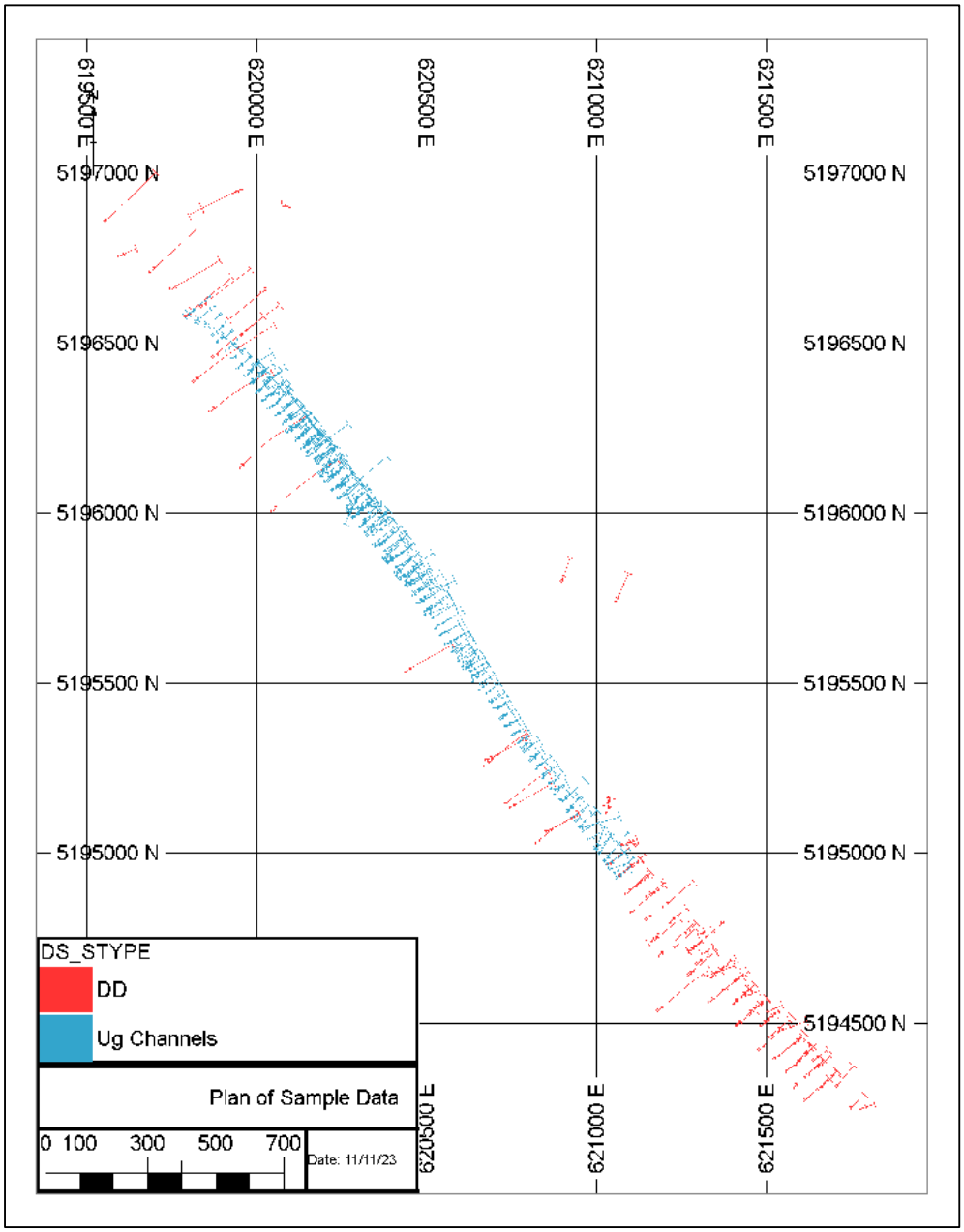



**Figure 11-36. Plan of NS Sample Data**

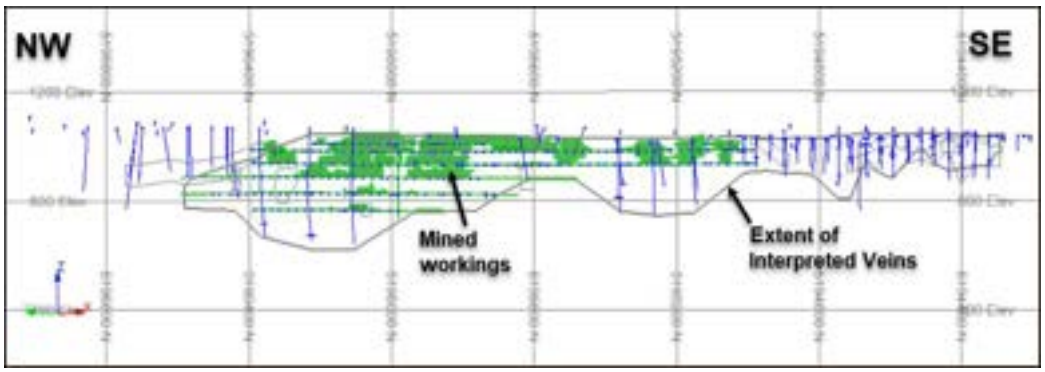



**Figure 11-37. Long Section of NS Sample Data**

**Table 11-42. Summary of NS Sample Database**

| | | | | | $CaF_2$ | | | | $CaCO_3$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Type | CAMPAIGN | Holes/Lines Total | Total Length | Avg. Length | Holes/Lines Sampled | Length Sampled | Number of Samples | Prop'n Holes/ Lines Sampled | Holes/Lines Sampled | Length Sampled | Number of Samples | Prop'n Holes/ Lines Sampled |
| | | | m | m | | m | | % | | m | | % |
| Diamond Drilling | DS-1964 | 6 | 1,198 | 200 | 3 | 28 | 46 | 50% | | | | 0% |
| | DS-1970 | 4 | 649 | 162 | 2 | 1 | 4 | 50% | | | | 0% |
| | DS-1971 | 5 | 764 | 153 | 4 | 15 | 39 | 80% | | | | 0% |
| | DS-2013 | 34 | 5,544 | 163 | 27 | 350 | 308 | 79% | | | | 0% |
| | DS-2015 | 9 | 2,036 | 226 | 4 | 70 | 82 | 44% | | | | 0% |
| | DS-2019 | 24 | 2,444 | 102 | 24 | 381 | 413 | 100% | 24 | 381.19 | 413 | 100% |
| | DS-2020 | 20 | 2,552 | 128 | 20 | 642 | 678 | 100% | 20 | 643.25 | 679 | 100% |
| | **Sub-Total** | **102** | **15,187** | **149** | **84** | **1,488** | **1,570** | **82%** | **44** | **1,024** | **1,092** | **43%** |
| U/g channel samples | L150 | 26 | 1,303 | 50 | 23 | 121 | 25 | 88% | | | | |
| | L250 | 64 | 3,858 | 60 | 56 | 229 | 65 | 88% | | | | |
| | L400 | 65 | 3,811 | 59 | 43 | 203 | 47 | 66% | | | | |
| | L550 | 35 | 1,474 | 42 | 33 | 171 | 36 | 94% | | | | |
| | L750 | 39 | 2,581 | 66 | 32 | 118 | 35 | 82% | | | | |
| | L950 | 21 | 1,342 | 64 | 16 | 41 | 18 | 76% | | | | |
| | **Sub-Total** | **250** | **14,369** | **57** | **203** | **883** | **226** | **81%** | | | | |
| | **Total** | **352** | **29,557** | **84** | **287** | **2,371** | **1,796** | **82%** | **44** | **1,024** | **1,092** | **13%** |

### 11.5.2 Interpretation

North/South Ridge is dominated by a single vein which is over 3km in length. It has also been extensively mined from underground. The previous interpretation has been updated, using a cut-off of approximately 5% $CaF_2$. There are 10 other much smaller vein structures. Plan and 3D views of the updated interpretations are shown in Figure 11-38 and Figure 11-39.

The dimensions of the NS veins are summarised in Table 11-43. The sample support for each NS vein system has been reviewed and is summarised in Table 11-44. This table summarises the number of drillholes intersecting each vein system, the number of drillholes which have been assayed for particular variables and the proportion of these drillhole/channel intersections which have been assayed.

**Table 11-43. NS Vein System Dimensions**

| Vein System | Strike Length | Overall Horizontal Width | Minimum Base Elevation | Maximum Elevation | Maximum Depth | Dip Range |
|---|---|---|---|---|---|---|
| | *m* | *m* | *m* | *m* | *m* | |
| **1** | 2,940 | 100 | 600 | 1,050 | 430 | $60^o$ - $90^o$ |
| **2** | 580 | 40 | 850 | 1,030 | 190 | $60^o$ - $90^o$ |
| **3** | 600 | 25 | 840 | 1,000 | 230 | $80^o$ - $90^o$ |
| **4** | 143 | 20 | 920 | 1,030 | 120 | $70^o$ - $80^o$ |
| **5** | 60 | 5 | 740 | 785 | 330 | $85^o$ - $90^o$ |
| **6** | 100 | 25 | 785 | 920 | 290 | $75^o$ - $85^o$ |
| **7** | 50 | 5 | 975 | 1,020 | 75 | $82^o$ - $90^o$ |
| **8** | 50 | 5 | 840 | 925 | 200 | $80^o$ - $85^o$ |
| **9** | 50 | 5 | 970 | 1,035 | 70 | $85^o$ - $90^o$ |
| **10** | 50 | 5 | 870 | 920 | 200 | $80^o$ - $85^o$ |
| **11** | 30 | 5 | 810 | 870 | 260 | $87^o$ - $90^o$ |

**Table 11-44. NS – Summary of Intersecting Drillholes/Channels**

| | | | | $CaF_2$ | | | | $CaCO_3$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VEIN | Holes Total | Total Length *m* | Avg. Length *m* | Holes/Lines Sampled | Length Sampled *m* | Number of Samples | Proportion Sampled *%* | Holes/Lines Sampled | Length Sampled *m* | Number of Samples | Proportion Sampled *%* |
| **1** | 316 | 1,919 | 6.1 | 272 | 1,548 | 943 | 81% | 42 | 477 | 508 | 25% |
| **2** | 19 | 146 | 7.7 | 18 | 117 | 128 | 80% | 15 | 105 | 114 | 72% |
| **3** | 8 | 57 | 7.2 | 7 | 50 | 63 | 88% | | | | |
| **4** | 4 | 27 | 6.7 | 4 | 27 | 28 | 99% | 3 | 23 | 24 | 85% |
| **5** | 2 | 3 | 1.5 | 2 | 3 | 2 | 100% | | | | |
| **6** | 5 | 15 | 2.9 | 5 | 13 | 5 | 89% | | | | |
| **7** | 2 | 7 | 3.4 | 2 | 7 | 9 | 100% | 2 | 7 | 9 | 100% |
| **8** | 1 | 4 | 4.3 | 1 | 3 | 4 | 71% | | | | |
| **9** | 1 | 1 | 1.5 | 1 | 1 | 1 | 92% | | | | |
| **10** | 2 | 11 | 5.5 | 1 | 10 | 11 | 91% | | | | |
| **11** | 1 | 4 | 4.0 | 1 | 4 | 5 | 100% | | | | |

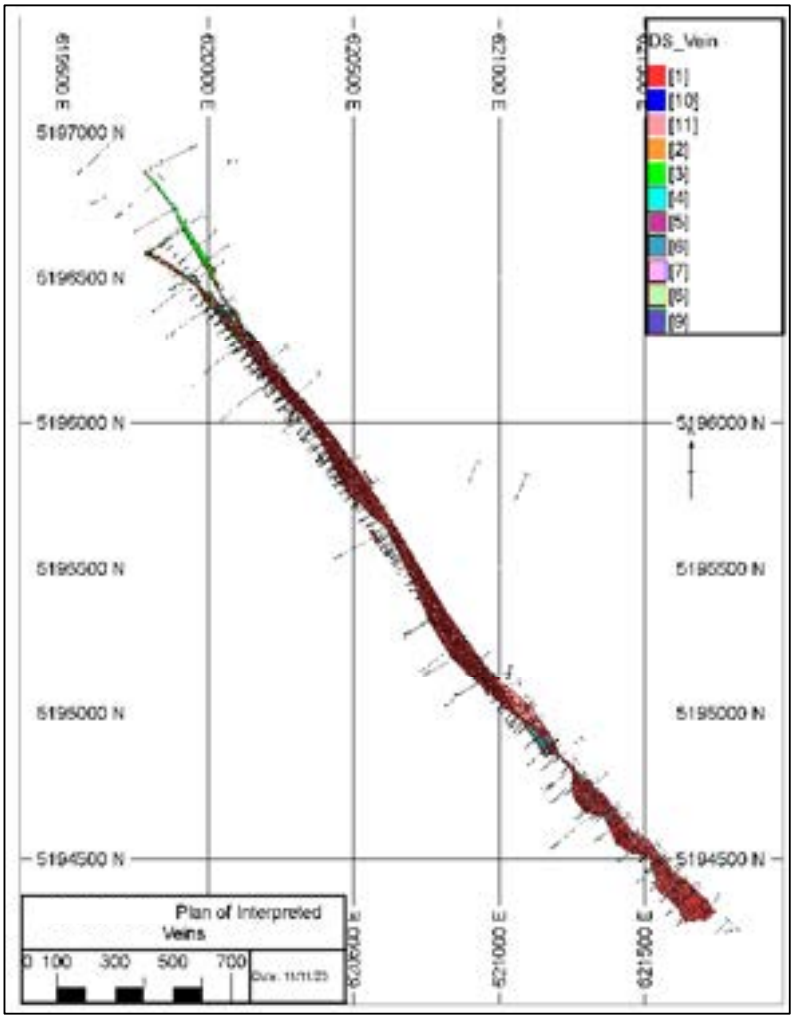



**Figure 11-38. Plan of NS Interpretation**

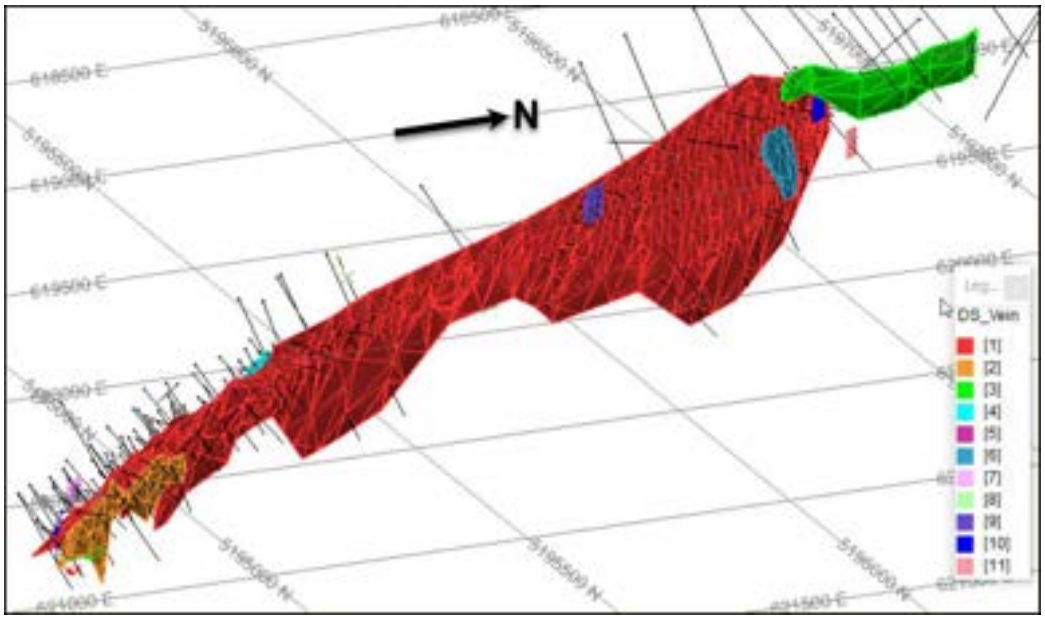



**Figure 11-39. 3D View of NS Interpretation**

### 11.5.3 Statistics- Samples

The interpreted wireframe models were used to select and allocate the drilling data according to interpreted veins. A statistical summary of those samples selected are shown in Table 11-45. Log-probability plots of $CaF_2$ grades, by vein system, are shown in Figure 11-40. These show that very strong natural breaks present. When considering all the captured vein samples, the two apparent splits are at approximately 3% and 45% $CaF_2$. However, this upper split is likely to heavily influenced by the absence of low-grade sampling from underground samples.

**Table 11-45. Statistics of Raw Samples within Mineralised Veins – NS**

| VEIN | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | **$CaF_2$** | 1,302 | 0 | 97.3 | 45.8 | 39.5 | 27.9 | 776.5 | 60.9 | 5.0 | 77.0 |
| **2** | **$CaF_2$** | 132 | 0.23 | 75.6 | 15.3 | 10.1 | 14.9 | 222.4 | 97.3 | 3.1 | 38.2 |
| **3** | **$CaF_2$** | 67 | 1.45 | 86.9 | 34.4 | 27.3 | 26.4 | 699.3 | 76.9 | 5.9 | 73.0 |
| **4** | **$CaF_2$** | 31 | 0.8 | 76.6 | 11.4 | 8.9 | 12.6 | 157.7 | 110.1 | 2.9 | 17.1 |
| **5** | **$CaF_2$** | 7 | 61 | 74.0 | 66.2 | 74.0 | 6.4 | 40.6 | 9.6 | 61.0 | 74.0 |
| **6** | **$CaF_2$** | 10 | 46 | 61.0 | 48.9 | 47.0 | 4.9 | 24.0 | 10.0 | 46.0 | 60.0 |
| **7** | **$CaF_2$** | 9 | 0.42 | 35.2 | 11.5 | 10.1 | 10.8 | 116.5 | 93.5 | 0.4 | 28.6 |
| **8** | **$CaF_2$** | 4 | 6.1 | 61.1 | 25.1 | 16.9 | 19.5 | 380.9 | 77.8 | 4.1 | 46.4 |
| **9** | **$CaF_2$** | 1 | 75 | 75.0 | 75.0 | | | | | | |
| **10** | **$CaF_2$** | 11 | 7.11 | 41.7 | 23.4 | 24.9 | 11.4 | 129.2 | 48.6 | 7.5 | 37.3 |
| **11** | **$CaF_2$** | 5 | 9.84 | 65.9 | 32.6 | 33.2 | 22.9 | 522.9 | 70.1 | 7.2 | 60.4 |
| **1** | **$CaCO_3$** | 525 | 0 | 18.2 | 0.6 | 0.0 | 1.5 | 2.2 | 264.5 | 0.0 | 1.8 |
| **2** | **$CaCO_3$** | 117 | 0 | 11.0 | 1.4 | 1.2 | 1.4 | 2.0 | 99.2 | 0.0 | 2.3 |
| **4** | **$CaCO_3$** | 27 | 0 | 7.2 | 1.1 | 0.9 | 1.4 | 1.8 | 117.6 | 0.0 | 2.2 |
| **7** | **$CaCO_3$** | 9 | 0.62 | 2.6 | 1.1 | 1.1 | 0.5 | 0.2 | 42.6 | 0.6 | 1.8 |

Log-probability plots of $CaCO_3$ grades, by vein system, are shown in Figure 11-41. This figure also shows a scatterplot of $CaF_2$ versus $CaCO_3$ grades, for those samples when both types of grades are available. There does not appear any clear relationship between the different types of grades.

One of the log-probability plots compares the drillhole vs the underground channel grades. This clearly demonstrates the generally much higher grades of underground samples. This is most probably because at the time of underground mining, the focus was on much higher grades, so many exposures of lower grades would not have been sampled. This therefore shows that the current evaluation is probably conservative i.e., it will be underestimating the quantity of lower grade material.

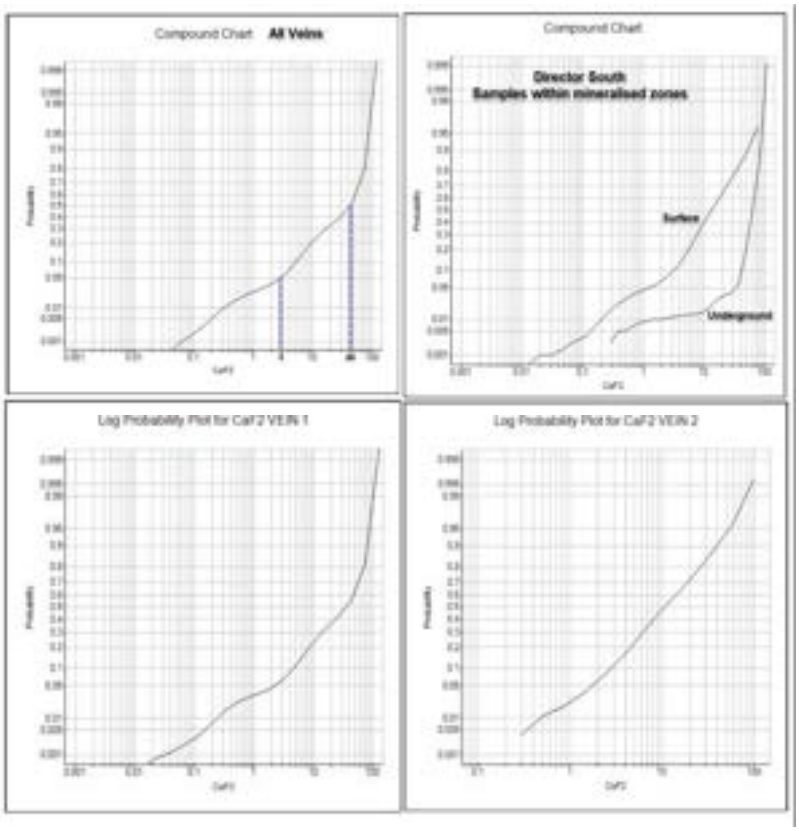



**Figure 11-40. Log Probability Plots of $CaF_2$ Samples within NS Veins**

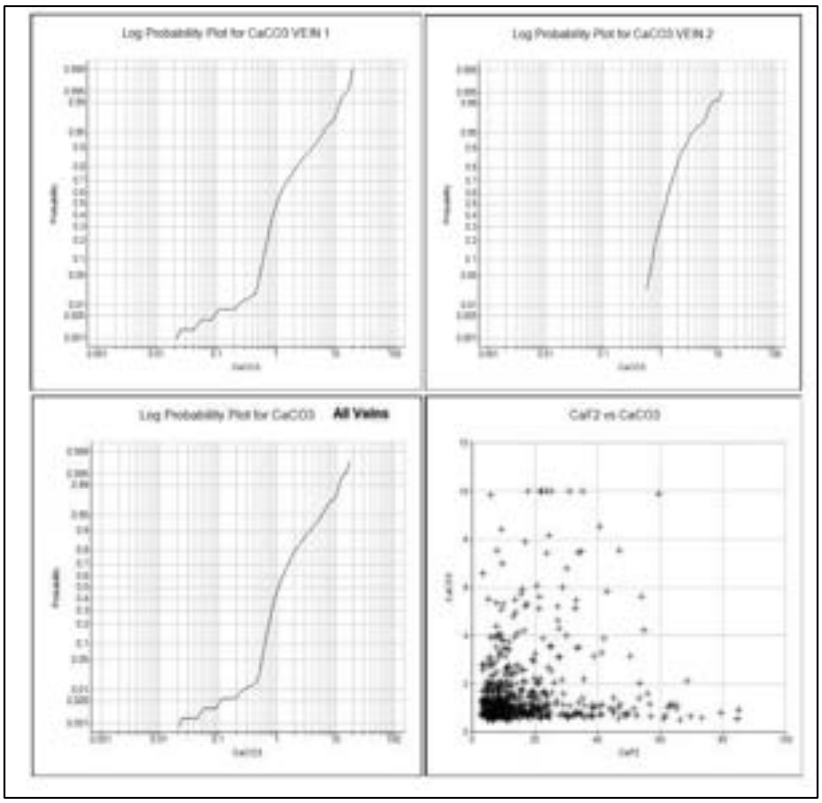



**Figure 11-41. Log Probability Plots of $CaCO_3$ Samples within NS Veins**

### 11.5.4 Drillhole Data Processing

A histogram of mineralised samples lengths for NS is shown in Figure 11-11. This clearly shows that the majority of samples have a 1m length or less. The majority of samples with greater than 1m length come from the 2013 drilling or the underground channel samples. It was decided to composite samples onto 1m composite length, so as to provide consistent sample support for geostatistical analysis.

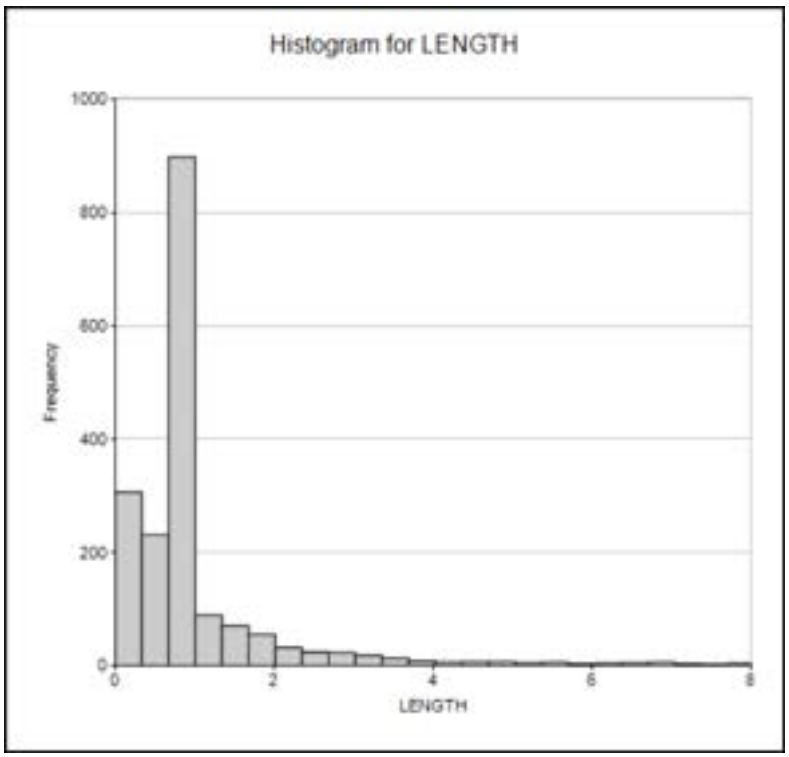



**Figure 11-42. Histogram of Mineralised Sample Lengths – NS**

The mineralised vein wireframes were based on definition of overall mineralisation limits. However, within these limits, quite different populations of low-grade samples (<3% $CaF_2$) as well as medium grades samples (>=3% and <45% $CaF_2$). These parts have been consequently modelled by assignment and extrapolation of these grade categories during the overall grade estimation process. The following drillhole data processing steps took place:

1. **Initial Sample Selection** within mineralised vein envelopes.

2. **Capping**. Top-cut levels were applied before compositing. The selection of top-cut levels is described below.

3. **Compositing** was then done, with composites being separated across each change in vein system (VEIN). A compositing length of 1m was applied; and this length was allowed to be slightly variable, so that composites are of equal length across each intersection. This avoids excessively small composites being created after rigidly applied composite lengths. A minimum composite length of 0.5m was applied.

4. **Grade Categories** were allocated within each overall vein intersection, with the field MINZ. This was based on the following break points, as derived from the sample log-probability plots.

**Table 11-46. NS Grade Categories**

| MINZ | Description |
|---|---|
| 1 | $CaF_2$<3% |
| 2 | $CaF_2$>=3% and $CaF_2$<45% |
| 3 | $CaF_2$>=45% |

As a preparation for compositing, an analysis of outlier grades was based on analysis of log-probability plots, decile analyses and coefficient of variation (CoV) analyses. Example graphs from CoV analysis are shown in Figure 11-43. These graphs depict the change in CoV variation in rank order for grades in the top decile. The CoV values represent the Coefficient of Variation (Standard Deviation/Mean) of all sample grades in the top decile, up to the particular sample grade being analysed.

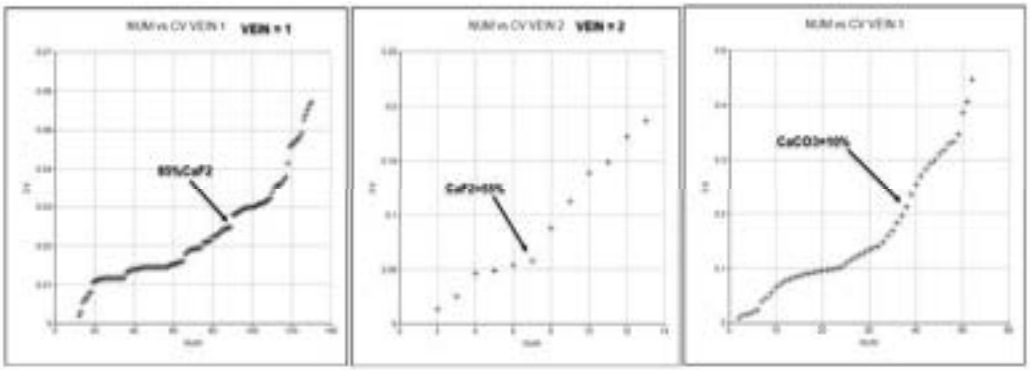


**Figure 11-43. Coefficient of Variation Analysis Plots – NS**

The capping levels determined for all the samples sets within each mineralised vein system are summarised in Table 11-8. The effect of these capping levels on overall NS grade means is shown in Table 11-9.

**Table 11-47. Summary of Capping Levels – NS**

| Field | VEIN | Value |
|---|---|---|
| $CaF_2$ | 1, 3+ | 85 |
| $CaF_2$ | 2 | 55 |
| $CaCO_3$ | All | 10 |

**Table 11-48. Effect of Applied Capping Levels – NS**

| Grade Field | VEIN | Number of Composites | Number Affected by TC | Proportion Affected % | Uncut Mean | Mean with TC |
|---|---|---|---|---|---|---|
| CaF2 | 1 | 1,566 | 50 | 3.2 | 45.9 | 45.7 |
| CaF2 | 2 | 119 | 8 | 6.7 | 15.4 | 15.0 |
| CaF2 | 3 | 50 | 6 | 12.0 | 34.8 | 34.8 |
| CaCO3 | 1 | 478 | 17 | 3.6 | 0.6 | 0.5 |
| CaCO3 | 2 | 107 | 1 | 0.9 | 1.4 | 1.4 |

### 11.5.5 Statistics – Composites

A statistical summary of 1m composites within the NS mineralised vein systems is shown in Table 11-49. Log-probability plots for the 1m composites' data sets are shown in Figure 11-44 and Figure 11-45. Features apparent from these statistics include:

- No major changes to grade distributions with generation of 1m composites.
- Very small decrease in $CaF_2$ coefficient of variation values.

**Table 11-49. Statistics of 1m Composites – NS**

| VEIN | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $CaF_2$ | 1566 | 0.1 | 85.0 | 45.8 | 55.0 | 27.3 | 746.2 | 59.7 | 6.5 | 79.0 |
| 2 | $CaF_2$ | 119 | 0.2 | 55.0 | 14.9 | 9.8 | 13.0 | 170.3 | 87.5 | 2.6 | 34.9 |
| 3 | $CaF_2$ | 50 | 2.5 | 78.5 | 34.8 | 28.5 | 22.5 | 507.6 | 64.8 | 7.7 | 69.8 |
| 4 | $CaF_2$ | 27 | 0.8 | 76.6 | 12.2 | 9.7 | 13.8 | 190.8 | 112.8 | 2.3 | 18.0 |
| 5 | $CaF_2$ | 3 | 61.0 | 74.0 | 66.2 | 61.0 | 6.4 | 40.6 | 9.6 | 61.0 | 70.1 |
| 6 | $CaF_2$ | 13 | 46.0 | 61.0 | 49.0 | 47.0 | 4.8 | 23.3 | 9.9 | 46.0 | 57.6 |
| 7 | $CaF_2$ | 6 | 6.2 | 16.8 | 11.4 | 11.3 | 4.3 | 18.7 | 37.9 | 6.2 | 16.6 |
| 8 | $CaF_2$ | 3 | 7.5 | 50.8 | 27.6 | 24.4 | 17.8 | 316.7 | 64.6 |  | 42.9 |
| 9 | $CaF_2$ | 1 | 75.0 | 75.0 | 75.0 |  |  |  |  |  |  |
| 10 | $CaF_2$ | 10 | 10.8 | 41.0 | 23.4 | 26.3 | 10.6 | 112.8 | 45.4 | 10.8 | 37.9 |
| 11 | $CaF_2$ | 4 | 9.8 | 65.8 | 32.6 | 27.4 | 22.2 | 495.0 | 68.2 | 6.7 | 55.4 |
| 1 | $CaCO_3$ | 478 | 0.02 | 10.0 | 1.8 | 1.0 | 1.8 | 3.3 | 103.3 | 0.6 | 3.9 |
| 2 | $CaCO_3$ | 107 | 0.5 | 10.0 | 1.6 | 1.3 | 1.3 | 1.8 | 83.6 | 0.7 | 2.6 |
| 4 | $CaCO_3$ | 23 | 0.6 | 4.1 | 1.3 | 0.9 | 1.0 | 0.9 | 72.0 | 0.6 | 2.5 |
| 7 | $CaCO_3$ | 6 | 0.8 | 1.6 | 1.1 | 1.0 | 0.3 | 0.1 | 25.4 | 0.7 | 1.4 |

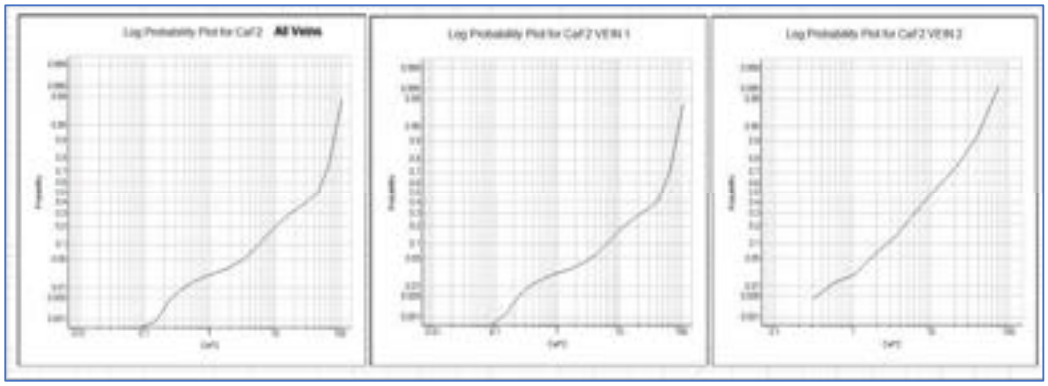


**Figure 11-44. Log-Probability Plots – Composites- $CaF_2$ NS**

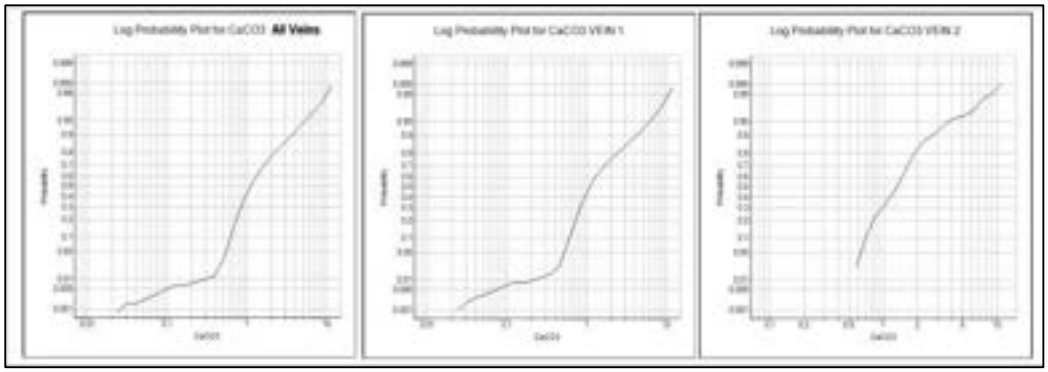


**Figure 11-45. Log-Probability Plots – Composites- $CaCO_3$ NS**

### 11.5.6 Density

Bulk density values were assigned on the basis of rock type, stemming from 39 SG measurements taken from NS core in 2013. The principal averaged values, as summarised from SLR's 2022 report, are shown in Table 11-50.

**Table 11-50. Summary of Assigned Density Values – NS**

| Rock/Material Type | Density $t/m^3$ |
|---|---|
| External Waste | 2.67 |
| Vein Material | 3.1 |
| Overburden | 1.8 |

The density measurements have a small variability, for external waste they range from 2.53t/$m_3$ to 2.70t/$m^3$, while for vein material they vary from 2.82t/$m^3$ to 3.21 t/$m^3$.

As with AGS, it is of concern that in some of the NS core, there appears to be core fragments over certain intervals, implying the washing out of clay gouge material.

### 11.5.7 Geostatistical Analysis

A geostatistical study was completed for $CaF_2$ and $CaCO_3$, according to the vein data sets at NS:

1. **Composites**. For analysis of the $CaF_2$ variography, 1m capped composites were filtered by grade category.

2. **Downhole Variograms**. For each filtered data set, downhole variograms were made with a lag of 1m. The variograms produced by this step helped determine the nugget variance.

3. **Experimental Variograms**. Directional experimental variograms were now produced, for different directions within the plane of the veins, as well as cross-strike. Lag distances typically of 40m applied along-strike and down-dip. Much shorter lag distances, of 1m were applied in the cross-strike direction.

4. **Model Variograms** were fitted to the experimental variograms, so as to obtain sill and range values in three principal orthogonal directions.

Experimental and model variograms are shown for $CaF_2$ in Figure 11-16 and for $CaCO_3$ in Figure 11-17. The model variogram parameters are shown for AGS are shown in Table 11-13.

**Table 11-51. Model Variogram Parameters – NS**

| | | | | | | 1st Structure | | | | 2nd Structure | | | | 3rd Structure | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Field | Grade | Rotation Angles | | | Nugget | Range | | | | Range | | | | Range | | | |
| | Category | 1 | 2 | 3 | C0 | X' | Y' | Z' | C1 | X' | Y' | Z' | C2 | X' | Y' | Z' | C3 |
| $CaF_2$ | <45% $CaF_2$ | - | - | - | 3 | 8.8 | 8.8 | 8.8 | 2.9 | 51.7 | 51.7 | 51.7 | 0.3 | 139.1 | 139.1 | 139.1 | 3.297 |
| $CaF_2$ | >45% $CaF_2$ | 230 | - | 75 | 13 | 70 | 24.7 | 6.4 | 95.727 | 75.7 | 61.4 | 10.5 | 90.768 | 999 | 999 | 13 | 87.228 |
| $CaCO_3$ | | - | - | - | 0.19 | 93.8 | 93.8 | 93.8 | 0.209 | | | | | | | | |

The $CaF_2$ variograms for the +45% $CaF_2$ material have ranges of approximately 80m. As would be expected, the cross-strike ranges are much shorter, corresponding with the orientation of higher-grade intersections parallel with the overall vein structures.

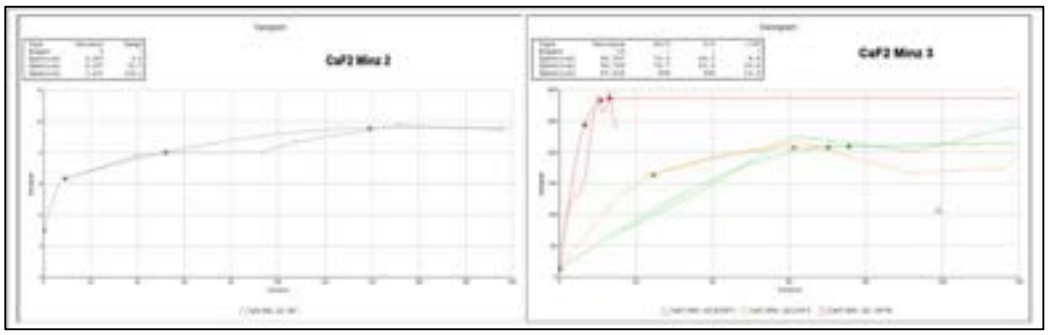


**Figure 11-46. $CaF_2$ Variograms – NS**

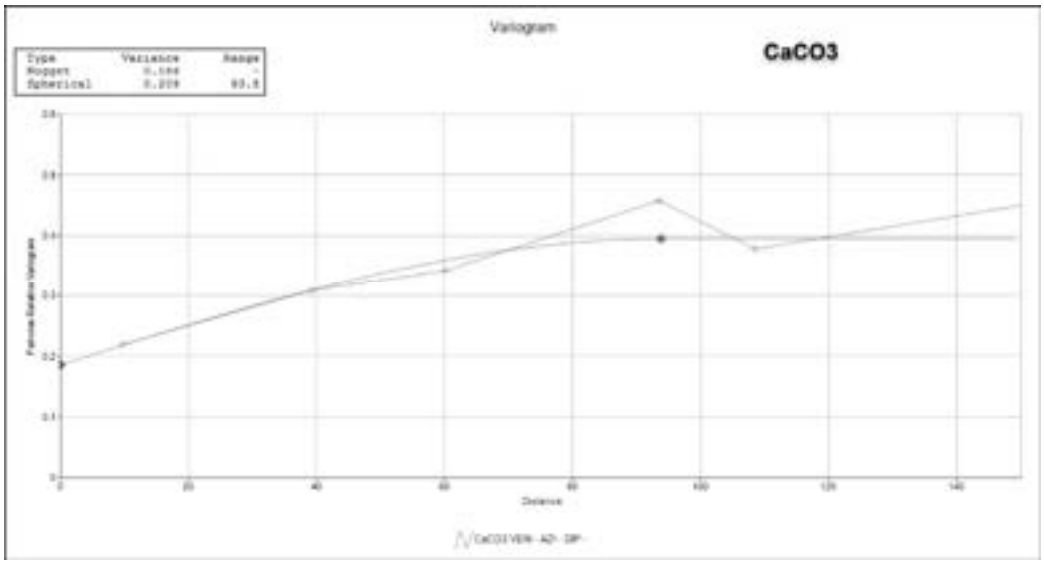



**Figure 11-47. $CaCO_3$ Variograms – NS**

### 11.5.8 Volumetric Modelling

The initial block model prototype used for the current NS resource estimation is summarised in Table 11-52, and are depicted in plan in Figure 11-18. The prototype was set up so as to include enough waste beyond the extents of the deposit, to enable a model coverage sufficient for potential open pit planning. The parent block height of 10m was selected so as to correspond with the planned pit bench height. Within the mineralised domains, sub-cells were created of 5m height, so as to allow more detail in grade estimation.

**Table 11-52. Block Model Prototype – NS**

| | Size | Number | Extent |
|---|---|---|---|
| | *m* | | *m* |
| **X** | 10 | 138 | 1,380 |
| **Y** | 10 | 426 | 4,260 |
| **Z** | 10 | 48 | 480 |

**Notes**

**. Rotation -40° around Z-axis**
**. Origin at**
**X 621,564**
**Y 5,193,377**
**Z 620**
**. Grade categories extrapolated on basis of 1m x 5m x 5m sub-cells**
**. Grade estimation on basis of of 2m x 10m x 10m sub-cells**

During creation of the volumetric block models, blocks were split into sub-cells laterally, down to a size 2.5m x 2.5m. The wireframe models used in the generation of the volumetric block models, and the resultant fields created, are summarised in Table 11-53.

**Table 11-53. Volumetric Model Fields – NS**

| Wireframes | Field | Values |
|---|---|---|
| Mineralised Veins | VEIN | Vein number |
| Original Topography | SOLID | 1 |
| Overburden | LITH | OB |
| Underground development | MINED | 1 |
| Stope excavations and voids | MINED | 1 |
| Sterile zone | MINE | 2 |

The sterile zone is an overall wireframe which envelopes the stoped-out areas, to prevent awkward and/or non-existent pillars from being included in the available resources.

### 11.5.9 Grade Estimation

With respect to grade estimation, the interpreted mineralised vein structures were used as hard boundaries. Therefore, only composites created from samples physically within each mineralised domain were used for the estimation of grades within each domain.

To properly represent alternating zones of different grade categories within them, as discussed in Section 11.5.4, these internal zones were modelled using the following procedure:

1. **Composites**. As described in Section 11.5.4, the 1m composites within each mineralised zone were flagged with the MINZ field (1: <3% $CaF_2$, 2: >=3<45% $CaF_2$ and 3: >=45% $CaF_2$). The lowest grade category (MINZ=1) is effectively internal waste.

2. **Orientation**. Vein orientation vectors were derived from the vein wireframes. These were then employed dynamic anisotropy processes in Datamine, so as to assign values in TRDIPDIR and TRDIP (true dip direction and true dip) fields in modelled blocks.

3. **Cell Slicing**. Blocks within the mineralised domains were sliced using an alternative model prototype with 1m x 5m x 5m. This size essentially represents the resolution of the internal waste zone extrapolation.

4. **Interpolation**. The 1/2/3 values in the MINZ field of composite file were then extrapolated into the sliced model, within each vein domain, using nearest neighbour estimation, and controlled through dynamic anisotropy. A flat search ellipsoid was applied with ratio of 6:1, with initial dimensions of 60m x 60m x 10m.

5. **Model Resolution**. The extrapolated vein sub-cells were then simplified and resolved onto a former 2m x 10m x 10m cell structure.

A summary of the search and other estimation controls for grade estimation are the same as were used for AGS and summarised in Table 11-16. The first and second search ellipses extend approximately as far as the $CaF_2$ variogram ranges. An example cross-section of the resultant grade estimation for NS is shown in Figure 11-48. In order for all of the vein blocks to receive a $CaCO_3$ grade in the $CaCO_3$ unsampled region, a regression was applied based on the composite data, as described below:

$$CaCO_3 = (0.05*CaF_2) + 0.5$$

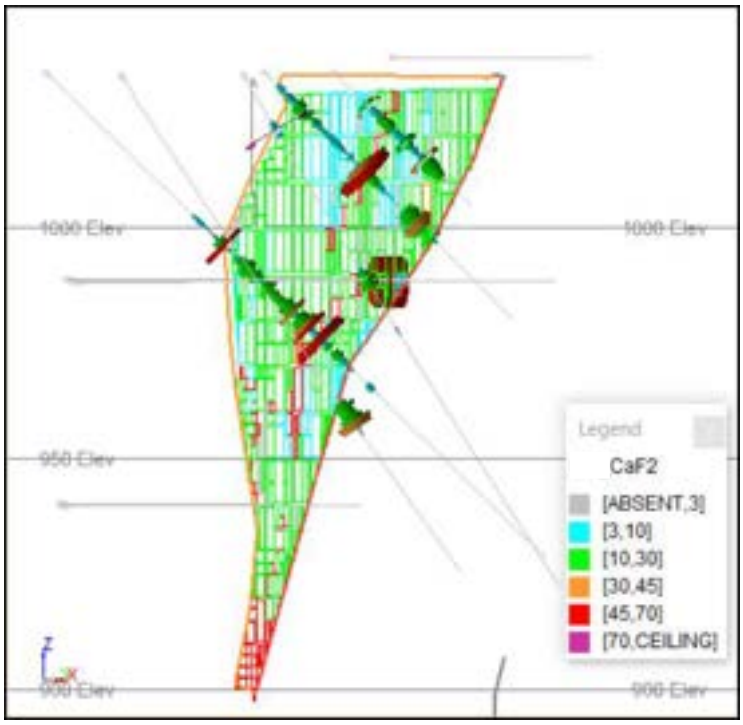



**Figure 11-48. Example Cross-Section (#14) of $CaF_2$ Grade Estimation – NS**

### 11.5.10 Mineral Resource Classification

The resource estimate data determined in this study have been prepared, as far as possible, in accordance with the terminology, definitions and requirements of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM 2014) Standards on Mineral Resources and Reserves, Definitions and Guidelines.

A resource classification risk matrix has been developed for the MRE work described in the current study for NS, as shown in Table 11-55. In turn, this supports the resource classification criteria summarised in Table 11-54.

**Table 11-54. Resource Classification Criteria- NS**

| Category | Description |
|---|---|
| **Indicated** | Within interpreted veins, covered by a drilling grid of at least 70m approximately. |
| **Inferred** | Within interpreted veins, max extrapolation approximately 100m. |

Inferred resource categories have been defined in those volumes within the extent of the Mineralised Veins, but outside the volumes defined as Indicated resources. In general, the maximum extent of extrapolation from drillhole intersections within Mineralised Veins, and therefore Inferred resources, has been 100m.

The resource criteria have been applied by determining average intersection spacings, and the viewing each vein on long section, where resource class polygons have been defined to assign the final classifications. The classification for the principal vein (Vein No. 1) is shown in Figure 11-49.

## Table 11-55. Resource Classification Risk Matrix- NS

| FACTORS | | Risk (E/H/M/L) | Comments |
|---|---|---|---|
| **1. SAMPLING TECHNIQUES & DATA** | | | |
| 1.1 | Sampling Techniques | L | Surface diamond drill hole samples used in estimation. |
| 1.2 | Drilling Techniques | L | Core drilling by standard wireline diamond drilling. Core drilling has been mostly NQ. |
| 1.3 | Drill sample Recovery | M | No digital core recovery data |
| 1.4 | Drillcore Logging | M | Lack of detailed lithology logs, recovery measurements and recording of fault gouge intersections. |
| 1.5 | Sub-sampling Techniques and Sample Prep | H | Samples from cut core, selected by geologist's opinion on what is mineralised, in and around vein intersections. |
| 1.6 | Quality of Assay Data and Laboratory Tests | M | Poor coarse duplicate results for lower grades, otherwise QAQC results adequate. |
| 1.7 | Verification of Sampling and Assaying | L | Check logging of a number of holes. Check of various collar coordinates. |
| 1.8 | Location of Data Points | L | Drillhole collars geodetically surveyed. Drillhole collar elevations checked against topography and selected holes checked in field with GPS. Drillhole sections make sense with respect to u/g topography data. |
| 1.9 | Data Spacing and Distribution | M | Drillhole sections on 50m grid, u/g channels spaced 30m apart. U/g samples only made for relatively high grades. Estimation therefore conservative. No CaCO3 assays over approx 2/3 of the strike length. |
| 1.1 | Orientation of Data cf Geological Structure | L | Holes on regular section lines, perpendicular to overall strike length. Some steep intersections due to near vertical nature of many of the veins. |
| 1.11 | Sample Security | H | Core held on site in core shack facility for post-2013 drillholes. Former lab facility exists, but in need of maintenance. Core facility **not** within a secure locked boundary. |
| **2. REPORTING OF EXPLORATION RESULTS** | | | |
| 2.1 | Mineral Tenement and Land Tenure Status | L | Appears ok, as documented by SLR. |
| 2.2 | Geology | M | Main vein 2km_ in length, passing into sediments at north end. Westerly branch follows granite-sediment contact. More irregular going south. Pinch and swell features along strike. Fluorite at North/South Ridge commonly banded. Spar veinlets in hanging wall over large widths. Rock bursts from stresses in vein. Lithology not modelled at present. |
| 2.3 | Drillhole Information | L | Delivered as Excel files. |
| 2.4 | Data Aggregation Methods | L | Drillhole data composited downhole into 1m lengths. |
| 2.5 | Diagrams | L | Cross-sections produced for all section lines where assayed holes exist. |
| 2.6 | Balanced Reporting | L | Consistent drilling and u/g sampling schemes along strike. |
| 2.7 | Other Substantive Data | L | Ground geophysical surveys over North/South Ridge area. Results of the 2012 ground magnetometer and HLEM surveys indicated weak to moderate EM conductors and magnetic lows are associated with the North/South Ridge Vein. |
| **3. ESTIMATION AND REPORTING OF MINERAL RESOURCES** | | | |
| 3.1 | Database Integrity | H | Multiple Excel files available from previous operation/ownership need consolidation into proper mine database. Needs also proper referencing of assaying method, core recoveries. NS - limited lithology data. |
| 3.2 | Site Visits | L | QP visited in August 2023 |
| 3.3 | Geological Interpretation | M | Sectional interpretation in Datamine, building on previous interpretations. Currently available data does not allow for interpretation and/or estimation of fault gouge intersections. |
| 3.4 | Dimensions | L | Overall, the main vein at NS covers an approximately 3km strike length, 300-400m depth. There are 4 other veins with a +100m strike length. |
| 3.5 | Estimation and Modeling Techniques | L | Three main $CaF_2$ grade categories extrapolated within overall vein envelopes, reflecting internal waste and different grade populations. |
| | | L | $CaF_2$ and $CaCO_3$ by ordinary kriging (OK). |
| 3.6 | Cut-off Parameters | H | Further process testing required to support mill recovery assumptions. |
| 3.7 | Mining Factors/Assumptions | L | No dilution applied for reporting of resources. |
| 3.8 | Metallurgical Factors or Assumptions | H | Previous milling operations shut in February 2002. Crusher, ore feed arrangements and other aspects being reviewed for improvements, prior to potential restart. |
| 3.9 | Environmental Factors or Assumptions | L | According to the SLR 2022 43-101, CFI does not have a formal environmental and social management system, however there are several environmental management plans in place. |
| 3.10 | Bulk Density | H | Global average density values by vein/waste, from 39 measurements. Variability of density quite low. Does not allow for vugs or fault zone intersections. |
| 3.11 | Classification | L | Areas delineated with intersection on less than 70m grid have been categorised as **Indicated** resources, other **Inferred** within interpreted zones. |
| 3.12 | Audits or Reviews | L | SLR prepared updated 43-101 study in 2022, including site visits. |
| | | | |
| **Notes** | | | |
| | . Not compliant and significant project risk | E | **Extreme Risk** |
| | . Current status does carry some project risk | H | **High Risk** |
| | . Improvements required for best practice | M | **Medium Risk** |
| | . Current reporting/information acceptable | L | **Low Risk** |

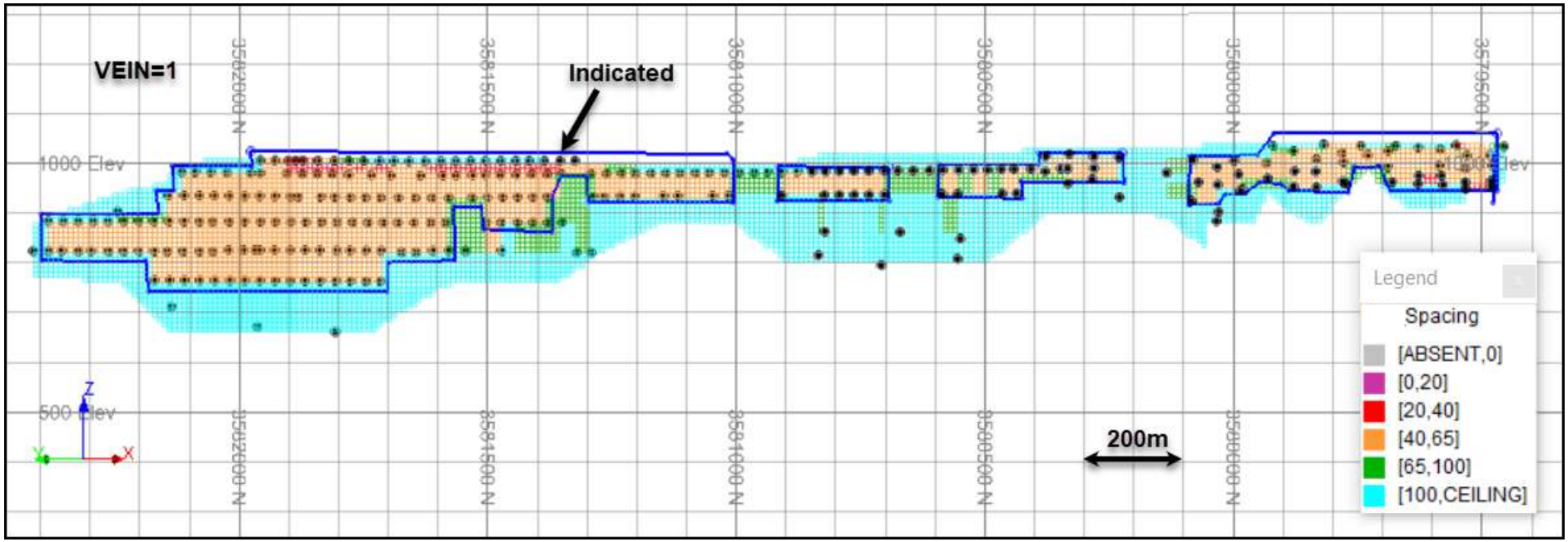



**Figure 11-49. Resource Class Long Section – NS – Main Vein 1**

The approximate volumetric split of resource categories at NS, by vein number, is summarised in Table 11-56. This evaluation has cut-off of 5% $CaF_2$ applied, and relates to in-situ resources.

**Table 11-56. Resource Category Split by Volume – NS**

| Vein System | Indicated Volume $m^3$ x 1000 | Inferred Volume $m^3$ x 1000 | Total Volume $m^3$ x 1000 | Proportion By Vein Ind % | Proportion By Vein Inf % | Proportion of Total Ind % | Proportion of Total Inf % |
|---|---|---|---|---|---|---|---|
| **1** | 807 | 906 | 1,713 | 47% | 53% | 96% | 68% |
| **2** | 33 | 110 | 143 | 23% | 77% | 4% | 8% |
| **3** | - | 262 | 262 | 0% | 100% | 0% | 20% |
| **4** | - | 25 | 25 | 0% | 100% | 0% | 2% |
| **6** | 1 | 4 | 5 | 26% | 74% | 0.2% | 0.3% |
| **7** | - | 6 | 6 | 0% | 100% | 0.0% | 0.4% |
| **8** | - | 9 | 9 | 0% | 100% | 0% | 1% |
| **9** | - | 5 | 5 | 0% | 100% | 0% | 0.3% |
| **10** | - | 6 | 6 | 0% | 100% | 0% | 0.4% |
| **11** | - | 4 | 4 | 0% | 100% | 0% | 0.3% |
| **TOTAL** | 842 | 1,337 | 2,178 | **39%** | **61%** | **100%** | **100%** |

### 11.5.11 Model Validation

Complete sets of cross-sections were made for $CaF_2$, comparing composite and estimated grades. An example of this is shown in Figure 11-48. The results of the visual comparison through the whole NS block model show acceptable representations of drillhole composite grades on a local scale.

Global average values by vein were determined from the original sample data, 1m composites, and from the block model, for grades estimated by ordinary kriging (OK), nearest-neighbour estimation (NN) and inverse-distance weighting (ID). The comparative average grades, for $CaF_2$, are summarised in Table 11-57. The model average grades have been derived for all resource model blocks in each domain, regardless of their resource classification and grade category.

Most of these global grade averages correspond quite closely. The gaps in the $CaCO_3$ reference lines are due to the lack of $CaCO_3$ data in these veins.

A local comparison of average grades was also made, in the form of swath plots, which compare the average grades on successive 50m thick sectional slices. Examples of the swath plots for $CaF_2$ for the main vein are shown in Figure 11-50, for the main vein +/-45%$CaF_2$ categories.

The swath plots produce show an acceptable comparison for both $CaF_2$ and $CaCO_3$. Overall, there appears to be a good correlation between the block model and underlying $CaF_2$ sample data. As discussed above in Section 11.5.1, the coverage of $CaCO_3$ samples is insufficient for proper estimation of $CaCO_3$ for all parts of NS.

**Table 11-57. Global Average CaF2 Grade Comparisons by Vein**

| | | | | Average Block Model Grades | | |
|---|---|---|---|---|---|---|
| FIELD | VEIN | Samples | Composites | OK | ID | NN |
| CaF2 | 1 | 45.8 | 45.8 | 45.0 | 45.0 | 44.9 |
| CaF2 | 2 | 15.3 | 14.9 | 14.5 | 14.7 | 14.0 |
| CaF2 | 3 | 34.4 | 34.8 | 30.9 | 30.8 | 30.7 |
| CaF2 | 4 | 11.4 | 12.2 | 12.2 | 12.0 | 11.8 |
| CaF2 | 5 | 66.2 | 66.2 | 66.3 | 65.2 | 64.9 |
| CaF2 | 6 | 48.9 | 49.0 | 51.3 | 50.1 | 50.5 |
| CaF2 | 7 | 11.5 | 11.4 | 12.1 | 12.2 | 10.8 |
| CaF2 | 8 | 25.1 | 27.6 | 29.2 | 29.1 | 29.7 |
| CaF2 | 9 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| CaF2 | 10 | 23.4 | 23.4 | 23.1 | 23.6 | 20.7 |
| CaF2 | 11 | 32.6 | 32.6 | 34.6 | 35.4 | 31.7 |
| CaCO3 | 1 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 |
| CaCO3 | 2 | 1.4 | 1.4 | 1.6 | 1.6 | 1.5 |
| CaCO3 | 4 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 |
| CaCO3 | 7 | 1.1 | 1.1 | 1.0 | 1.0 | 1.1 |

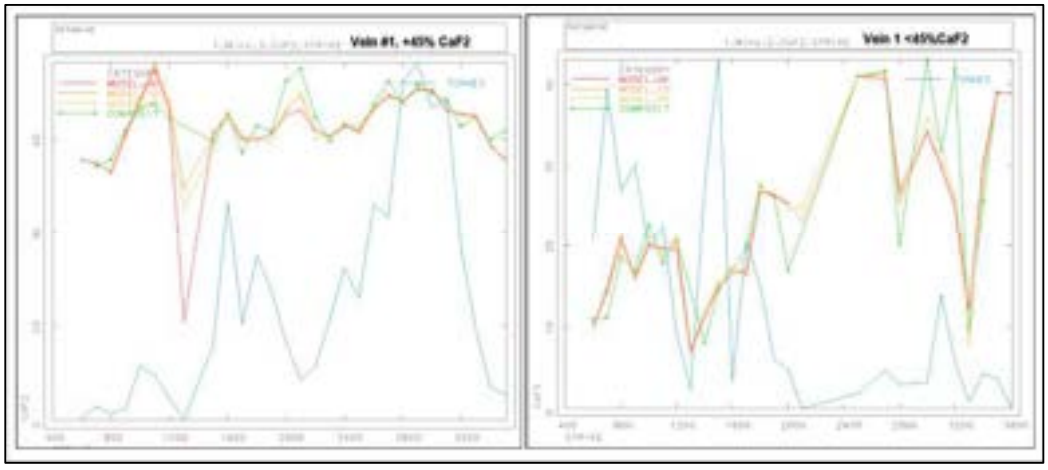


**Figure 11-50. Along-Strike Swath Plots – NS Vein 1 – $CaF_2$**

### 11.5.12 Mineral Resources

It is considered that these validation steps have demonstrated that the blocks models provide an acceptable basis for the calculation and subsequent declaration of Mineral resources.

The NS resource block model was initially evaluated overall, effectively providing a resource inventory. This block model was used as the basis for an open pit optimisation, so as to provide a reasonable open-pit constraint. A constrained evaluation then provided the data for the principal Mineral Resource statement.

*In-Situ Evaluation*

**Table 11-58. In-Situ Resource Summary – NS**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | Indicated | | | Inferred | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| **1** | 2,503 | 34.1 | 1.8 | 2,807 | 42.2 | 1.8 |
| **2** | 102 | 19.2 | 2.0 | 342 | 15.8 | 1.9 |
| **3** | - | | | 811 | 32.9 | 1.7 |
| **4** | - | | | 78 | 14.3 | 1.5 |
| **5** | - | | | 1 | 66.5 | 2.0 |
| **6** | 4 | 49.9 | 2.0 | 12 | 52.5 | 2.0 |
| **7** | - | | | 18 | 11.9 | 1.0 |
| **8** | - | | | 28 | 29.6 | 1.6 |
| **10** | - | | | 18 | 23.9 | 1.7 |
| **11** | - | | | 12 | 33.8 | 1.8 |
| **TOTAL** | **2,609** | **33.5** | **1.8** | **4,129** | **37.4** | **1.8** |

**Notes**

- **In-Situ Resources, with no constraints**
- **Cut-off 5% $CaF_2$**
- **Inclusive of any subsequent reserves**
- **Rounding as required may result in apparent summation differences between tonnages and grades. Where these occur, they are not considered material.**

*Constrained Pit Evaluation*

A pit optimisation was completed on the available resources, so as to produce open pit shells which provide a 'Reasonable Prospects of Eventual Economic Extraction' (RPEEE) pit constraint. The parameters applied in this pit optimisation are summarised in Table 11-22. No physical limits were placed on the optimisation. An evaluation breakdown of the resources within the constraints of the (maximum cashflow) optimisation is shown in Table 11-59. Potential underground resources beneath this optimised pit are summarised in Table 11-60 Grade tonnage tables for the Indicated resources inside the pit constraints are shown in Table 11-61,

**Table 11-59. Constrained Resources Summary – NS**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | Indicated | | | Inferred | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| **1** | 1,544 | 23.3 | 1.7 | 160 | 21.0 | 1.4 |
| **2** | 35 | 30.0 | 2.2 | 68 | 21.7 | 1.6 |
| **4** | | | | 42 | 17.0 | 1.7 |
| **7** | | | | 18 | 11.9 | 1.0 |
| **TOTAL** | **1,579** | **23.5** | **1.7** | **288** | **20.0** | **1.5** |

**Notes**

**. Constrained Resources, within Ind+Inf optimisation**

**. Cut-off 5% $CaF_2$**

**. Approx 100% of the Resources estimated with $CaCO_3$ assays**

**Table 11-60. Potential Underground Resources Summary - NS**

As Of October 31st, 2023

| | Resource Class | | | | | |
|---|---|---|---|---|---|---|
| | Indicated | | | Inferred | | |
| Vein System | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % | Tonnes Kt | $CaF_2$ % | $CaCO_3$ % |
| **1** | 789 | 60.2 | 2.0 | 2,265 | 49.0 | 1.9 |
| **2** | 14 | 24.4 | 1.9 | 92 | 21.6 | 2.1 |
| **3** | - | | | 690 | 36.7 | 1.8 |
| **4** | - | | | 4 | 16.0 | 1.5 |
| **5** | - | | | 1 | 66.5 | 2.0 |
| **6** | 4 | 49.9 | 2.0 | 12 | 52.5 | 2.0 |
| **8** | - | | | 23 | 33.6 | 1.7 |
| **10** | - | | | 17 | 24.6 | 1.7 |
| **11** | - | | | 12 | 33.8 | 1.8 |
| **TOTAL** | **808** | **59.5** | **2.0** | **3,116** | **45.2** | **1.9** |

**Notes**

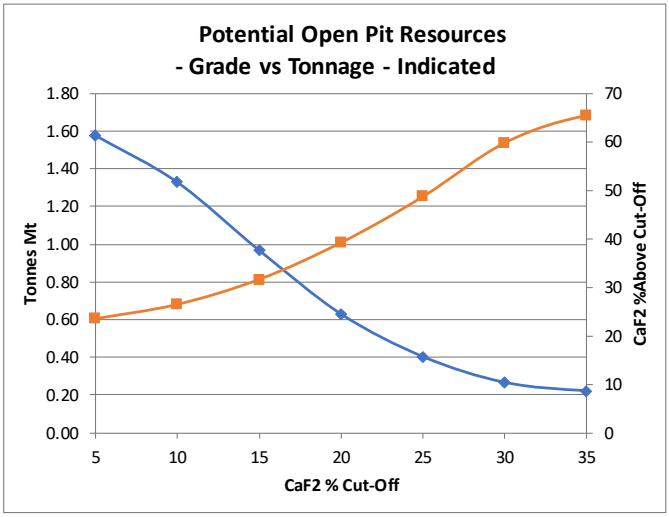
**. Below Open Pit Constraint**

**. Cut-off 15% $CaF_2$**

**Table 11-61. Grade-Tonnage Table –Indicated Resources - NS**

[Constrained Open Pit Resources Only]

| CaF2 Cut-Off % | Tonnes Mt | CaF2 % | CaCO3 % |
|---|---|---|---|
| 5 | 1.58 | 23.5 | 1.7 |
| 10 | 1.33 | 26.4 | 1.8 |
| 15 | 0.97 | 31.6 | 1.8 |
| 20 | 0.63 | 39.2 | 1.8 |
| 25 | 0.40 | 48.7 | 1.7 |
| 30 | 0.27 | 59.8 | 1.4 |
| 35 | 0.22 | 65.4 | 1.3 |
| 40 | 0.21 | 66.4 | 1.3 |

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## 11.6 Tarefare Deposit

### 11.6.1 Database

The database resulting from several different phases of drilling. A summary of the drillholes and samples available, and used for this current Tarefare (TF) resource estimate, is shown in Table 11-62. The $CaF_2$ grades used were all assayed by DCT (Direct Calcium Titration). A small number (135) of ISE assays were also used for lower grades. These were not included in the current study. Of these assays, only 47 were greater than 5% $CaF_2$.

There are no $CaCO_3$ assays available for TF.

**Table 11-62. Summary of TF Sample Database**

| YEAR | Holes Total | Total Length m | Avg. Length m | $CaF_2$ Holes Sampled | $CaF_2$ Length Sampled m | $CaF_2$ Number of Samples | $CaF_2$ Prop'n Holes Sampled % |
|---|---|---|---|---|---|---|---|
| **1947** | 1 | 181 | 181 | 1 | 10 | 11 | 6% |
| **1966** | 1 | 181 | 181 | 1 | 11 | 25 | 6% |
| **1972** | 16 | 4,746 | 297 | 14 | 135 | 329 | 3% |
| **1973** | 2 | 856 | 428 | 2 | 20 | 58 | 2% |
| **1974** | 2 | 1,209 | 605 | 2 | 10 | 28 | 1% |
| **1999** | 16 | 5,769 | 361 | 14 | 113 | 88 | 2% |
| **2008** | 39 | 12,177 | 312 | 31 | 230 | 292 | 2% |
| **Total** | **77** | **25,120** | **326** | **65** | **529** | **831** | **2%** |

A plan of these samples is shown in Figure 11-51. For reference purposes, this plan also shows the main Tarefare vein and three minor veins.

Most of the drillhole sections are approximately 75m apart. The deepest drillholes are over 500m in depth. Most of the drillhole have collar elevations of approximately 320mRL. For modelling and mine planning purposes, the elevation coordinates of all drillholes and modelling data have then had 1,000m added to them, so that all the model and resultant pit bench elevations are positive. This elevation shift has been applied to all the of the resource models described in this report.

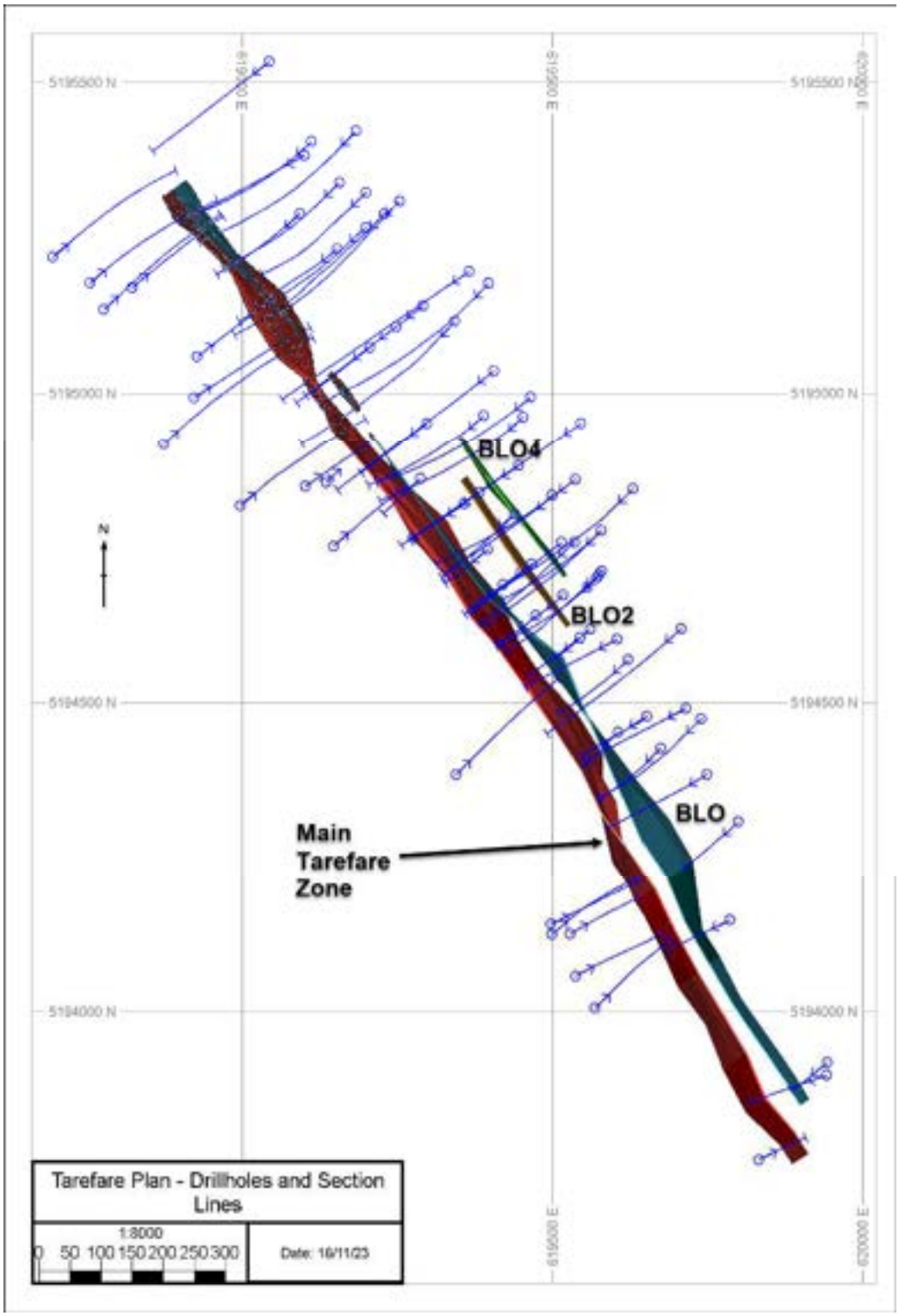



**Figure 11-51. Plan of TF Drillholes**

### 11.6.2 Interpretation

Consistent with previous estimation work for TF, there is one major vein system and three other smaller blowout veins to the north-east. The previous interpretations were checked in 3D and some small updates were applied. The vein dimensions are summarised in Table 11-63.

The sample support for each mineralised vein is summarised in Table 11-64. This table summarises the number of drillholes intersecting each vein system, the number of drillholes which have been assayed for a particular variable and the proportion of these drillhole intersections which have been assayed.

An example cross-section of the TF interpretation (and resultant block model) is shown in Figure 11-52.

**Table 11-63. Vein Dimensions - TF**

| Vein | | Strike Length | Overall Horizontal Width | Minimum Base Elevation | Maximum Elevation | Maximum Depth | Dip Range |
|---|---|---|---|---|---|---|---|
| | | *m* | *m* | *m* | *m* | *m* | |
| **1** | **Main** | 1,900 | 75 | 800 | 1,300 | 480 | 75° - 90° |
| **2** | **BLO** | 1,300 | 60 | 950 | 1,320 | 360 | 73° - 90° |
| **3** | **BLO2** | 300 | 20 | 1,080 | 1,320 | 240 | 83° - 90° |
| **4** | **BLO4** | 280 | 20 | 1,140 | 1,320 | 180 | 78° - 80° |

**Table 11-64. Summary of Drillholes Vein Intersections – TF**

| | | | | | $CaF_2$ | | | |
|---|---|---|---|---|---|---|---|---|
| VEIN | | Holes Total | Total Length | Avg. Length | Holes Sampled | Length Sampled | Number of Samples | Proportion Sampled |
| | | | *m* | *m* | | *m* | | *%* |
| **1** | **Main** | 58 | 428 | 7.4 | 57 | 375 | 586 | 88% |
| **2** | **BLO** | 23 | 163 | 7.1 | 20 | 55 | 85 | 34% |
| **3** | **BLO2** | 4 | 5 | 1.3 | 4 | 5 | 12 | 100% |
| **4** | **BLO4** | 3 | 4 | 1.5 | 3 | 4 | 6 | 100% |
| **Total** | | | **601** | | | **440** | **689** | |

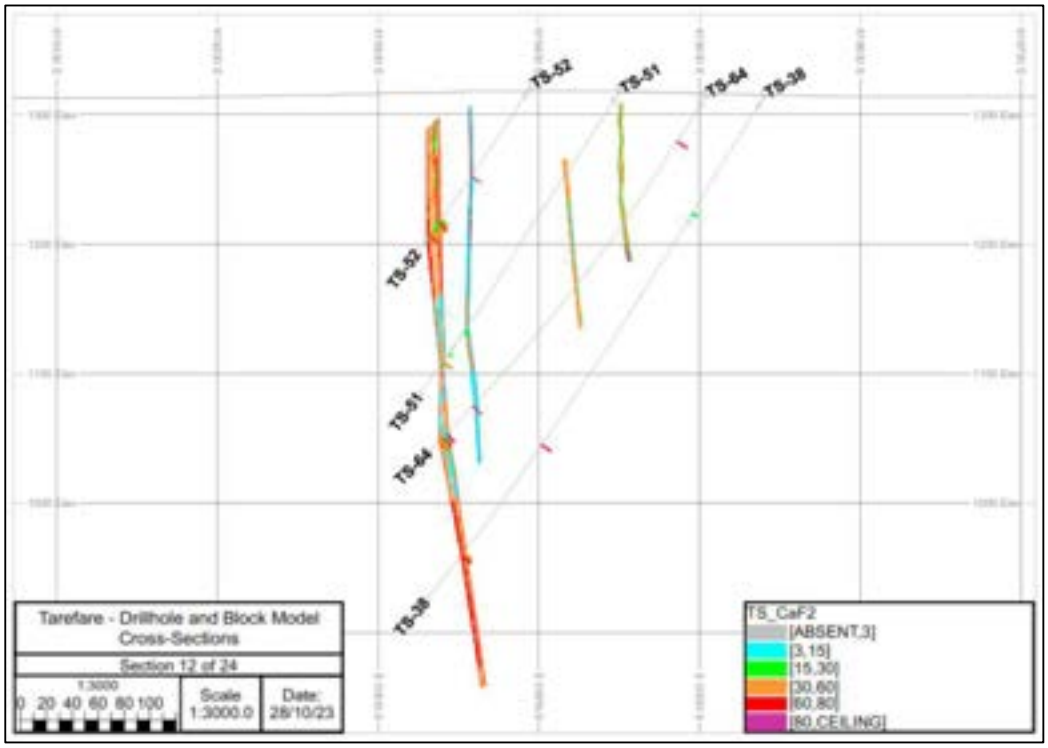



**Figure 11-52. Example TF Section #12**

### 11.6.3 Statistics- Samples

The interpreted wireframe models were used to select and allocate the drilling data according to interpreted veins. A statistical summary of those samples selected are shown in Table 11-65. Log-probability plots of $CaF_2$ grades, by vein system, are shown in Figure 11-53. These show that within each vein system, the $CaF_2$ grades are approximately log-normally distributed. However, there are some natural breaks present, which correspond with splits and banding seen on cross-sections. When considering all the captured vein samples, the two apparent splits are at approximately 15% and 60% $CaF_2$.

**Table 11-65. Statistics of Raw Samples within Mineralised Veins – TF**

| VEIN | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CaF2 | 603 | 0 | 97.5 | 46.4 | 46.0 | 24.4 | 596.3 | 52.7 | 14.6 | 80.0 |
| 2 | CaF2 | 94 | 0 | 93.1 | 42.2 | 36.0 | 28.3 | 798.4 | 66.9 | 7.6 | 85.4 |
| 3 | CaF2 | 12 | 3 | 98.0 | 53.3 | 49.9 | 37.9 | 1434.5 | 71.1 | 3.1 | 96.5 |
| 4 | CaF2 | 7 | 11 | 98.0 | 62.9 | 71.0 | 27.9 | 780.4 | 44.4 | 7.7 | 98.0 |

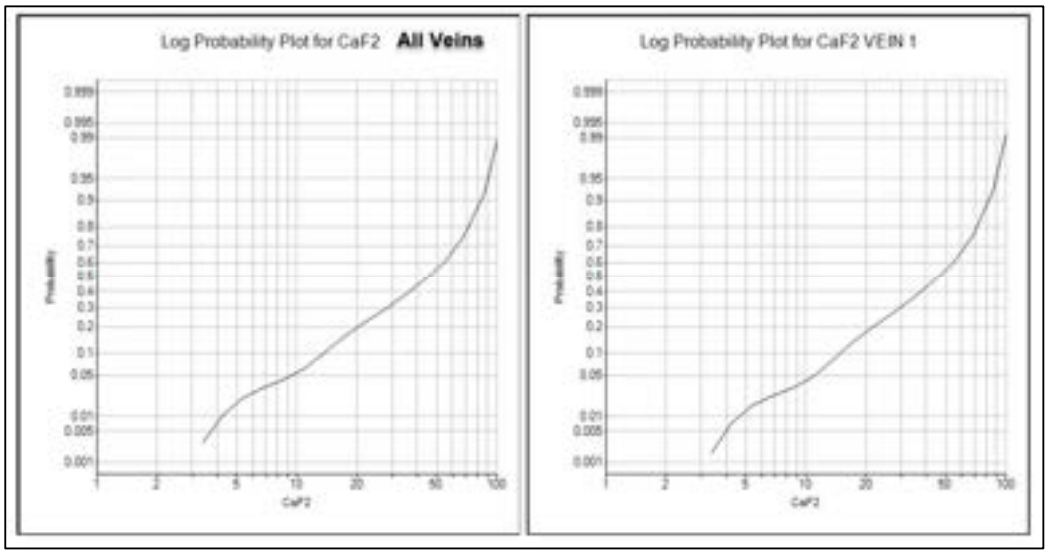



**Figure 11-53. Log Probability Plots of $CaF_2$ Samples within Veins - TF**

### 11.6.4 Drillhole Data Processing

A histogram of mineralised samples lengths for TF is shown in Figure 11-11. This clearly shows that the majority of samples have a 1m length or less. From this it was decided to composite samples onto 1m composite length, so as to provide consistent sample support in geostatistical analysis.

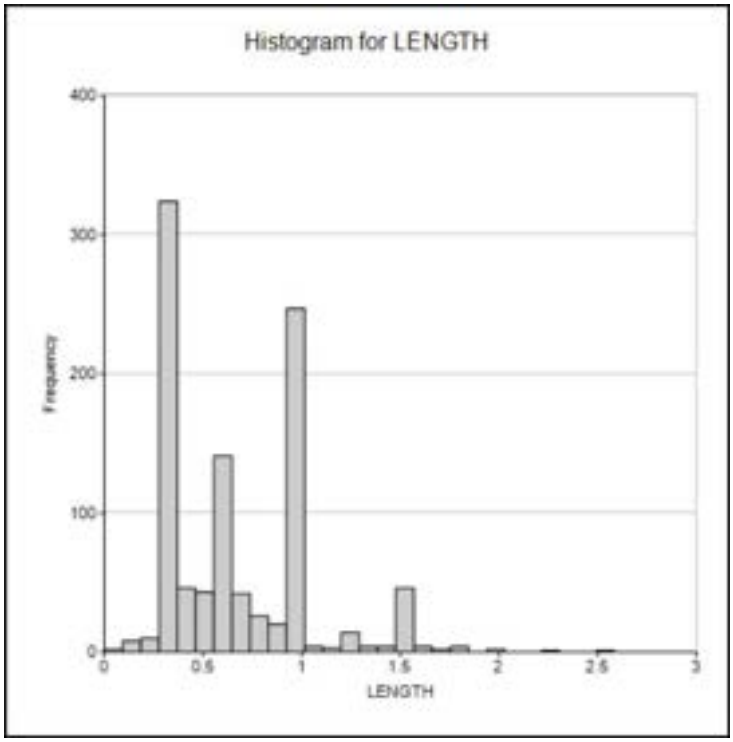



**Figure 11-54. Histogram of Mineralised Sample Lengths- TF**

The mineralised vein wireframes were based on definition of overall mineralisation limits. However, within these limits, different populations of lower, medium and high-grade samples exist. These parts have been consequently modelled by assignment and extrapolation of these grade categories during the overall grade estimation process. To facilitate this procedure, the following drillhole data processing steps took place:

1. **Initial Sample Selection** within mineralised vein envelopes.

2. **Capping**. Top-cut levels were applied before compositing. The selection of top-cut levels is described below.

3. **Compositing** was then done, with composites being separated across each change in vein system (AZONE) as well as individual vein (AZ_VEIN). A compositing length of 1m was applied; and this length was allowed to be slightly variable, so that composites are of equal length across each intersection. This avoids excessively small composites being created after rigidly applied composite lengths. A minimum composite length of 0.5m was applied.

4. **Grade Categories** were allocated within each overall vein intersection, with the field MINZ. This was based on the following break points, as derived from the sample log-probability plots.

**Table 11-66. TF Grade Categories**

| MINZ | Description |
|---|---|
| 1 | $CaF_2$<15% |
| 2 | $CaF_2$>=15% and $CaF_2$<60% |
| 3 | $CaF_2$>=60% |

As a preparation for compositing, an analysis of outlier grades was based on analysis of log-probability plots, decile analyses and coefficient of variation (CoV) analyses. A graph from the CoV analysis is shown in Figure 11-55. This graph depicts the change in CoV variation in rank order for grades in the top decile. The capping level determined from this was 92% $CaF_2$. The effect of this capping levels on overall TF grade means by vein is shown in Table 11-67.

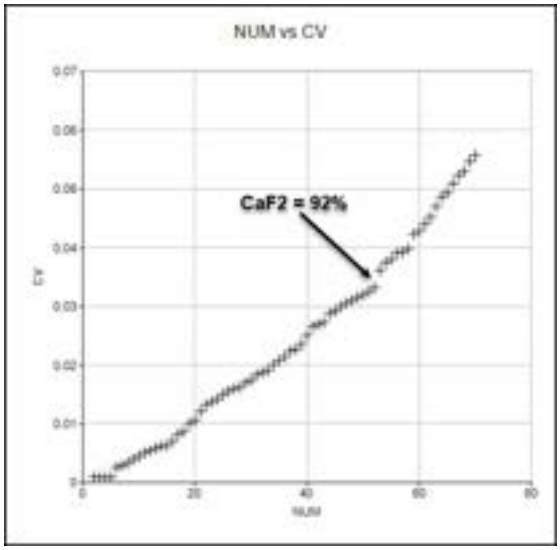



**Figure 11-55. Coefficient of Variation Analysis Plot – DF**

**Table 11-67. Effect of Applied Capping – TF**

| Grade Field | VEIN | Number of Composites | Number Affected by TC | Proportion Affected % | Uncut Mean | Mean with TC |
|---|---|---|---|---|---|---|
| CaF2 | 1 | 379 | 15 | 4 | 46.4 | 46.4 |
| CaF2 | 2 | 48 | 3 | 6 | 44.9 | 44.9 |
| CaF2 | 3 | 6 | 3 | 50 | 50.3 | 49.2 |
| CaF2 | 4 | 4 | 1 | 25 | 62.5 | 61.0 |

### 11.6.5 Statistics - Composites

A statistical summary of 1m composites within the TF mineralised veins is shown in Table 11-68. Log-probability plots for the 1m composites' data sets are shown in Figure 11-56. Features apparent from these statistics include:

- No major changes to grade distributions with generation of 1m composites.
- General decrease in coefficient of variation from typically around 120% to around 100%, with conversion from raw samples to 1m composites for $CaF_2$.

**Table 11-68. Statistics of 1m Composites – TF – By Vein**

| VEIN | FIELD | NUMBER | MIN | MAX | MEAN | PCTL50 | STANDDEV | VARIANCE | COVARTN% | PCTL10 | PCTL90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | **CaF2** | 379 | 3.4 | 92.0 | 46.3 | 45.5 | 21.5 | 462.9 | 46.5 | 17.3 | 76.1 |
| **2** | **CaF2** | 57 | 0.0 | 90.4 | 41.9 | 36.3 | 24.1 | 580.5 | 57.5 | 13.9 | 75.5 |
| **3** | **CaF2** | 6 | 11.7 | 92.0 | 51.9 | 49.6 | 25.9 | 673.2 | 50.0 | 1.7 | 70.1 |
| **4** | **CaF2** | 4 | 38.1 | 92.0 | 61.5 | 57.0 | 21.4 | 458.5 | 34.8 | 35.1 | 83.7 |

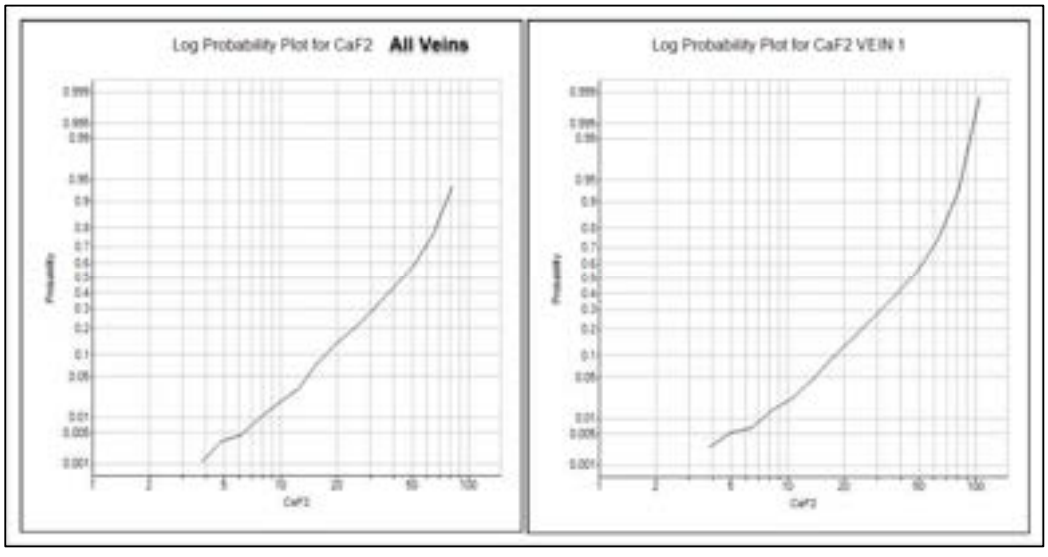



**Figure 11-56. Log-Probability Plots – Composites- $CaF_2$ -TF**

### 11.6.6 Density

Bulk density values were assigned on the basis of rock type, as summarised in Table 11-69. The external waste/granite average value stems from the same measurements taken from AGS during 2013-2017. The vein material average comes from by CFI-NL during the 1999 drilling program.

**Table 11-69. Summary of Assigned Density Values – TF**

| Rock/Material Type | Density $t/m^3$ |
|---|---|
| External Waste, SLG | 2.61 |
| Vein Material | 2.9 |
| Overburden | 1.8 |

### 11.6.7 Geostatistical Analysis

A geostatistical study was completed for $CaF_2$, according to the mineralised vein data sets at TF. This was done in order to understand spatial relationships for different types of grades within the various mineralised veins, and to assist with parameters for block grade estimation and resource classification.

The following steps were completed for the geostatistical study.

1. **Composites**. For analysis of the $CaF_2$ variography, 1m capped composites were filtered by grade category.

2. **Downhole Variograms**. For each filtered data set, downhole variograms were made with a lag of 1m. The variograms produced by this step helped determine the nugget variance.

3. **Experimental Variograms**. Directional experimental variograms were now produced, for different directions within the plane of the veins, as well as cross-strike. Lag distances of 40m applied along-strike and down-dip. Much shorter lag distances of 1m were applied in the cross-strike direction.

4. **Model Variograms** were fitted to the experimental variograms, so as to obtain sill and range values in three principal orthogonal directions.

Experimental and model variograms are shown for $CaF_2$ in Figure 11-57. The model variogram parameters for TF are shown in Table 11-70.

**Table 11-70. Model Variogram Parameters – TF**

| Field | Grade | Rotation Angles | | | Nugget | Range | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Category | 1 | 2 | 3 | C0 | X' | Y' | Z' | C1 |
| $CaF_2$ | <60% $CaF_2$ | -36 | -85 | 90 | 88.1 | 100 | 5.2 | 100 | 109.7 |
| $CaF_2$ | >60% $CaF_2$ | 144 | -5 | 90 | 25.1 | 10.5 | 100 | 100 | 55.6 |

The $CaF_2$ variograms for %CaF2 material are not good quality, but they appear to have ranges of approximately 70m. As would be expected the cross-strike ranges are much shorter, corresponding with orientation of higher-grade intersections parallel with the overall vein structures.

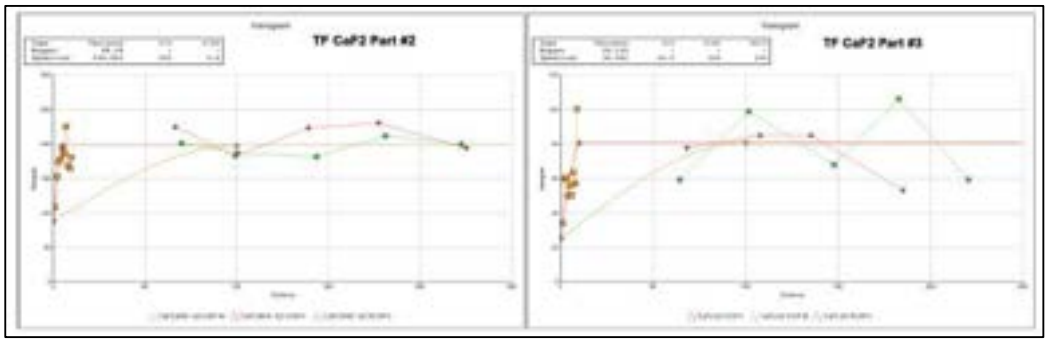



**Figure 11-57. $CaF_2$ Variograms - TF**

### 11.6.8 Volumetric Modelling

The initial block model prototype used for the current TF resource estimation is summarised in Table 11-71. The prototype was set up so as to include enough waste beyond the extents of the deposit, to enable a model coverage sufficient for potential open pit planning. The parent block height of 10m was selected so as to correspond with the planned pit bench height. Within the mineralised domains, sub-cells were created of 5m height, so as to allow more detail in grade estimation.

**Table 11-71. Block Model Prototype - TF**

| | Size | Number | Extent |
|---|---|---|---|
| | *m* | | *m* |
| X | 10 | 102 | 1,020 |
| Y | 10 | 324 | 3,240 |
| Z | 10 | 60 | 600 |

**Notes**

**. Rotation -36.34° around Z-axis**
**. Origin at**
**X 619,995**
**Y 5,193,078**
**Z 800**
**. Grade categories extrapolated on basis of 1m x 5m x 5m sub-cells**
**. Grade estimation on basis of of 2m x 10m x 10m sub-cells**

During creation of the volumetric block models, blocks were split into sub-cells laterally, down to a size 2.5m x 2.5m. The wireframe models used in the generation of the volumetric block models, and the resultant fields created, are summarised in Table 11-72.

**Table 11-72. Volumetric Model Fields**

| Wireframes | Field | Values |
|---|---|---|
| Mineralised Veins | VEIN | Vein number |
| Original Topography | SOLID | 1 |
| Overburden | LITH | OB |
| Underground development | MINED | 1 |
| Stope excavations and voids | MINED | 1 |

### 11.6.9 Grade Estimation

With respect to grade estimation, the interpreted mineralised vein structures were used as hard boundaries. Therefore, only composites created from samples physically within each mineralised domain were used for the estimation of grades within each domain.

To represent these internal grade band zonations, the following procedure was applied:

1. **Composites**. The 1m composites within each mineralised zone were flagged with the MINZ field (1: <15% $CaF_2$, 2: >=15<60% $CaF_2$ and 3: >=60% $CaF_2$).

2. **Orientation**. Vein orientation vectors were derived from the vein wireframes. These were then employed dynamic anisotropy processes in Datamine, so as to assign values in TRDIPDIR and TRDIP (true dip direction and true dip) fields throughout all modelled blocks within the mineralised veins.

3. **Cell Slicing**. Blocks within the mineralised domains were sliced using an alternative model prototype with 1m x 5m x 5m. This size essentially represents the resolution of the internal waste zone extrapolation.

4. **Interpolation**. The 1/2/3 values in the MINZ field of composite file were then extrapolated into the sliced model, within each vein domain, using nearest neighbour estimation, and controlled through dynamic anisotropy. A flat search ellipsoid was applied with ratio of 6:1, with initial dimensions of 60m x 60m x 10m.

5. **Model Resolution**. The extrapolated vein sub-cells were then simplified and resolved onto a former 2m x 10m x 10m cell structure.

A summary of the search and other estimation controls for grade estimation are the same as were used for AGS and summarised in Table 11-16. The first and second search ellipses extend approximately as far as the $CaF_2$ variogram ranges. An example cross-section of the resultant grade estimation is shown in Figure 11-52.

### 11.6.10 Mineral Resource Classification

A resource classification risk matrix has been developed for the MRE work described in the current study for TF, as shown in Table 11-75. In turn, this supports the resource classification criteria summarised in Table 11-73.

**Table 11-73. Resource Classification Criteria – TF**

| Category | Description |
|---|---|
| **Indicated** | Within interpreted veins, covered by a drilling grid of at least 70m approximately. |
| **Inferred** | Within interpreted veins, max extrapolation approximately 100m or where supported by underground development. |

The drilling grid threshold of 70m for Indicated resources is supported by most of the along-strike and down-dip variogram being approximately 70m for the +10%$CaF_2$ grades. Inferred resource categories have been defined in those volumes within the extent of the Mineralised Veins, but outside the volumes defined as Indicated resources. In general, the maximum extent of extrapolation from drillhole intersections within Mineralised Veins, and therefore Inferred resources, has been 100m. In some areas there is a greater distance, but in these the vein has still been delineated by underground development.

The resource criteria have been applied by determining average intersection spacings, and the viewing each vein on long section, where resource class polygons have been defined to assign the final classifications. The resource classification for the main Tarefare vein is shown in Figure 11-58. The approximate volumetric split of resource categories at TF, by vein, is summarised in Table 11-19. This evaluation has cut-off of 5% $CaF_2$ applied and relates to in-situ resources.

**Table 11-74. Resource Category Split by Volume – TF**

| Vein | | Indicated | Inferred | Total | Proportion By Vein Sysyem | | Proportion of Total | |
|---|---|---|---|---|---|---|---|---|
| | | Volume | Volume | Volume | Ind | Inf | Ind | Inf |
| | | $m^3$ x 1000 | $m^3$ x 1000 | $m^3$ x 1000 | % | % | % | % |
| **1** | **Tarefare Main** | 680 | 1,488 | 2,168 | 31% | 69% | 100% | 70% |
| **2** | **BLO** | 0 | 490 | 490 | 0% | 100% | 0% | 23% |
| **3** | **BLO-2** | 0 | 78 | 78 | 0% | 100% | 0% | 4% |
| **4** | **BLO-4** | 0 | 75 | 75 | 0% | 100% | 0% | 4% |
| **TOTAL** | | **680** | **2,130** | **2,811** | **24%** | **76%** | **100%** | **100%** |

The RPA 2011 study reported that their Indicated resource criteria required drillhole intersections spaced at approximately 50m (down-dip) x 75m (along-strike). Their own Tarefare evaluation comprised almost 100% Indicated material. However, they did not show any long sections demonstrating the actual drillhole spacing or extent of their evaluation relative to the drillholes. Plotting of the available data in the current study (Figure 11-58 for Vein 1|) shows clearly that many parts of the Tarefare main vein are only covered by a 100m drill spacing or more. Therefore, the much reduced proportion of Indicated resources in the current estimate is justified.

## Table 11-75. Resource Classification Risk Matrix – TF

| FACTORS | | Risk (E/H/M/L) | Comments |
|---|---|---|---|
| **1. SAMPLING TECHNIQUES & DATA** | | | |
| 1.1 | Sampling Techniques | L | Surface diamond drill hole samples used in estimation. |
| 1.2 | Drilling Techniques | L | Core drilling by standard wireline diamond drilling. Core drilling has been mostly NQ. |
| 1.3 | Drill sample Recovery | M | No digital core recovery data available. |
| 1.4 | Drillcore Logging | L | Consistent lithology logs, including fault intersections |
| 1.5 | Sub-sampling Techniques and Sample Prep | L | Samples from cut core, selected by geologist's opinion on what is mineralised. At time of logging the focus u/g mining only, so lower grades may not have been sampled. Only CaF2 grades available, assayed by DCT. No $CaCO_3$ assays. |
| 1.6 | Quality of Assay Data and Laboratory Tests | L | QAQC results accepted as adequate by RPA in 2011 audit. |
| 1.7 | Verification of Sampling and Assaying | L | In 1991 approx 20 samples sent for SGS (then XRAL) check assay, to compare with original Lakefield results. RPA judged the results as acceptable. |
| 1.8 | Location of Data Points | L | RPA reviewed in 2011: acceptable industry standards. U/g intersections align properly with underground development and stope data. |
| 1.9 | Data Spacing and Distribution | M | Drillhole sections on 75m grid. Although partly mined out, no u/g samples available. |
| 1.1 | Orientation of Data cf Geological Structure | L | Holes on regular section lines, perpendicular to overall strike length. Some steep intersections due to near vertical nature of the veins. |
| 1.11 | Sample Security | H | Core from post-1999 held in historic core storage area. Core facility **not** within a secure locked boundary. |
| **2. REPORTING OF EXPLORATION RESULTS** | | | |
| 2.1 | Mineral Tenement and Land Tenure Status | L | Appears ok, as documented by RPA and SLR. |
| 2.2 | Geology | L | The Tarefare vein contains abundant blastonite accompanied by crystalline, locally banded massive fluorite with gangue of quartz and calcite and lesser amount of sulphides. Mineralised zones within an approximately 20m thick zone of brick red brecciated granitic rock and vein material. Northern part of Tarefare vein overlain by thick cover of metasediments. |
| 2.3 | Drillhole Information | L | Delivered as Excel files. |
| 2.4 | Data Aggregation Methods | L | Drillhole data composited downhole into 1m lengths. |
| 2.5 | Diagrams | L | Cross-sections produced for all section lines where assayed holes exist. |
| 2.6 | Balanced Reporting | L | Consistent drilling along strike. |
| 2.7 | Other Substantive Data | L | Underground survey data: useful as many galleries developed along strike of veins. |
| **3. ESTIMATION AND REPORTING OF MINERAL RESOURCES** | | | |
| 3.1 | Database Integrity | H | Multiple Excel files available from previous operation/ownership need consolidation into proper mine database. |
| 3.2 | Site Visits | L | QP visited TF surface area in August 2023. |
| 3.3 | Geological Interpretation | M | Sectional interpretation update in Datamine, buliding on previous interpretations, with lower cut-off of 5% $CaF_2$. |
| 3.4 | Dimensions | L | Overall, the main vein at DS covers an approximately 1.9km strike length, 300-480m depth. One blowout vein of approx 1,300m length, and two other smaller veins of 300m strike length. |
| 3.5 | Estimation and Modeling Techniques | L | Three main $CaF_2$ grade categories extrapolated within overall vein envelopes, reflecting internal waste and different grade populations. |
| | | L | $CaF_2$ and $CaCO_3$ by ordinary kriging (OK). |
| 3.6 | Cut-off Parameters | H | Further process testing required to support mill recovery assumptions. |
| 3.7 | Mining Factors/Assumptions | L | No dilution applied for reporting of resources. |
| 3.8 | Metallurgical Factors or Assumptions | H | Previous milling operations shut in February 2002. Crusher, ore feed arrangements and other aspects being reviewed for improvements, prior to potential restart. |
| 3.9 | Environmental Factors or Assumptions | L | According to the SLR 2022 43-101, CFI does not have a formal environmental and social management system, however there are several environmental management plans in place. |
| 3.10 | Bulk Density | H | Global average density value for vein averaged from 100 measurements > 2.9t/$m^3$. Average SLG for granite taken from AGS measurements of 2.61t/$m^3$. Does not allow for vugs or fault zone intersections. |
| 3.11 | Classification | L | Areas delineated with intersection on less than 70m grid have been categorised as **Indicated** resources, other vein material within interpreted zones categorised as **Inferred.** |
| 3.12 | Audits or Reviews | L | Previous study in 2011 by RPA. |
| | | | |
| **Notes** | | | |
| | . Not compliant and significant project risk | E | **Extreme Risk** |
| | . Current status does carry some project risk | H | **High Risk** |
| | . Improvements required for best practice | M | **Medium Risk** |
| | . Current reporting/information acceptable | L | **Low Risk** |

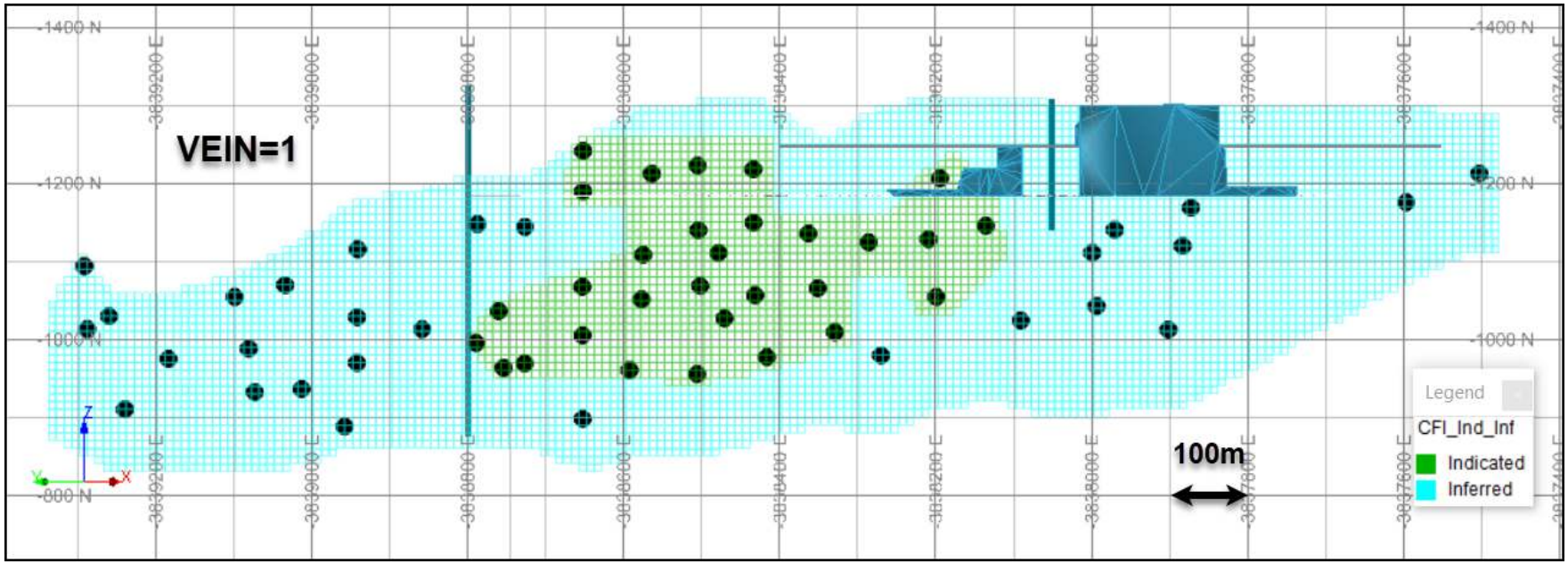



**Figure 11-58. Resource Class Long Section Main Tarefare Vein**

### 11.6.11 Model Validation

Complete sets of cross-sections were made for $CaF_2$, comparing composite and estimated grades. An example of this is shown in Figure 11-52. The patterns of $CaF_2$ grades in the sections appear to reflect properly the banded nature of the fluorite mineralisation.

Global average values by vein were determined from the original sample data, 1m composites, and from the block model, for grades estimated by ordinary kriging (OK), nearest-neighbour estimation (NN) and inverse-distance weighting (ID). The comparative average grades, for $CaF_2$, are summarised in Table 11-76. The model average grades have been derived for all resource model blocks in each domain, regardless of their resource classification and grade category.

Most of these global grade averages correspond quite closely, even though the resultant drillhole intersections can be quite irregular.

**Table 11-76. Global Average Grade Comparisons by Vein**

| | | | | Average Block Model Grades | | |
|---|---|---|---|---|---|---|
| FIELD | VEIN | Samples | Composites | OK | ID | NN |
| CaF2 | 1 | 46.4 | 46.3 | 40.3 | 40.3 | 40.1 |
| CaF2 | 2 | 42.2 | 41.9 | 37.9 | 37.5 | 37.9 |
| CaF2 | 3 | 53.3 | 51.9 | 56.6 | 56.3 | 55.6 |
| CaF2 | 4 | 62.9 | 61.5 | 70.8 | 71.1 | 71.5 |

A local comparison of average grades, for the +10% $CaF_2$ grade category, was also made, in the form of swath plots, which compare the average grades on successive 70m thick sectional slices. These plots compare for each slice:

- The average drillhole composite grades;
- The average estimated model grades, from different alternative methods of estimation; and
- For reference, the total resource tonnage on each slice used from the model.

The swath plot for the main vein, for $CaF_2$, is shown in Figure 11-59. This has not been filtered by resource category. This swath plot shows an acceptable comparison for $CaF_2$ in all veins, particularly on those parts with higher tonnages. Overall, there appears to be a good correlation between the block model and underlying sample data.

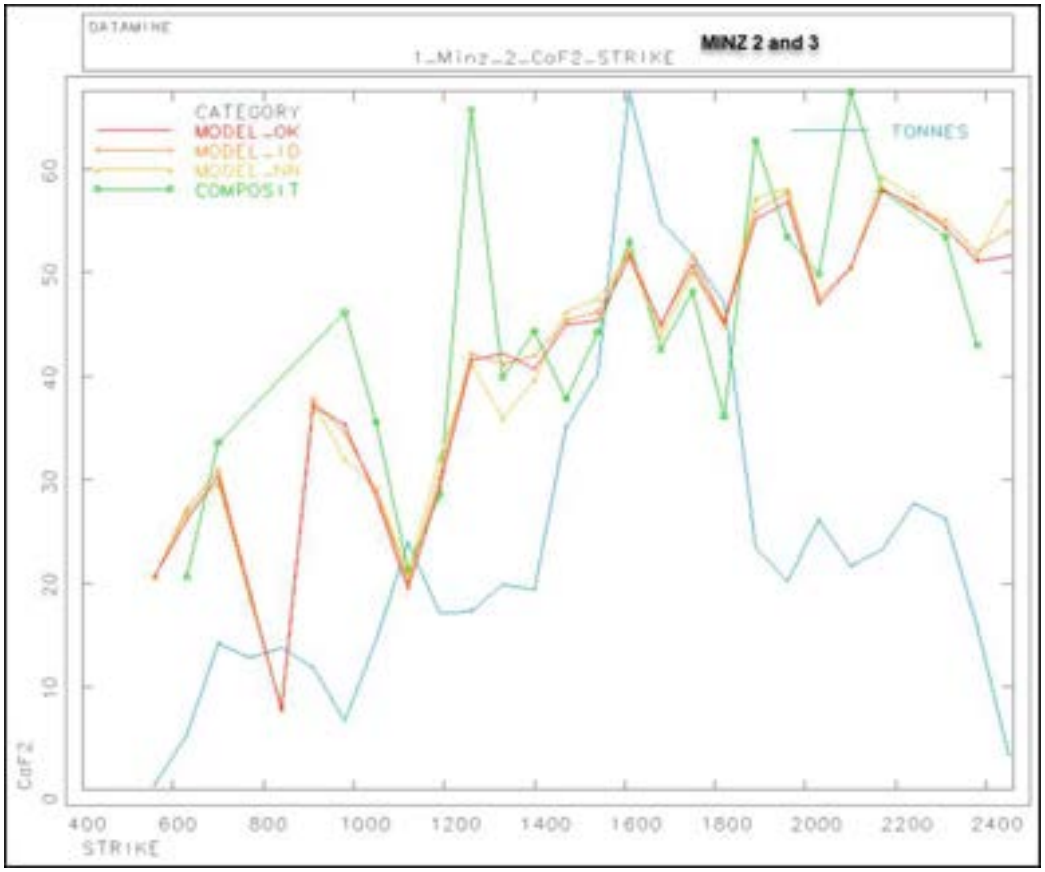



**Figure 11-59. Along-Strike Swath Plots – TF Main Vein - $CaF_2$**

### 11.6.12 Mineral Resources

It is considered that these validation steps have demonstrated that the blocks models provide an acceptable basis for the calculation and subsequent declaration of Mineral resources. CIM (2014) definitions have been used for Mineral Resources

The TF resource block model was initially evaluated overall, effectively providing a resource inventory, as summarised in Table 11-77. This block model was used as the basis for an open pit optimisation, so as to provide a reasonable open-pit constraint. A constrained evaluation then provided the data for the principal Mineral Resource statement.

*In-Situ Evaluation*

**Table 11-77. In-Situ Resource Summary - TF**

As Of October 31st, 2023

| | | Resource Class | | | |
|---|---|---|---|---|---|
| | | Indicated | | Inferred | |
| Vein | | Tonnes Kt | $CaF_2$ % | Tonnes Kt | $CaF_2$ % |
| 1 | Tarefare Main | 1,972 | 42.9 | 4,315 | 39.1 |
| 2 | BLO | - | | 1,422 | 39.7 |
| 3 | BLO-2 | - | | 225 | 56.6 |
| 4 | BLO-4 | - | | 217 | 70.8 |
| **TOTAL** | | **1,972** | **42.9** | **6,178** | **41.0** |

**Notes**

- **In-Situ Resources, with no constraints**
- **Cut-off 5% $CaF_2$**
- **Inclusive of any subsequent reserves**
- **Rounding as required may result in apparent summation differences between tonnages and grades. Where these occur, they are not considered material.**

*Constrained Pit Evaluation*

A pit optimisation was completed on the available resources, so as to produce open pit shells which provide a 'Reasonable Prospects of Eventual Economic Extraction' (RPEEE) pit constraint. The parameters applied in this pit optimisation are summarised in Table 11-22. No physical limits were placed on the optimisation. An evaluation breakdown of the resources within the constraints of the (maximum cashflow) optimisation is shown in Table 11-78. Potential underground resources beneath this optimised pit are summarised in Table 11-79 Grade tonnage tables for the Indicated resources inside the pit constraints are shown in Table 11-80.

**Table 11-78. Constrained Resources Summary - TF**

As Of October 31st, 2023

| | | Resource Class | | | |
|---|---|---|---|---|---|
| | | Indicated | | Inferred | |
| Vein | | Tonnes Kt | $CaF_2$ % | Tonnes Kt | $CaF_2$ % |
| 1 | Tarefare Main | 744 | 45.1 | 427 | 43.9 |
| 2 | BLO | | | 201 | 33.3 |
| 3 | BLO-2 | | | 186 | 53.7 |
| 4 | BLO-4 | | | 189 | 69.2 |
| **TOTAL** | | **744** | **45.1** | **1,003** | **48.4** |

**Notes**

**. Constrained Potential Open Pit Resource**

**. Cut-off 5% $CaF_2$**

**Table 11-79. Potential Underground Resources Summary - TF**

As Of October 31st, 2023

| | | Resource Class | | | |
|---|---|---|---|---|---|
| | | Indicated | | Inferred | |
| Vein | | Tonnes Kt | $CaF_2$ % | Tonnes Kt | $CaF_2$ % |
| 1 | Tarefare Main | 1,018 | 47.5 | 3,069 | 46.2 |
| 2 | BLO | | | 857 | 52.2 |
| 3 | BLO-2 | | | 33 | 80.4 |
| 4 | BLO-4 | | | 28 | 81.5 |
| **TOTAL** | | **1,018** | **47.5** | **3,988** | **48.1** |

**Notes**

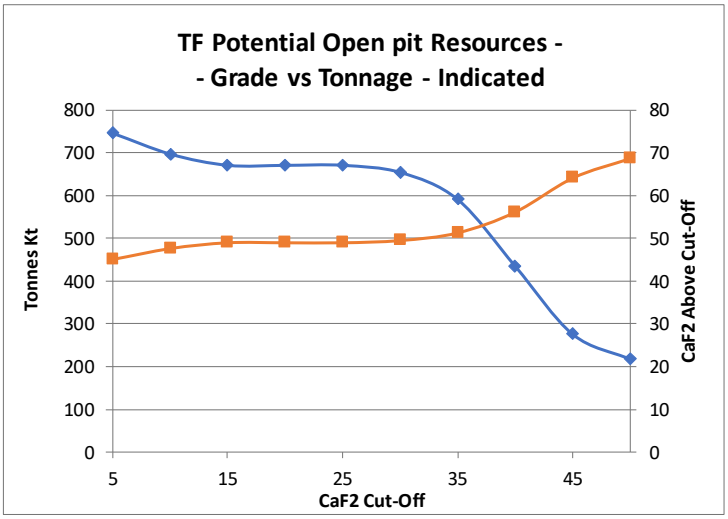
**. Below Optimal Pit Shell**

**. Cut-off 15% $CaF_2$**

**Table 11-80. Grade-Tonnage Table –Indicated Resources - TF**

[Constrained Open Pit Resources Only]

| CaF2 Cut-Off % | Tonnes Mt | CaF2 % |
|---|---|---|
| 5 | 744 | 45.1 |
| 10 | 696 | 47.6 |
| 15 | 670 | 48.9 |
| 20 | 670 | 48.9 |
| 25 | 669 | 49.0 |
| 30 | 653 | 49.5 |
| 35 | 590 | 51.2 |
| 40 | 434 | 56.1 |
| 45 | 276 | 64.0 |
| 50 | 218 | 68.6 |



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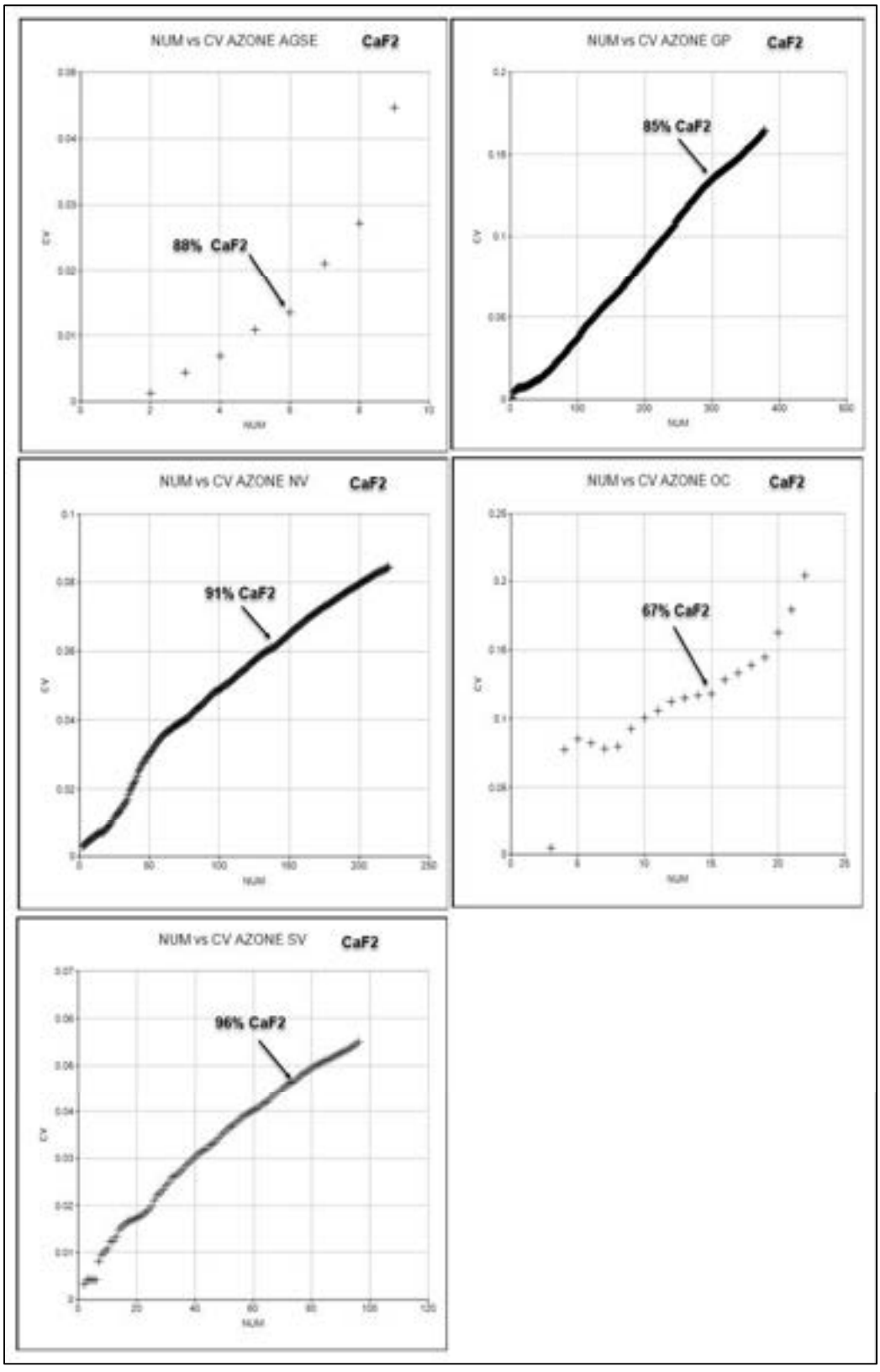
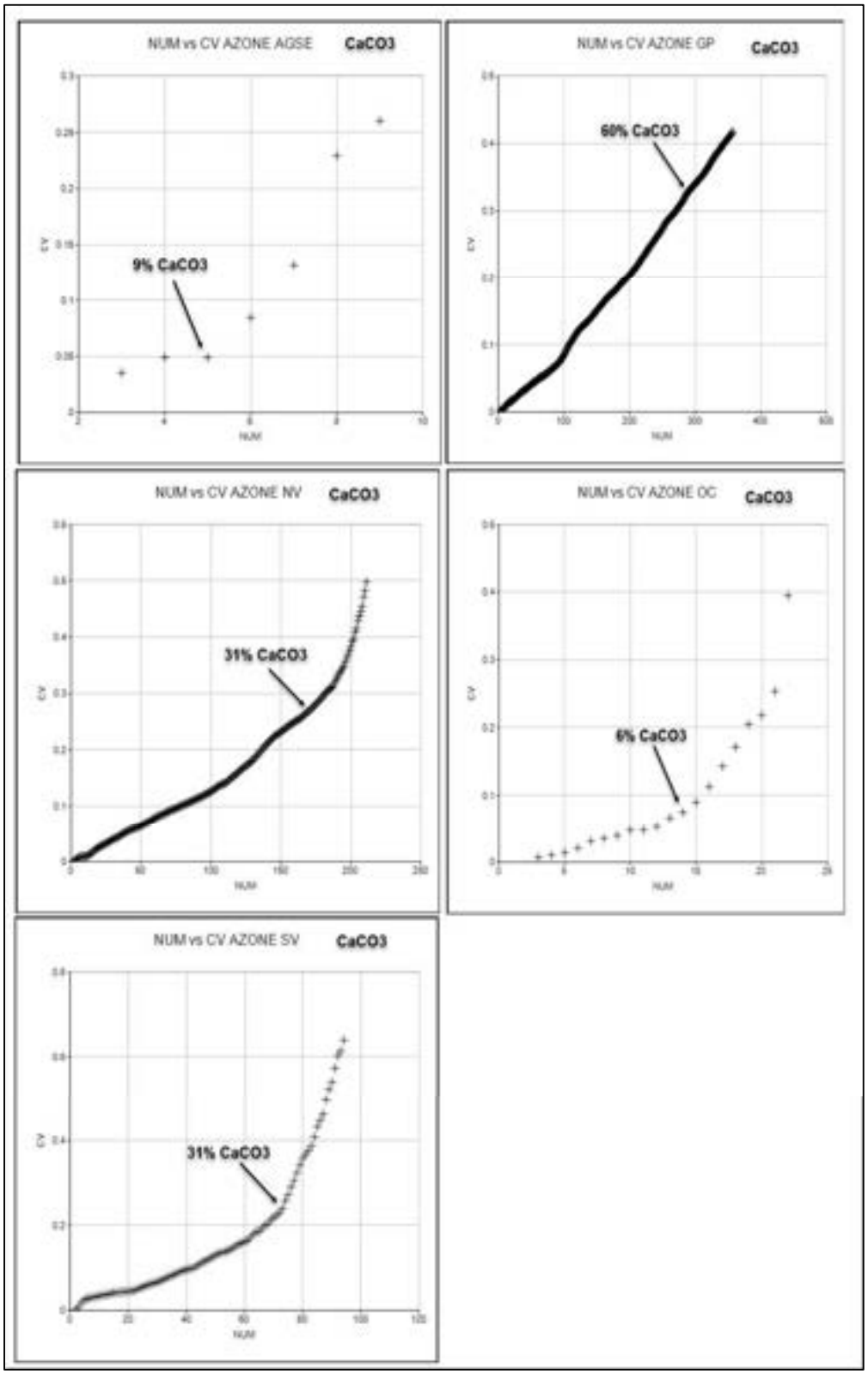
# APPENDIX A - Coefficient of Variation Plots

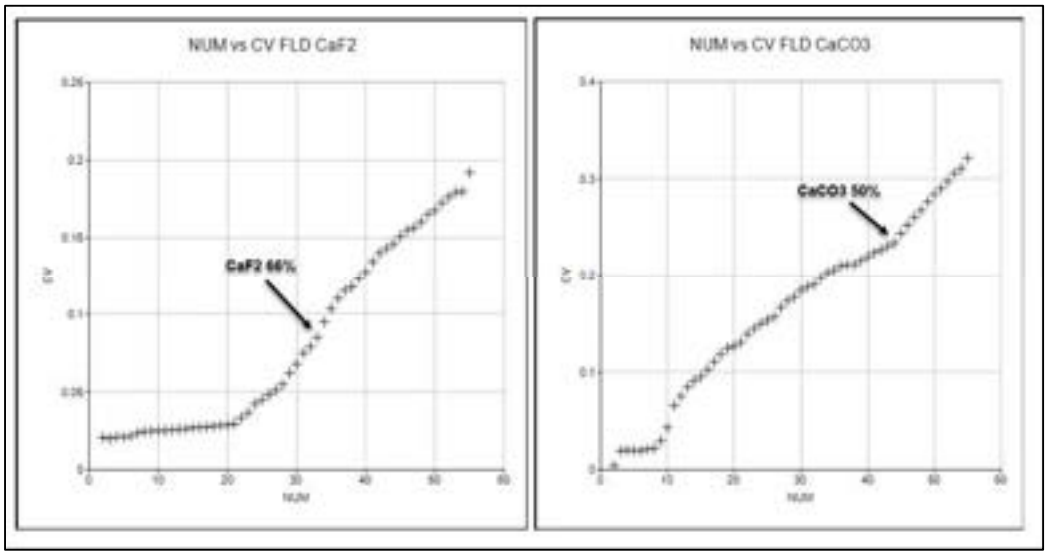
# AGS – $CaF_2$


NUM vs CV AZONE AGSE
CaF2
88% CaF2
NUM vs CV AZONE GP
CaF2
85% CaF2
NUM vs CV AZONE NV
CaF2
91% CaF2
NUM vs CV AZONE OC
CaF2
67% CaF2
NUM vs CV AZONE SV
CaF2
96% CaF2
CV
NUM

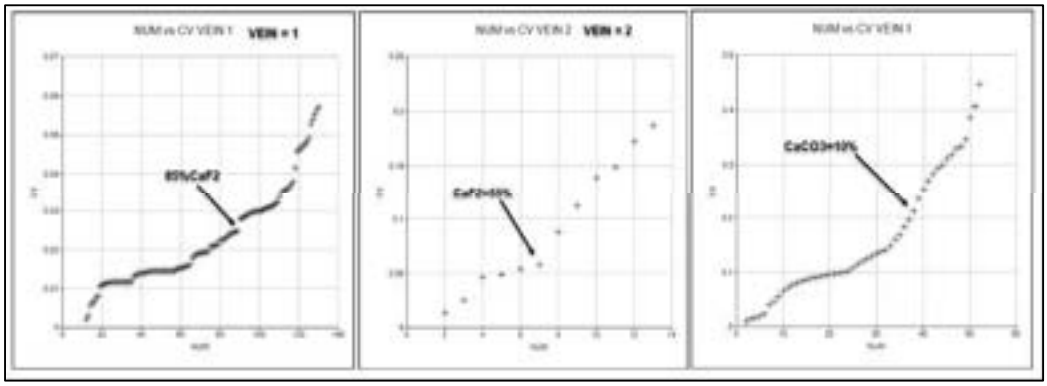
# AGS – $CaCO_3$


NUM vs CV AZONE AGSE
CaCO3
9% CaCO3
CV
NUM
NUM vs CV AZONE GP
CaCO3
60% CaCO3
CV
NUM
NUM vs CV AZONE NV
CaCO3
31% CaCO3
CV
NUM
NUM vs CV AZONE OC
CaCO3
6% CaCO3
CV
NUM
NUM vs CV AZONE SV
CaCO3
31% CaCO3
CV
NUM

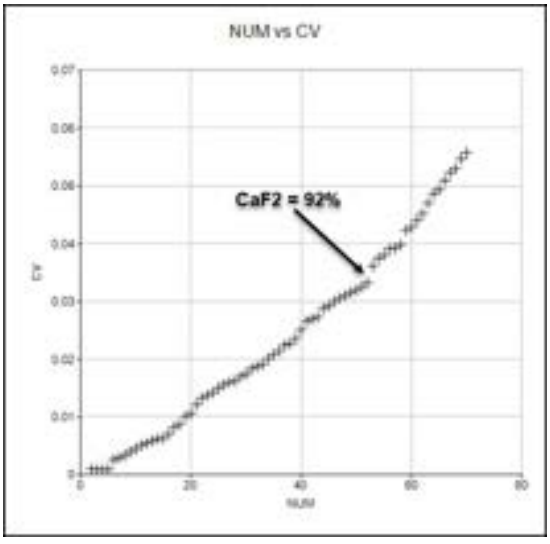
# AGSN – $CaF_2$




# DS – $CaF_2$

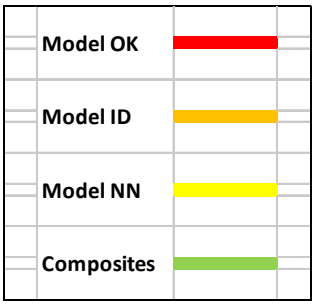



# TF – $CaF_2$

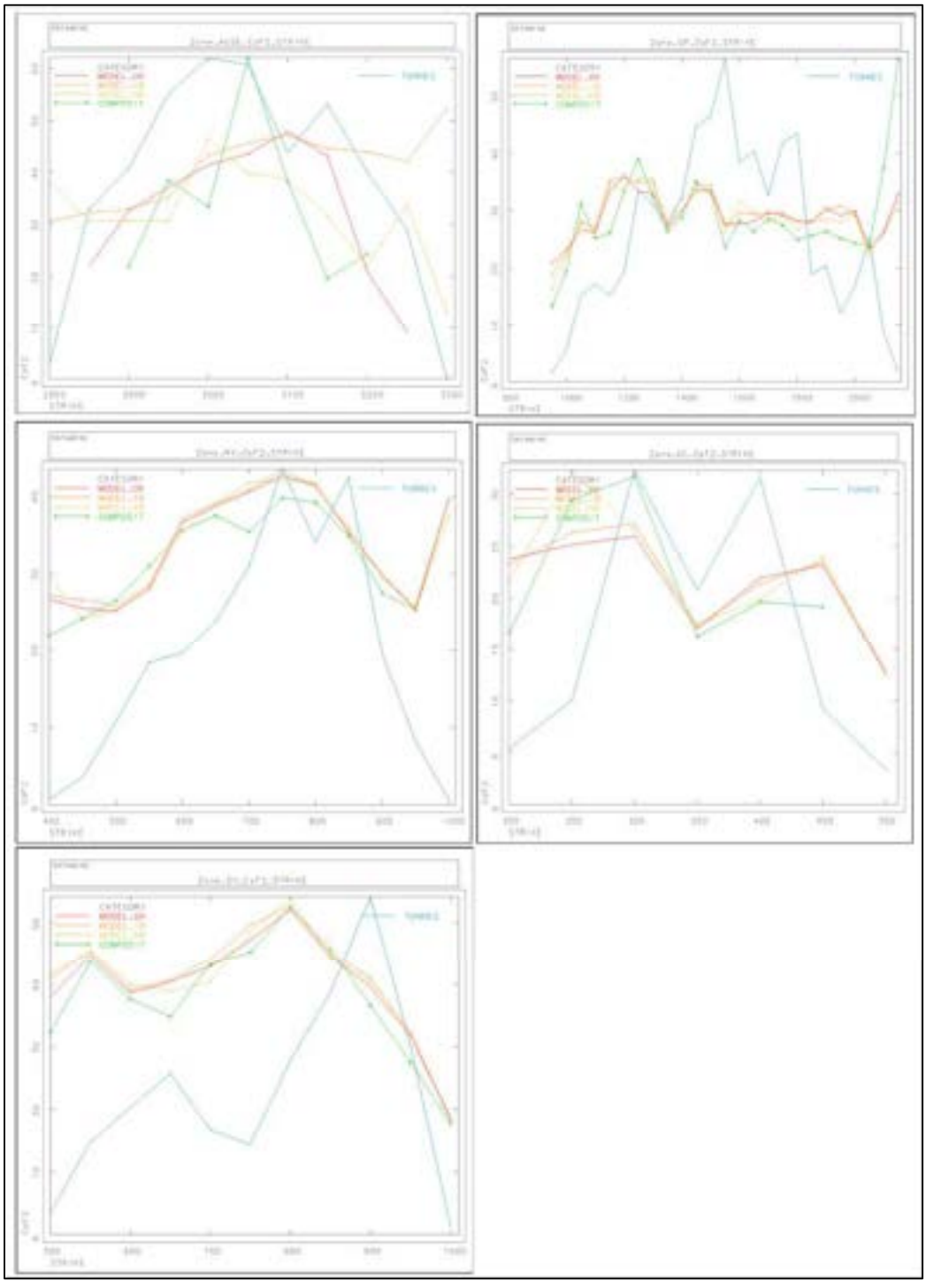


# APPENDIX B – Swath Plots

Legend for each plot:

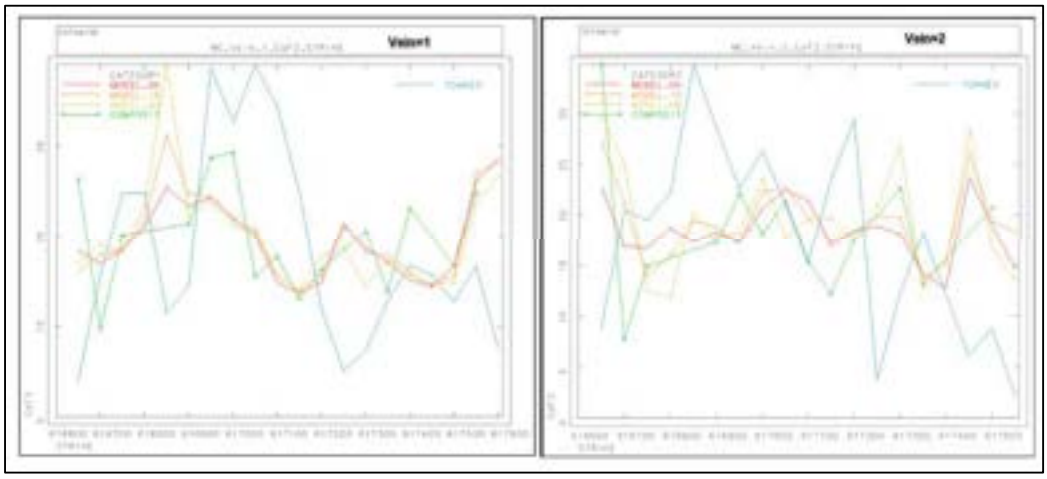


# AGS – $CaF_2$

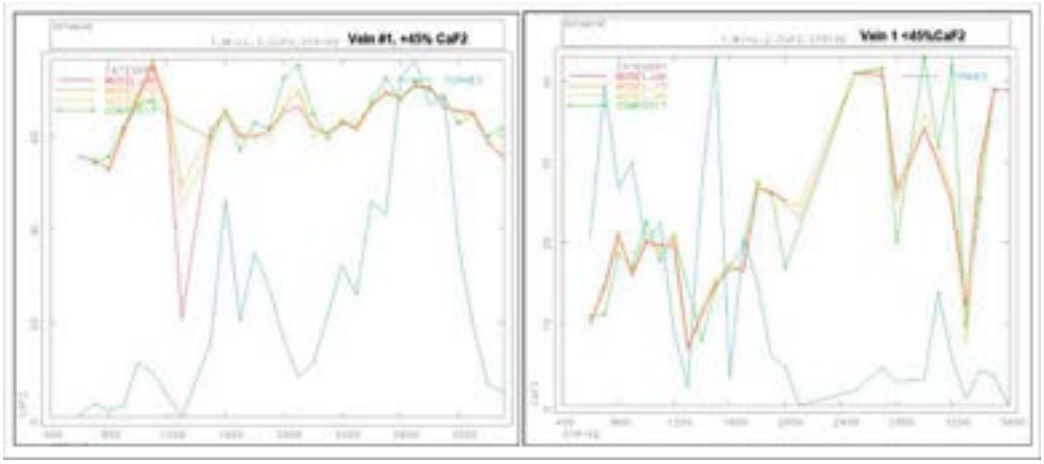


# AGS – $CaCO_3$

## MS


Vein#1
Vein#2

## DS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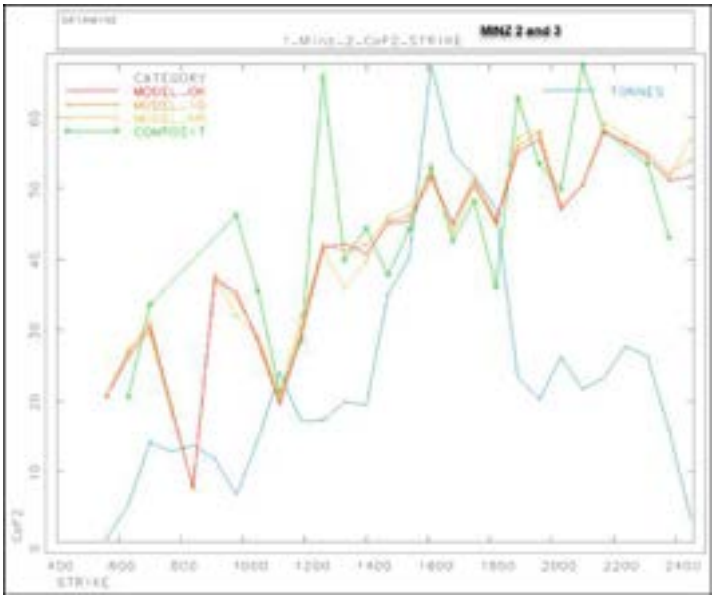
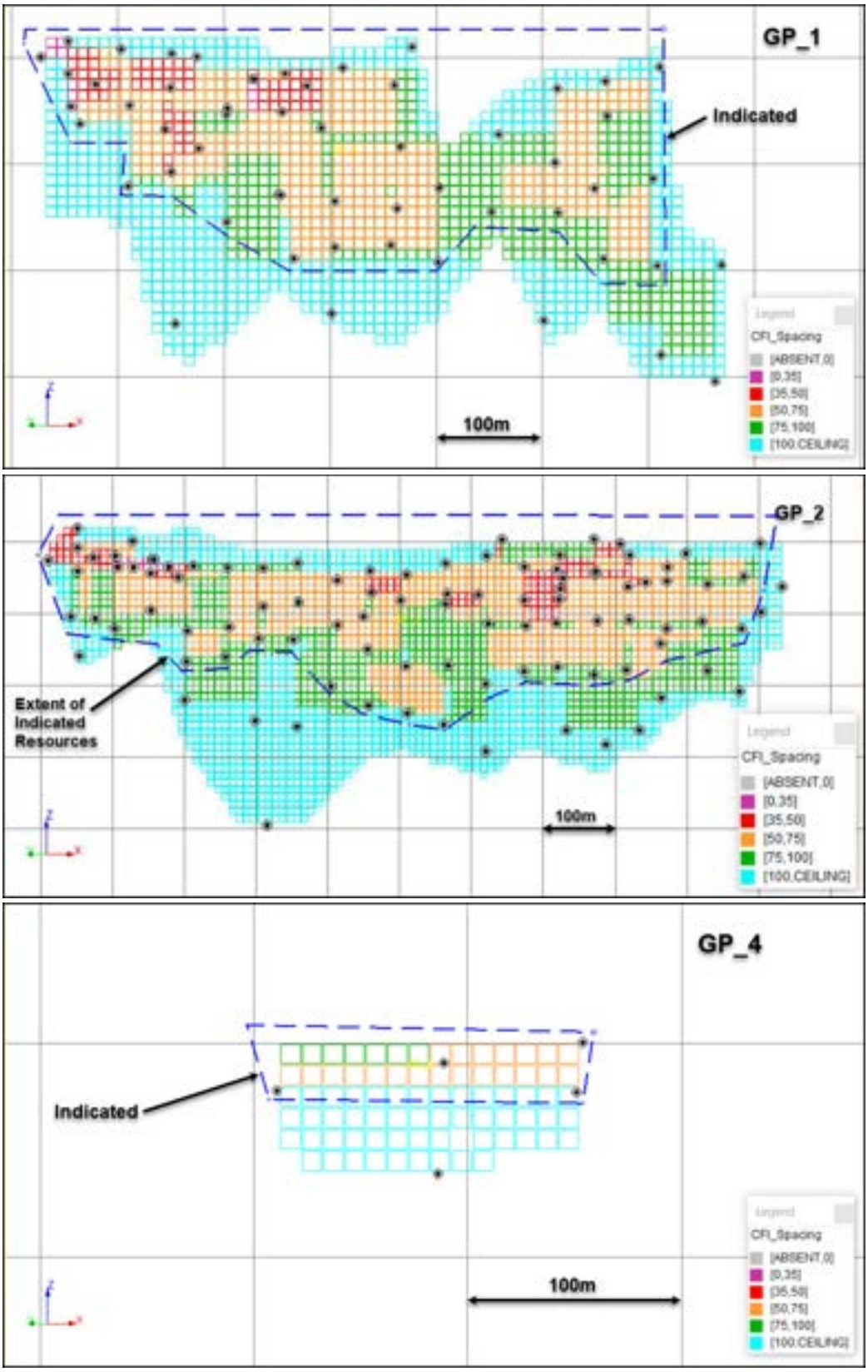
Vein 1 +45%CaF2

## TF


MINZ 2 and 3
CATEGORY
TONNES
CaF2
STRIKE

# APPENDIX C – Resource Class Long Sections

# AGS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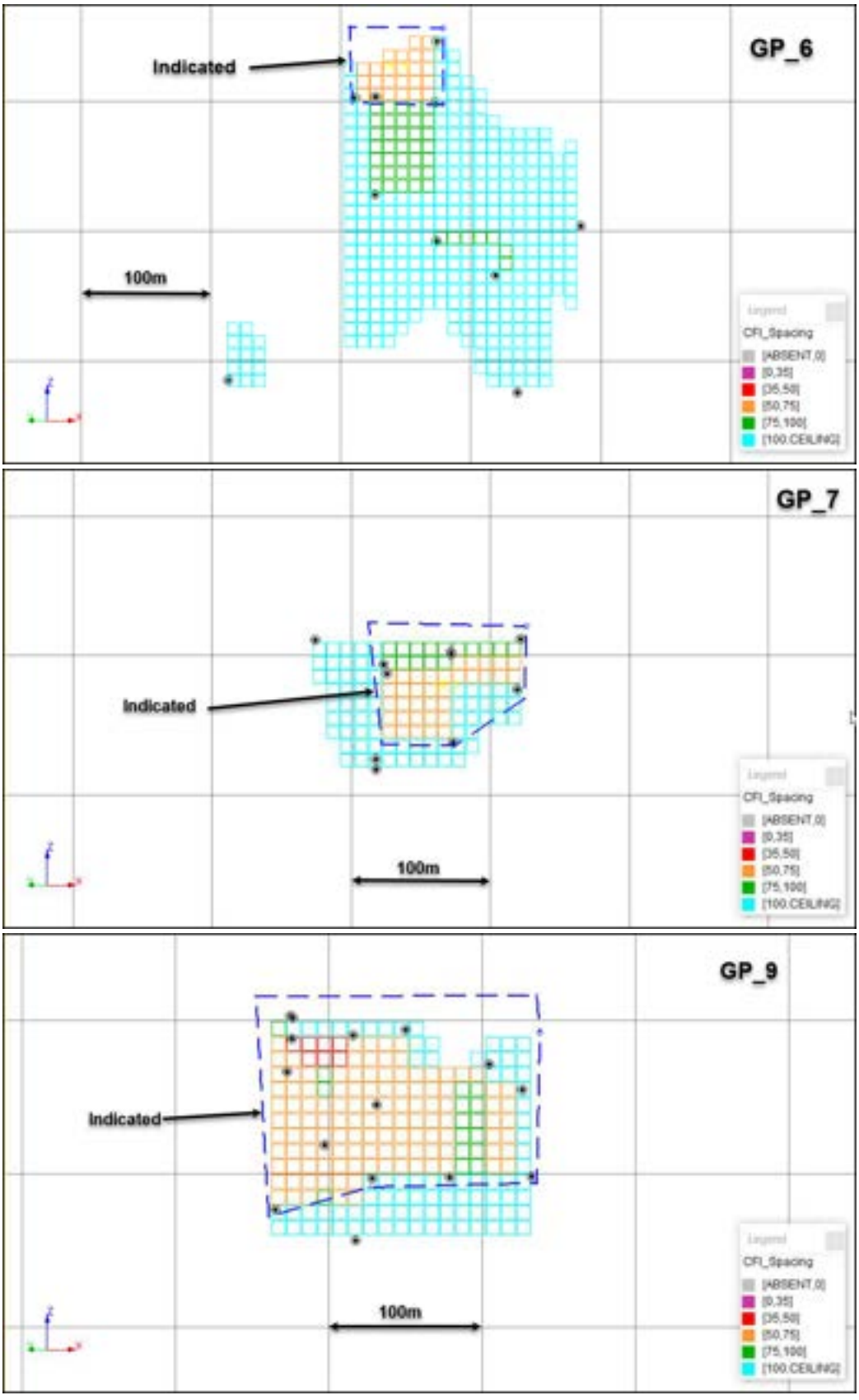
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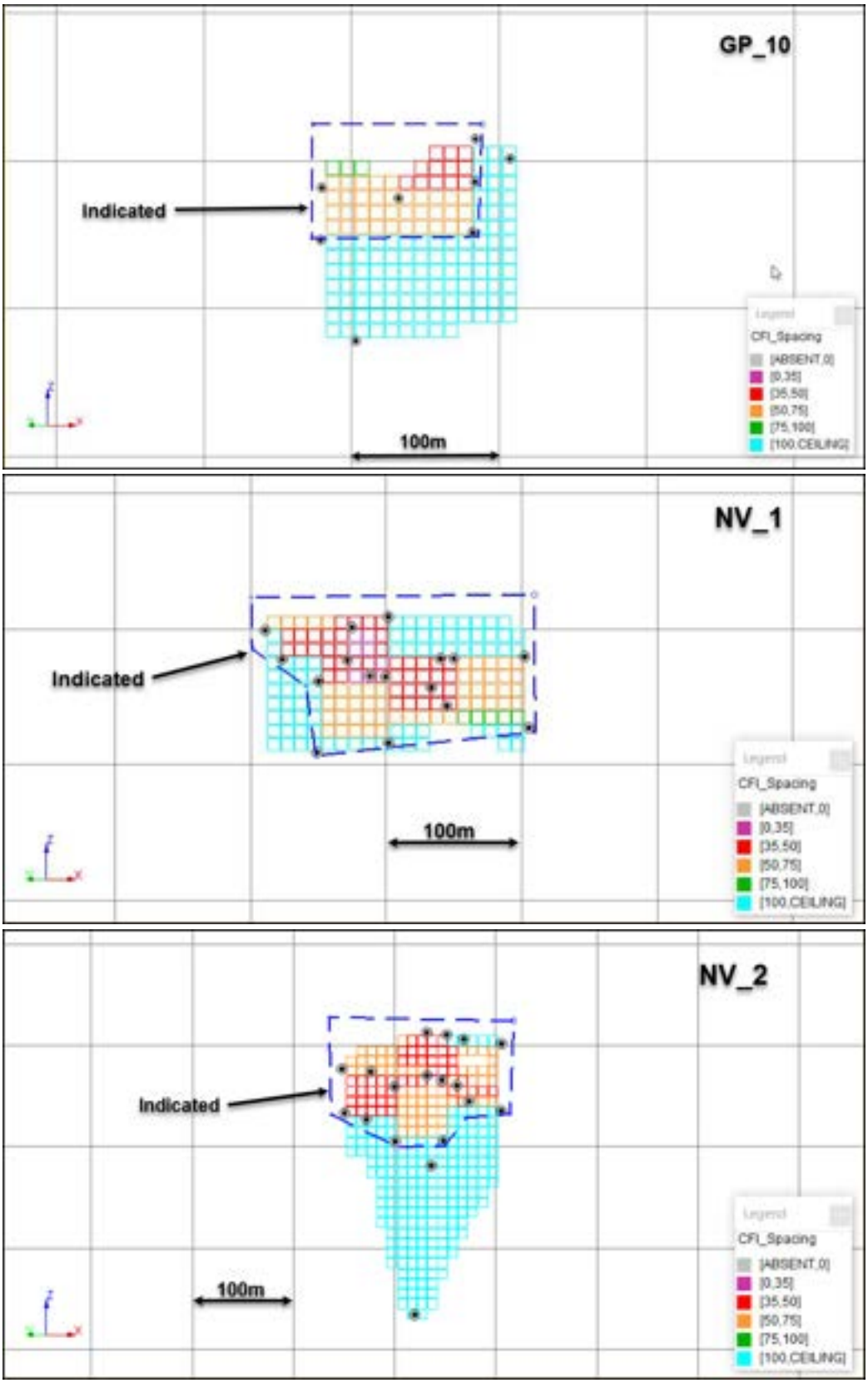
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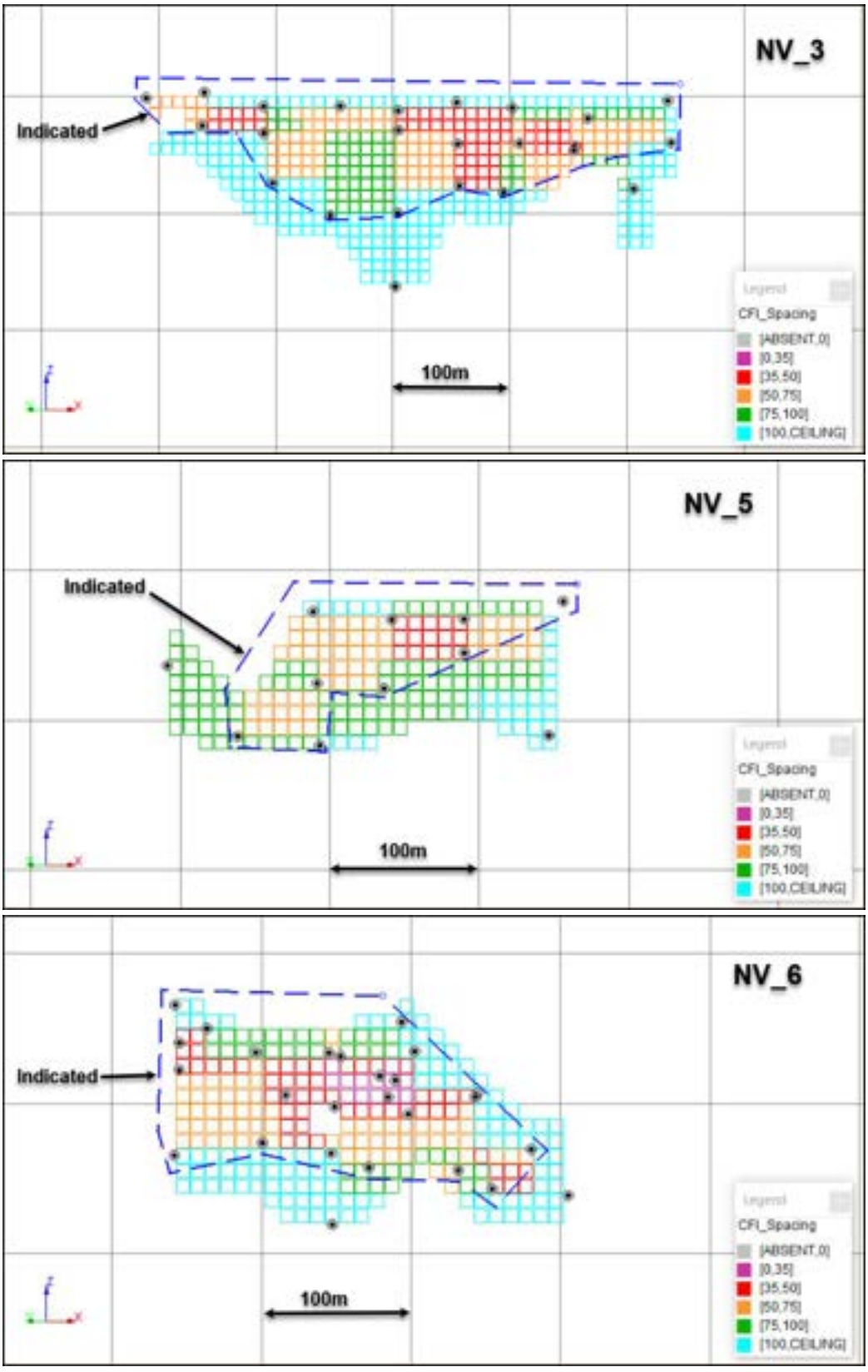
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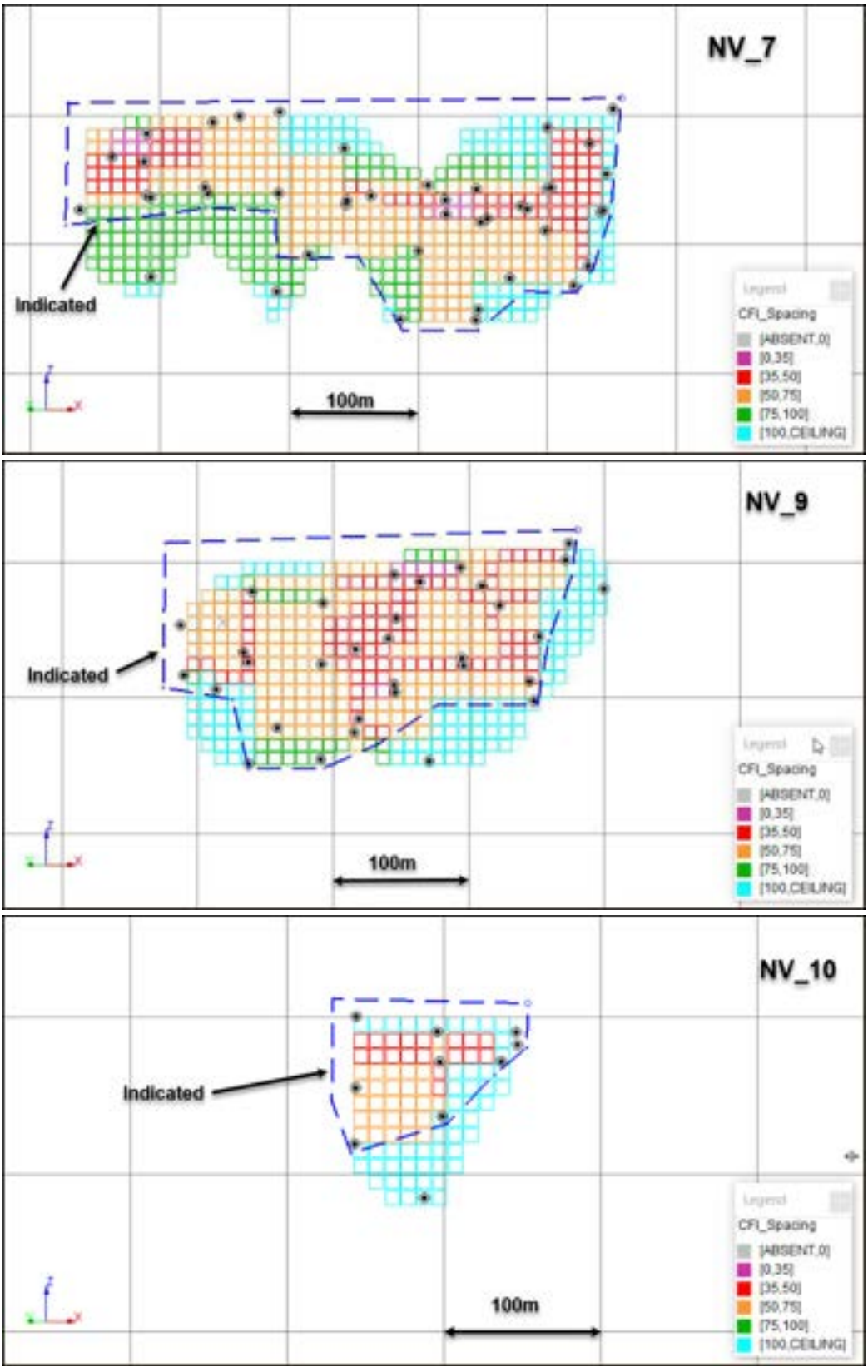
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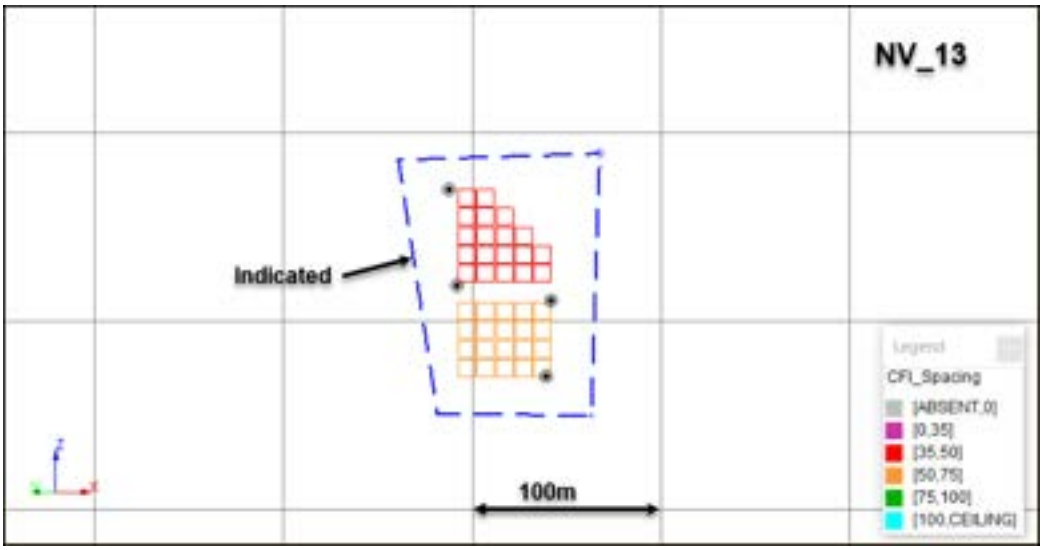
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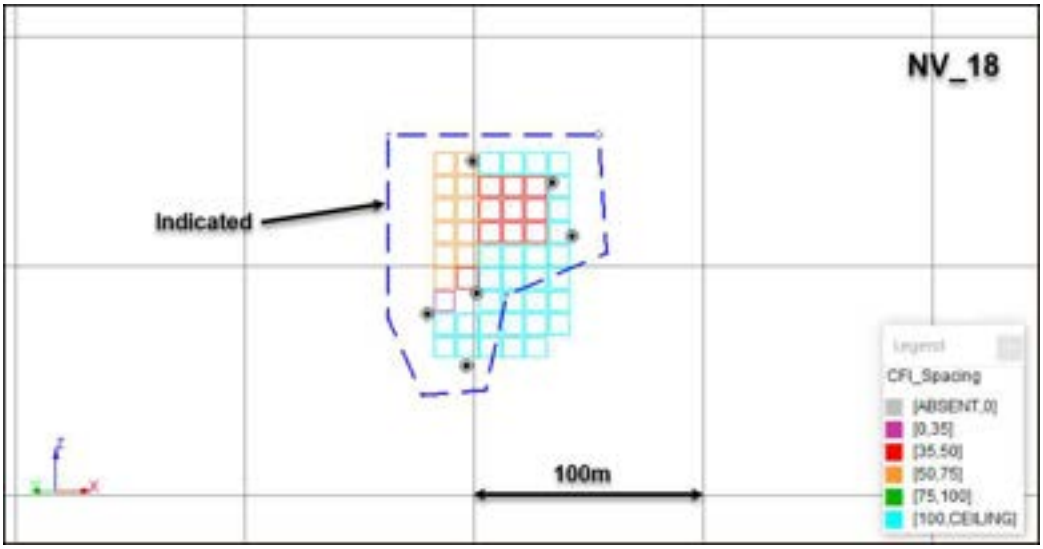
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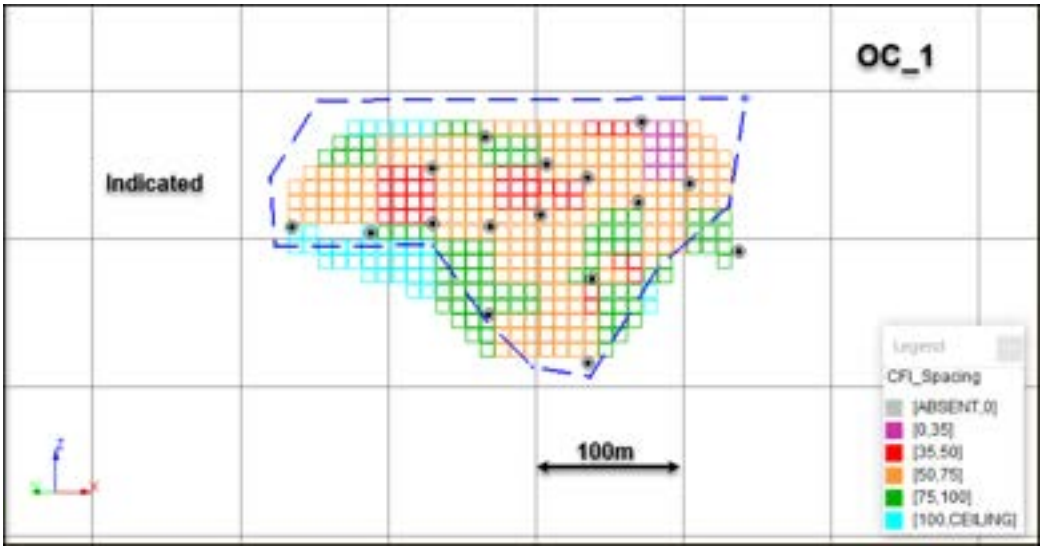
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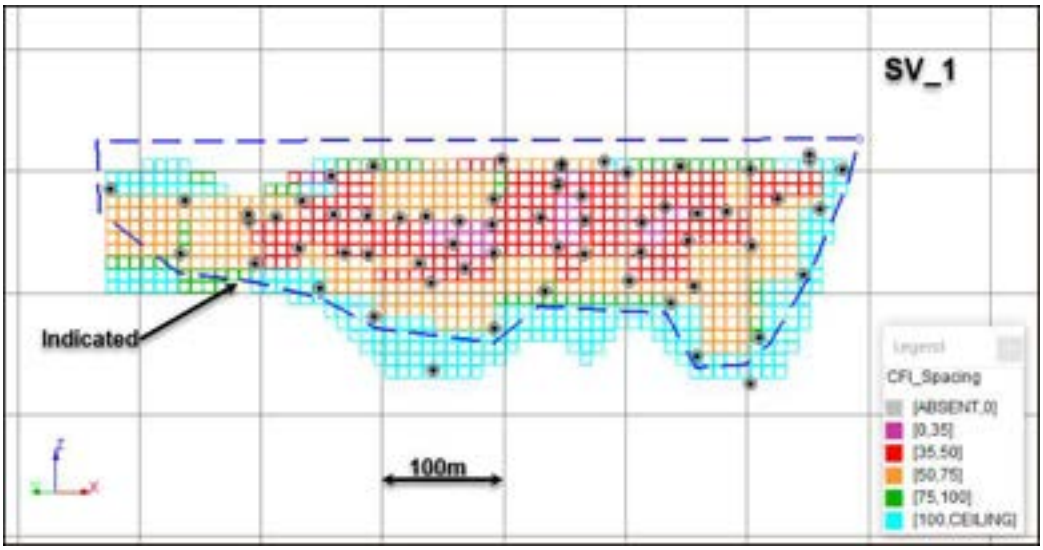
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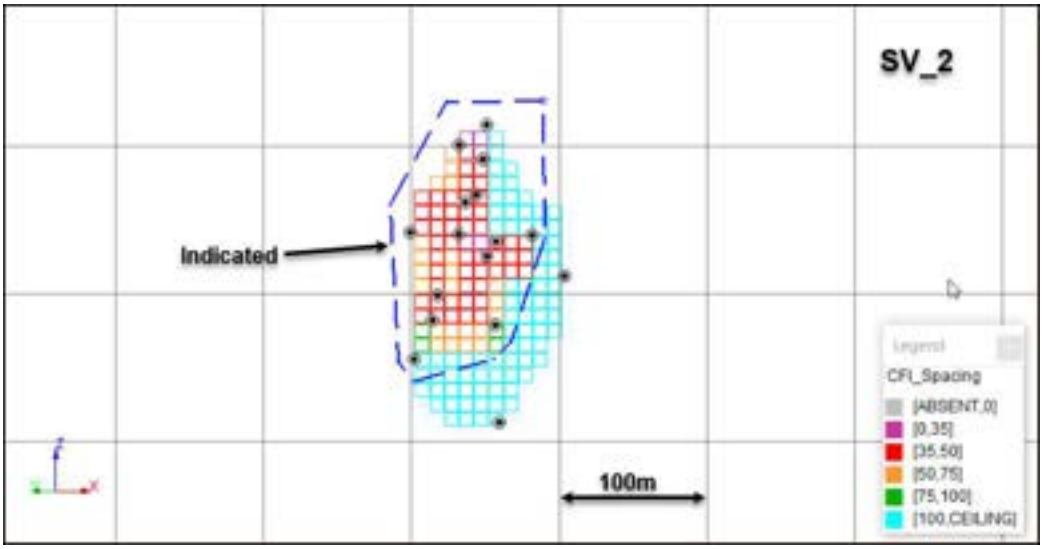
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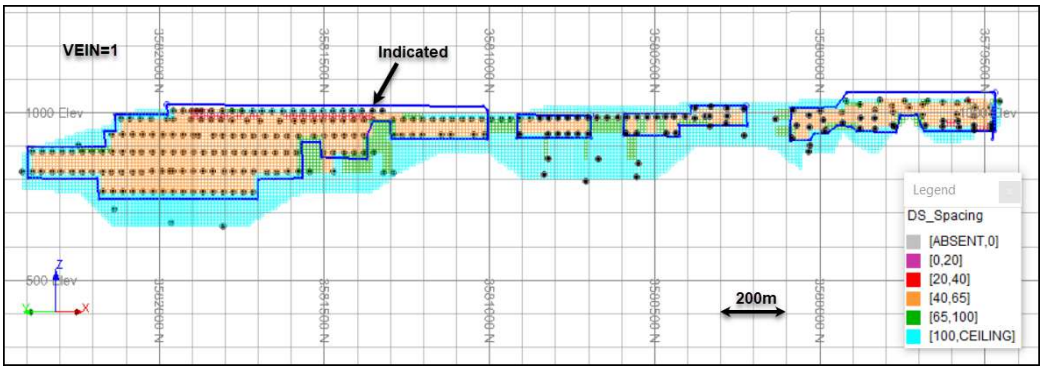
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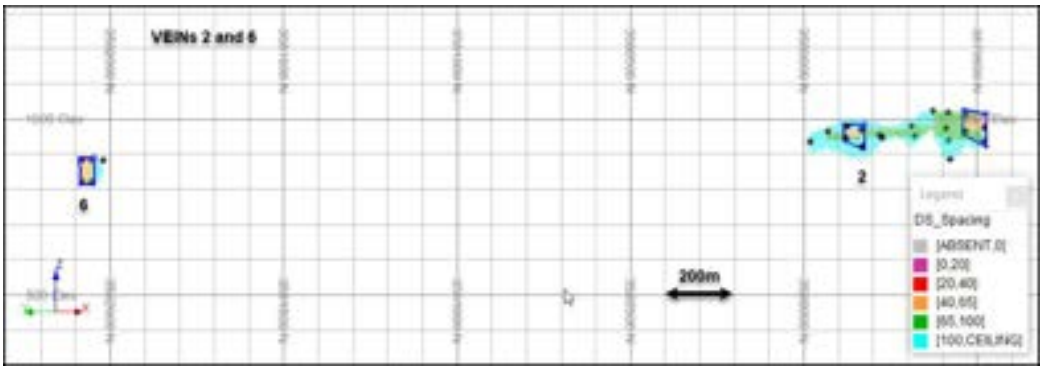
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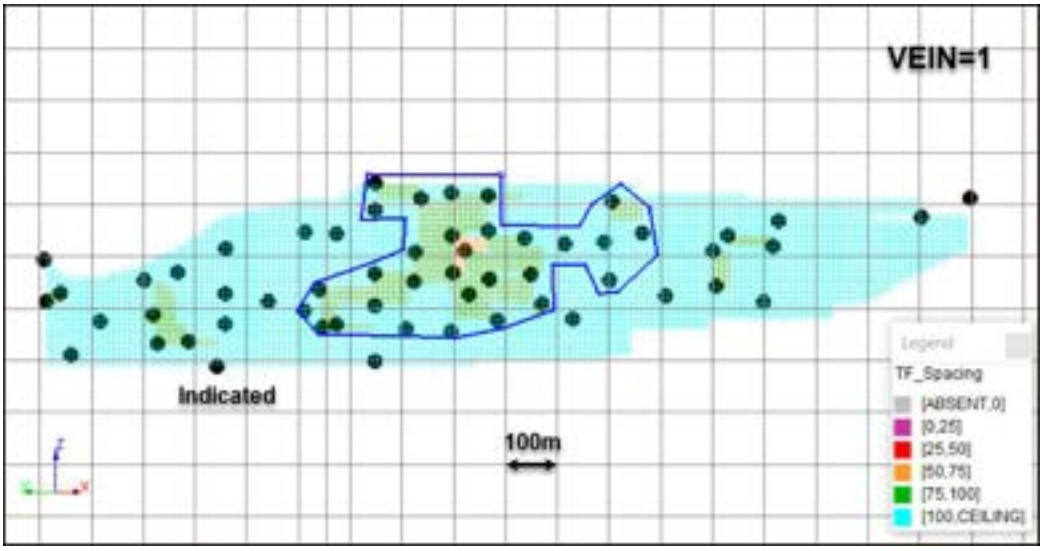
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# Appendix 3-1: Regulatory Feedback Received on Draft EARD

## Appendix 3-1: EARD Comments Tracking Table

| Comment ID | Comment Date | Document Section Number and Title | Commenter | Reviewer Comment | Proponent Response |
|---|---|---|---|---|---|
| 1 | 25-Mar-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change | Edit Name Change – Department of Environment, Conservation and Climate Change | Thank you for your comment. The Department name has been revised throughout the document. |
| 2 | 25-Mar-26 | Draft EA Registration Document | Department of Jobs, Growth and Rural Development | (Sarah Geck, Program and Policy Development Specialist, tel. 709-729-3426, sarahgeck@gov.nl.ca) - Recommend the proponent state whether the positions are full/part time if that information is available. See tables 2.8-1 Skills and Labour Requirements, and, 6.11-2 Estimated Personal Requirements. | Section 2 has been updated to decribe the full time employment needs of the Project. |
| 3 | 25-Mar-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Pollution Prevention Division | Robert Redmond (Senior Environmental Scientist, tel. 709-729-6052) may have comments after receiving the final draft which will contain appendices 6.2-1 South Ridge Project Air Emissions Assessment Report and 6.2-2 South Ridge Project Final Calpuff Air Dispersion Modelling | CFI has contacted Robert Redmond and provided the Appendices as requested. |
| 4 | 01-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Pollution Prevention Division | Air emission modelling results presented in the draft registration indicates that there could be occasional exceedances of ambient air standards for particulate matter at sensitive receptors when winds are high and conditions are dry. It is stated in the draft that exceedances of provincial ambient air standards are not expected once planned mitigation measures are put in place. Further information should be provided in the registration to support this statement (i.e. how has the predicted effectiveness of the mitigation measures been assessed?) | CFI has provided an addional memo from IEC which includes further information (i.e. how the predicted effectiveness of the mitigation measures were assessed)<br><br>IEC's memo has been referencesd In Section 6.2 Air Quality and the memo is attached as Appendix 6.2-3 |
| 5 | 01-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Pollution Prevention Division | It is also stated in the draft that a response plan should be developed such that if ambient air monitoring indicates that standards may be exceeded at any sensitive receptors, increased dust management practices and/or controls could be developed to mitigate specific air contaminant sources if needed. Further information on what potential increased practices/controls may consist of should be provided in the registration. | Although a detailed trigger response plan is yet to be developed, at a high level this plan will consist of the monitoring and forecasting review of weather conditions (e.g. wind speed/direction and precipitation), site conditions (e.g. visible plumes from stockpiles and roads) and the ambient monitoring data. The plan will also set threshold conditions based on these monitored parameters to trigger a series of escalated response actions. The actions may include: continue to monitor, apply water/dust suppressant, reduce operations and cease operations. This is addressed in Section 6.2.4.1 |
| 6 | 01-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Pollution Prevention Division | Water quantity and quality modelling and assessment has not been included in this draft, but it has been noted that this will be included in the formal registration document. Our Division may further evaluate the water quality component when that information is available. | Thank you for your comment. Water quantity and quality environmental assessment sections and associated appendices are included in final registration document as Sections 6.4 and 6.5. |
| 7 | 01-Apr-26 | Draft EA Registration Document | Department of Fisheries and Aquaculture, Sustainable Fisheries and Oceans (SFO) | Request for clarification on Blue Beach Marine Terminal construction will be taking place under this project. (ie. provide date constructed, pictures, site drawings, etc.) | No construction at Blue Beach Marine Terminal (BBMT) will take place as part of the Project. BBMT is part of existing infrastructure. The Blue Beach Haul Road will be upgraded, but no construction or upgrades at BBMT. |
| 8 | 01-Apr-26 | Draft EA Registration Document | Department of Fisheries and Aquaculture, Sustainable Fisheries and Oceans (SFO) | Request for spatial mapping files (GPS/kmz) to accompany the draft registration. | Thank you, spatial mapping files (GPS/kmz) to be included with the final project registration document. |
| 9 | 07-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Mineral Development Division | Shoal Pond:<br>Figure 2.3-2 is a drawing for a proposed Shoal Cove Pond tailings facility. Some features such as the tailings pond dam and the polishing pond dam do not have approval to be constructed and are therefore misleading. This is not part of the project scope and must be removed from the document. | Figure 2.3-2 has been revised to show historical Minworth tailings only without other infrastructure from previous EA. |
| 10 | 07-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Mineral Development Division | Historical underground workings:<br>Will there be any interactions between new open pit and historical workings? What impact will blasting/dewatering at South Ridge have on the stability of adjacent underground workings | CFI will have an assessment completed by qualified engineer to assess potential impacts on historical workings including blasting impacts on adjacent underground workings. Section 2.3.4 has been revised to include this commitment. |
| 11 | 07-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Mineral Development Division | Minworth tailings / tailings dam:<br>CFI must provide an assessment from a Qualified Professional on the potential impact blasting may have on the stability of the Minworth tailings and the Minworth tailings dam. | CFI will hire a qualified engineer to complete an assessment on the potential impact blasting may have on the stability of the Minworth tailings and the Minworth tailings dam. Section 2.3.4 has been revised to include this commitment. |
| 12 | 07-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Mineral Development Division | ARD / ML Potential:<br>The ARD / ML potential for the project must be assessed to the satisfaction of Mineral Development Division prior to any site development. | Thank you for your comment. ARD/ML potential has been assessed as part of Section 6.4 and memos will be appended as part of the final submission. Appendix 6.5-4 MLARD Phase 1 Report Geochemistry testing program summary memo; and Appendix Appendix 6.5-5 Technical Memo Preliminary ML/ARD Assessment of Kinetic Tests |
| 13 | 07-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Mineral Development Division | Reserves/Resources:<br>Is there enough geological confidence to report at least Measured Resources? Reserves would be ideal to demonstrate economic viability supported by at minimum a pre-feasibility study. | Yes the most reliable geological resources currently available is the Indicated Resources reported in the Mineral Resource Report (Appendix 2-10). |
| 14 | 07-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Mineral Development Division | Geological Maps and Sections:<br>All maps and sections must be legible and ideally full landscape page with elements clearly labelled | Thank you, all maps and sections will be legible and provided in full landscape (where applicable) with elements clearly labelled |
| 15 | 07-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Mineral Development Division | Drawings and Figures:<br>All figures supplied in the document must be up to date and reflect the current conditions. | Thank you, all figures in the document will be up to date and reflect the current conditions. |

| Comment ID | Comment Date | Document Section Number and Title | Commenter | Reviewer Comment | Proponent Response |
|---|---|---|---|---|---|
| 16 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | The Department of Tourism, Culture, Arts and Recreation is responsible for implementing the Provincial Tourism Strategy. The strategy aims to grow the tourism industry in all regions, enhance the visitor experience, and lead responsible, regenerative, and sustainable tourism development. Demand continues to increase for authentic, engaging, and personalized experiences that connect visitors with the province's people and places. Natural assets such as scenic landscapes, wildlife, and wilderness areas remain key drivers of visitation and are essential to sustainable growth. Maintaining balance among provincial tourism priorities, private tourism operators, and forestry management is critical. | Thank you, the Project activities will be conducted in a manner that maintains balance among provincial tourism priorities, private tourism operators, and forestry management as this is identified as a critical priority. |
| 17 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | ***Touring Corridor/Viewscapes***<br>TCAR recommends that major industrial developments and operations near key touring corridors be carefully managed to protect the scenic landscapes that attract visitors. Route 220 is a strategically important corridor, serving both as a key tourism route for travel to and within the Burin Peninsula. | The proposed South Ridge Project is not visible from Route 220. The scenic attractions of St. Lawrence and surrounding areas will remain accessible and uninterupted by the Project. The re-routing of Iron Springs Road does not restrict access to coastal trails, beaches and scenic lookouts; and will be an improved road in terms of bridges, width, surface and structure, and can provide improved access for vehicles carrying mobility impaired visitors to reach Chambers Cove. |
| 18 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | ***Touring Corridor/Viewscapes***<br>Effective management of mining activities along Route 220 is essential to protecting viewscapes, maintaining a strong sense of arrival, and supporting tourism operators and communities that rely on scenic quality. Mine-related infrastructure and operations adjacent to or visible from this corridor should be carefully sited and designed to minimize visual impact, using landscape integration, vegetation retention, and visual screening wherever feasible. | The proposed South Ridge Project is not visible from Route 220. The scenic attractions of St. Lawrence and surrounding areas will remain accessible and uninterupted by the Project. The re-routing of Iron Springs Road does not restrict access to coastal trails, beaches and scenic lookouts; and will be an improved road in terms of bridges, width, surface and structure, and can provide improved access for vehicles carrying mobility impaired visitors to reach Chambers Cove. |
| 19 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | ***Trails***<br>Trails are important tourism assets that support high-quality visitor experiences, especially those centered on pristine environments, natural settings, and nature-based activities. They underpin guided and independent tourism products, cultural interpretation, and community-based offerings. Protecting these values requires careful planning and management of mining activities, including appropriate setbacks and consideration of viewscapes and soundscapes. | The proposed South Ridge Project is not visible from Route 220. The scenic attractions of St. Lawrence and surrounding areas will remain accessible and uninterupted by the Project. The re-routing of Iron Springs Road does not restrict access to coastal trails, beaches and scenic lookouts; and will be an improved road in terms of bridges, width, surface and structure, and can provide improved access for vehicles carrying mobility impaired visitors to reach Chambers Cove. Section 6.11 has been updated to include this response in the final submission. |
| 20 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | ***Trails***<br>Within the project area, a couple of trails have been identified where visual, noise, and potential vibration impacts should be minimized. These include:<br>Cape Chapeau Rouge Trail<br>Chamber Cove Heritage Walk | A noise and vibration assessment was completed and is included in Section 6.3 |
| 21 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | ***Trails***<br>The Town of St. Lawrence is the primary point of contact for both sites and should be consulted regarding current use, peak visitation periods, and local sensitivities related to tourism and recreation activity. | CFI has been consulting with the Town of St. Lawrence, and the Historic Advisory Committee, and collaborating with them during project planning. inlcuding on the design of bridges, which will improve visitor experiences for drivers and walkers. |
| 22 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | ***Tourism Stakeholders***<br>TCAR recommends engagement with the following stakeholders to identify potential conflicts, understand operating conditions, and coordinate mitigation measures related to mining activities:<br>**Town of St. Lawrence**<br>Email: amanda.edwards@townofstlawrence.com<br>Phone: 709 873 2222<br>**Lunch Tin Café**<br>Email: heritagesl@live.ca<br>Phone: 709 873 2584<br>**Island View Cottage**<br>Email: pallypuss@hotmail.com<br>Phone: 902 240 0524<br>**Legendary Coasts of Eastern Newfoundland**<br>Email: info@legendarycoasts.com<br>Phone: 709 687 7068 | CFI has been consulting with the Town of St. Lawrence, and the Historic Advisory Committee, and collaborating with them during project planning. inlcuding on the design of bridges, which will improve visitor experiences for drivers and walkers. |
| 23 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | ***Recommendations***<br><br>Mitigation measures should be implemented to protect the visitor experience and preserve scenic viewscapes along Route 220 and identified trails. Mine-related development and operations in these high-visibility areas should be carefully planned and sited to avoid prominent visibility where feasible, using natural topography, vegetation retention, and visual screening to limit exposure from roads, trails, and key viewpoints. | The scenic attractions of St. Lawrence and surrounding areas will remain accessible and uninterupted by the Project. The re-routing of Iron Springs Road does not restrict access to coastal trails, beaches and scenic lookouts; and will be an improved road in terms of bridges, width, surface and structure, and can provide improved access for vehicles carrying mobility impaired visitors to reach Chambers Cove. The scenic attractions, history and culture of St. Lawrence are intertwined, and a valuable demonstration of a living working community, inlcuding the Museum, a working fishing harbour, deep-rooted soccer prowess, and visitor accommodations. Visitors appreciate the contemporary working mine, seafood processing plant, and other activities. |
| 24 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | Safe, reliable, and dust-controlled access should be maintained on public roads, particularly Route 220, and in the vicinity of trails. Road use and maintenance should reflect the visitor's expectations for clean, well-managed travel corridors and account for tour operators, travellers, and community users who rely on predictable and safe access conditions. | The scenic attractions of St. Lawrence and surrounding areas will remain accessible and uninterupted by the Project. The re-routing of Iron Springs Road does not restrict access to coastal trails, beaches and scenic lookouts; and will be an improved road in terms of bridges, width, surface and structure, and can provide improved access for vehicles carrying mobility impaired visitors to reach Chambers Cove. The scenci attractions, history and culture of St. Lawrence are intertwined, and a valuable demonstration of a living working community, inlcuding the Museum, a working fishing harbour, deep-rooted soccer prowess, and visitor accommodations. Visitors appreciate the contemporary working mine, seafood processing plant, and other activities. |

| Comment ID | Comment Date | Document Section Number and Title | Commenter | Reviewer Comment | Proponent Response |
|---|---|---|---|---|---|
| 25 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | Potential noise and vibration from mining activities, including blasting, should be assessed for their impact on visitors' experience of the surrounding landscape. Where feasible, higher-noise activities should be scheduled outside the peak tourism season (June to September) or otherwise planned to minimize disruption to trails, events, and visitor experiences. | A noise and vibration assessment was completed and is included in Section 6.3 |
| 26 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | Ongoing consultation should be maintained with the Town of St. Lawrence, tourism operators, trail managers, and regional tourism organizations (Legendary Coasts of Eastern Newfoundland) to stay informed about local use, sensitivities, and operational conditions. Input from these groups should guide access controls, scheduling, blasting procedures, and site-specific mitigation measures, ensuring that tourism operations, community values, and visitor experiences are protected. | CFI has been consulting with the Town of St. Lawrence, and the Historic Advisory Committee, and collaborating with them during project planning. including on the design of bridges, which will improve visitor experiences for drivers and walkers. Legendary Coasts Tourism Association actively promote the stories of St. Lawrence throughout its 'peculiar confluence of extraordinary stories' tied to soccer, heroism of mine and coastline rescues and related renown of Lanier Phillips, connection to art through a dedicated stage play "Oil and Water' economic connectiosn to stock market crash of 1929, half a billion years of geology, word wars, active mining, a working fishing commuity and harbour, inlcudince on health and safety regulations. it is a living community that tourists want to experience. The community anchors regional tourism experiences and attarctions, inlcuding Saint Pierre et Miquelon. (source: interview Andrew Hiscock, Legenday Coasts) |
| 27 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | Timely, plain-language notice should be provided for mining activities that may affect access, noise levels, or visitor experience. Communication should be shared through appropriate channels such as onsite signage, municipal communication platforms, local tourism networks, and project information pages to ensure both operators and visitors are aware of potential disruptions. | Blast notices are posted on CFI's Facebook page in advance for proper notice. Signage will be installed.Tourism operators, promoters and organizers are encouraged to call CFI to check on operations. The Town of St. Lawrence and the Museum provie information, and share CFI's notices. Planned Engagement is described in Section 4.4 where CFI is committed to ongoing community engagement inlcuding Meetings Town Council Liaison Committee – monthly meetings; Town Council presentation and update – biannual meetings; Digital Communications; Website project updates; Facebook notices, updates; Email southridge@canadafluorspar.com. |
| 28 | 07-Apr-26 | Draft EA Registration Document | Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division | It is recommended that the proponent engage with Julia Penney at JuliaPenney@gov.nl.ca or 709 729 0559 regarding the Project, and preparation for Environmental Assessment. | CFI has contacted Julia Penney regarding the Project and shared the South Ridge Project Summary presentation. |
| 29 | 08-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Climate Change Division | Section 6.2 covers Air Quality, including greenhouse gas emissions, and while it is noted that details of a baseline GHG assessment can be found in Appendix 6.2-1, Attachment 4; this attachment is not in the draft document. Included in the final submission. | Thank you, Appendix 6.2-1, Attachment 4 is included in in Section 6.2 Air Quality in the final submission. |
| 30 | 08-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Climate Change Division | Section 6.2.3.4 (GHG emissions inventory) outlines two scenarios for which a GHG inventory was completed. While a total GHG value is given for each scenario, we would request that a year over year full emissions inventory by source category be included in the final submission. This is noted in Table 3-1 in the proponent's summary of discussions. Include in final submission. | Thank you, a year over year full emissions inventory by source category is included in Appendix 6.2-1 (Table A7) in the final submission. |
| 31 | 08-Apr-26 | Draft EA Registration Document | Department of Environment, Conservation and Climate Change – Climate Change Division | Also noted in Table 3-1 is the advice that we provided that the proponent review climate change projections, rather than historical weather data, to ensure the project is built/prepared for weather changes resulting from climate change. | The weather for the life span of this project (i.e next few years) is expected to be very similar to the "historical weather" reviewed (last 3-5 years) from an air quality perspective. This question may be more relevant to the closure plan in the long run. |

# Appendix 4-1: Public Notice Public information session on the Proposed South Ridge Project October 3

Canada Fluorspar Inc.
September 23, 2025 ·

# Appendix 4-2: Canada Fluorspar South Ridge Brochure October 3

# Your Community, Your Voice, Our Commitment.

# Planning our Next Chapter in Support of St. Lawrence.

## Contact

1 Clarke's Pond Road

St. Lawrence, NL, CA

southridge@canadafluorspar.com

info@canadafluorspar.com

www.canadafluorspar.com

# Canada Fluorspar

SOUTH RIDGE DEVELOPMENT

OCTOBER 3, 2025

CFI

CANADA FLUORSPAR INC.

# Next Steps

**Engagement Assessment**

- Complete environmental and socioeconomic studies
- Submit EA Registration

**Timeline: December 2025**

**EA Review Process**

- Follow EA Review Process

**Timeline: 45-days from submission**

**Post-EA Permitting**

- Amend Mining Permits
- Amend Environmental Permits

**Timeline: February 2026**

***We're committed to keeping the community involved every step of the way!***

# The Commitment

🔍 **Transparency**

We commit to open, honest communication about the project.

🏗️ **Responsibility**

We prioritize safety, the environment, and the community.

🤝 **Collaboration**

We value your insights—your voice helps shape this project.

🌎 **Stewardship**

We live here too, and we're committed to being positive stewards.

📢 **Accountability**

We stand by our commitments and will keep you informed.

# The Project

🏗️ **What it is**

A small satellite pit that supports and sustains the existing AGS Mine.

📍 **Where it is**

Located 2.0 km southwest of St. Lawrence, along Iron Springs Road between the AGS Mine and Blue Beach Marine Terminal.

🎯 **Purpose**

Our goal is to ensure sustainability, extend the life of the AGS Mine, protect current jobs, and create new employment opportunities throughout the two years of construction and production.

🧠 **Smart approach**

Built on existing roads, mill, and port—no major new infrastructure needed.

🌐 **The big picture**

Advancing the NL Critical Minerals Strategy and boosting rural economic development in St. Lawrence.

# The Benefits

🌿 **Environmental Responsibility**

- Small footprint, maximizing rehabilitation.
- Enhanced environmental monitoring.
- Use of existing infrastructure and roads.

🏘️ **Community Investment**

- Preservation of heritage areas and trails.
- Upgrade access to recreation sites.
- Collaboration with the Community.
- Local procurement and services.

👷 **Employment Investment**

- Maintain current employment at AGS
- Create new job opportunities to support South Ridge operations, with a strong focus on hiring locally.

# Appendix 4-3: Canada Fluorspar South Ridge Presentation October 3

CFI
CANADA FLUORSPAR INC.

# South Ridge Development

## Your Community, Your Voice, Our Commitment

*Planning our Next Chapter in Support of St. Lawrence*

Prepared by Canada Fluorspar Inc.

**October 3, 2025**

# Meeting Agenda

- Welcome
- Rules of Engagement
- CFI Team Introduction
- Presentation
- Q&A Session

# Why We’re Here Today

**We're here to listen to you.** This session is about sharing information and gathering your feedback on the proposed South Ridge project.

**Your input matters.** We want to understand your concerns, answer your questions, and work together to ensure this project benefits St. Lawrence.

**Open dialogue.** Today is a conversation—we welcome all perspectives and are committed to addressing community priorities.

**What to expect:** Project overview, local benefits overview, how we will mitigate impacts, and plenty of time for your questions and feedback.

# How We Got Here

**AGS Mine restart:** CFI has invested over $138 million since June 2023 into restarting the AGS Mine, with the intention of returning it to a steady operation that provides ongoing employment and benefits to the community.

**Long-term expansion planning:** CFI continues to explore deposits nearby existing operations to validate the feasibility of extending operations into these areas.

**Near-term ore requirements:** The AGS mill needs a near-term source of high-grade ore and low strip to make the project sustainable, fund longer-term exploration and expansion planning activities. South Ridge will bridge the gap between AGS and all future projects.

**Aggregate benefit:** Waste rock from South Ridge is high-quality material that can be used as construction aggregate, providing a secondary benefit.

# Our Commitment to You

**Transparency:** We'll provide clear, honest information about all aspects of the project.

**Responsibility:** Environmental protection, community, and safety are our priorities.

**Collaboration:** Your knowledge of this community is invaluable—we need your input.

**Stewardship:** This is our community too, and we commit to being positive stewards.

**Accountability:** We'll follow through on our commitments and keep you informed every step of the way.

# **South Ridge Project** | At A Glance

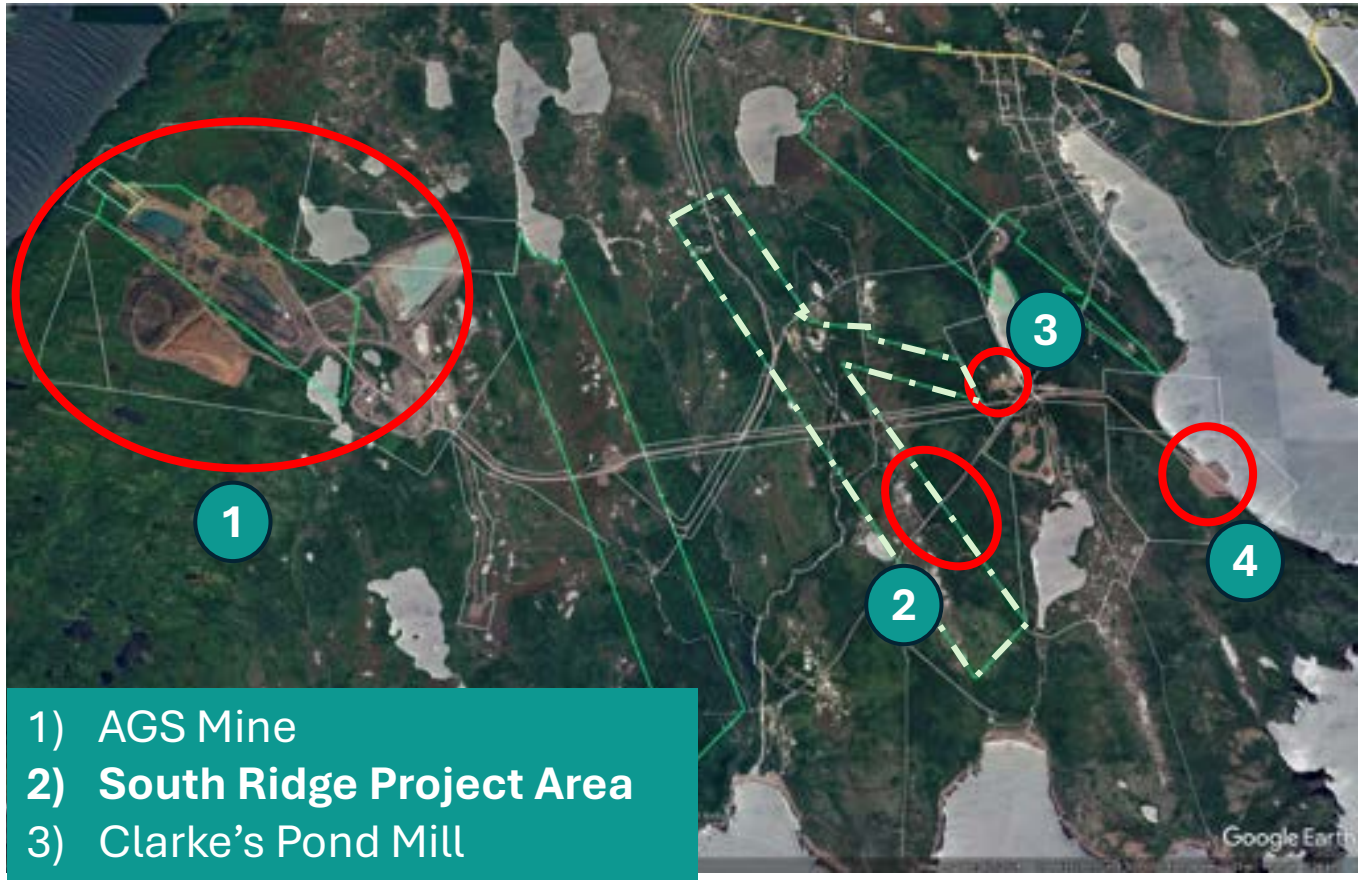
**What it is:** Small satellite pit supporting the existing AGS Mine.

**Where it is:** 2.0 km SW of St. Lawrence, between AGS Mine and Blue Beach Marine Terminal, along Iron Springs Road.

**Purpose:** Profitability, extend the mine life, maintain existing AGS jobs while adding new jobs over 2 years of construction/production.

**Smart approach:** Uses existing AGS mill facilities, roads, and port—no new major infrastructure needed.

**The big picture:** Supports St. Lawrence and Newfoundland & Labrador's Critical Minerals Strategy and rural economic development.




1) AGS Mine
2) **South Ridge Project Area**
3) Clarke's Pond Mill
4) Blue Beach Marine Terminal

# **South Ridge Project** | Proposed Site Plan

## One pit:

South Ridge consists of a single, high-grade, low-strip pit

## Four stockpiles:

Topsoil, overburden, and two “waste” rock stockpiles

## Aggregate potential:

“Waste rock” is high-quality granite material that is planned to be crushed, screened, and sold as construction aggregate

# **South Ridge** | What We're Mining

**Fluorspar (Calcium Fluoride):** A critical mineral essential for modern life used in Lithium batteries, aluminum production, steel manufacturing, refrigerants, pharmaceuticals, and clean energy technologies – supporting NL's critical minerals strategy and Canada's critical minerals security.

**Compact Operation:** Total disturbance area just over 50 hectares

- **No new mill needed** – all ore will be processed at AGS
- **No new port needed** – concentrate shipped via Blue Beach Marine Terminal
- **Use existing road network** – minimal new road construction required
- **Proven environmental monitoring** – we'll build on established processes

Small footprint designed to minimize environmental impact, streamline production

# **South Ridge** | Protecting Community Access

**Your Trails Matter to Us.** We know coastal recreation areas and heritage trails are important to this community.

**Our Plan:** Community access roads will be developed FIRST to ensure uninterrupted access to coastal recreation areas.

**Retained Access:** The project will upgrade alternate access routes before any mining begins.

**Ongoing Commitment:** Recreation access will be maintained throughout the project lifecycle.

**Infrastructure Improvement:** CFI is committed to revitalizing existing access roads and improving trail infrastructure.

# **South Ridge Project Details** | Access to Recreation Areas

## Memorial Bridge Access

**Iron Springs Route:** 3.6 km
**Director Drive Route:** 5.1 km

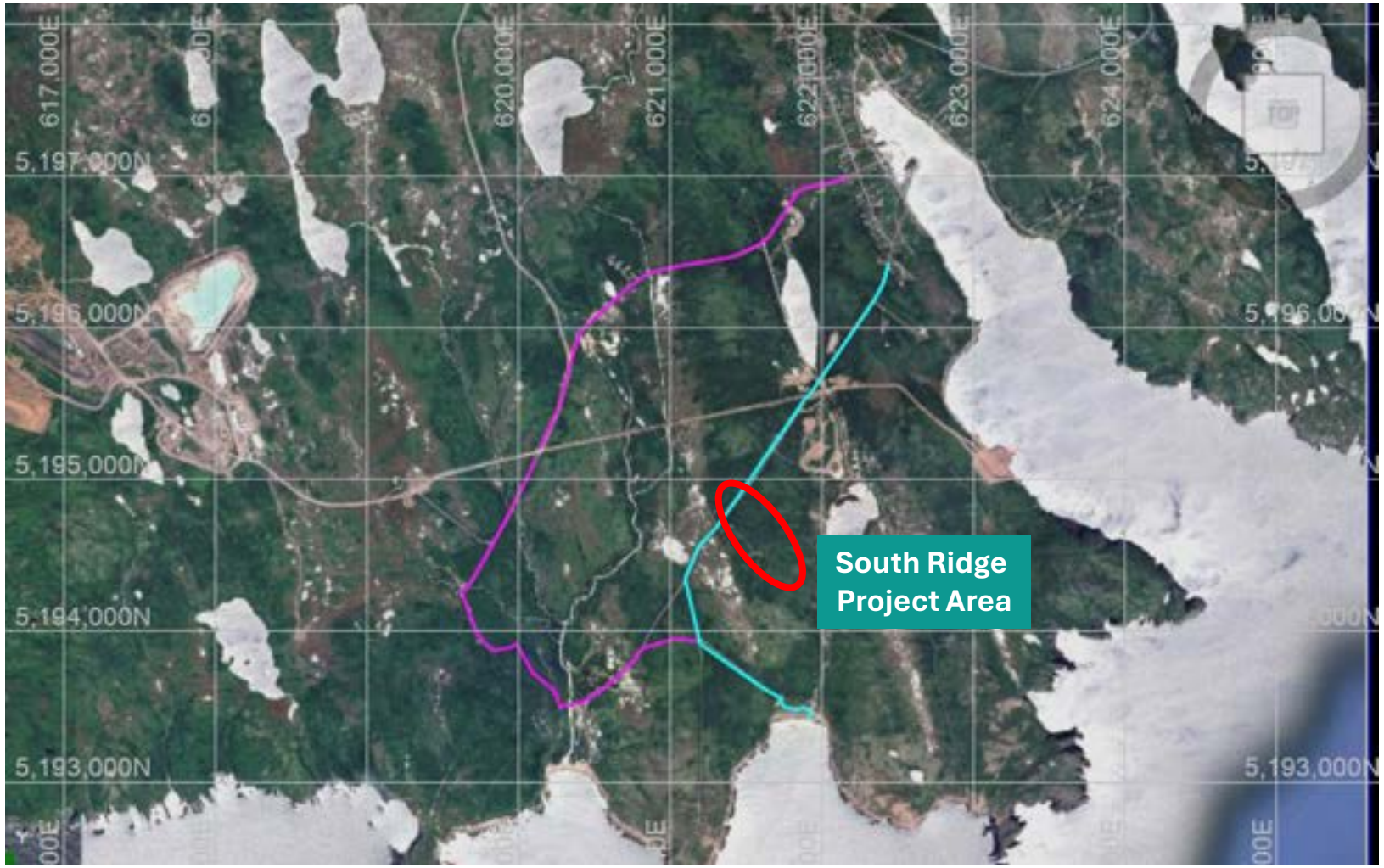
**Projected drive time difference:** ~2.5 minutes

# **South Ridge Project Details** | Access to Recreation Areas

## Shoal Cove Beach Access

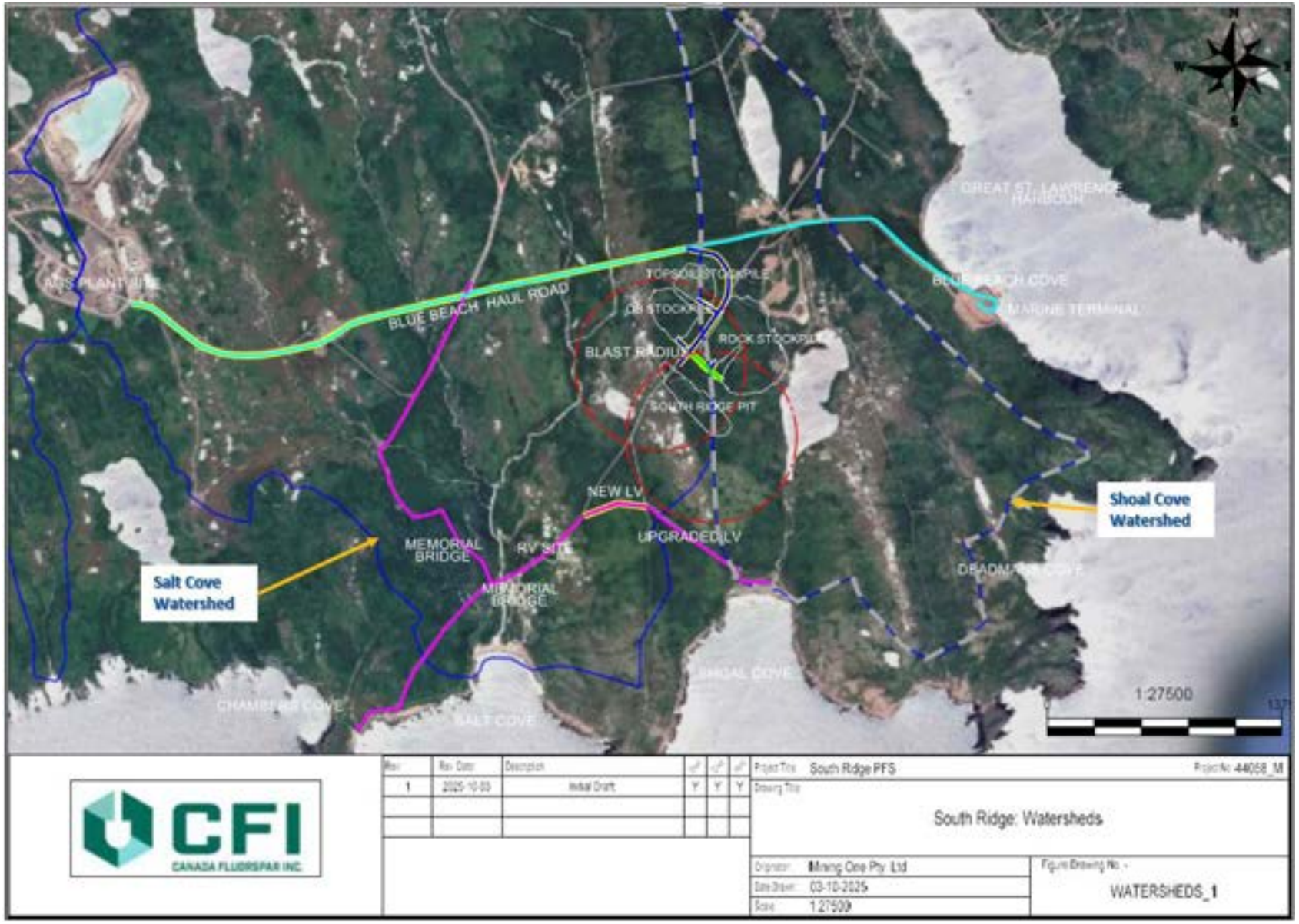
**Iron Springs Route:** 3.9 km
**Director Drive Route:** 7.1 km

**Projected drive time difference:** ~5 minutes



# **South Ridge Project Details** | Development Overview

# **South Ridge Project Details** | Development Overview - Watersheds



# South Ridge Project | Key Project Activities

## Phase 1A: Road Revitalization & Construction

- Revitalize Director Drive road route to provide uninterrupted access to recreational areas
- Make improvements to Blue Beach Haul Road while constructing pit/stockpile access roads

## Phase 1B: South Ridge Site Preparation

- Clear and strip the pit area; build upper bench access
- Clear and strip stockpile areas
- First blast planned for approximately 6 weeks after starting pit preparation

## Phase 2: South Ridge Production Phase

- Begin production from South Ridge pit while completing stockpile site development
- South Ridge production expected to last for approximately 18 months

## Phase 3: South Ridge Site Closure

- Cover haul roads with topsoil and re-seed
- Crush rock piles and haul to Blue Beach for sale as construction aggregate material
- Seed and store remaining soil for future reclamation requirements (e.g., AGS)
- **Option** to flood pit, install safety berms and signage

# South Ridge Project | Construction Sequence

| | Year 1 | | | | Year 2 | | | | Year 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Construction | | | | | | | | | | | | |
| Site Operations | | | | | | | | | | | | |
| Site Closure | | | | | | | | | | | | |

## Road Revitalization & Construction

- Focus on establishing alternative access routes first to **provide uninterrupted access** to coastal recreation areas
  - Improve existing Director Drive road
  - Construct Shoal Cove connector road
  - Collaborate with the Town to upgrade Memorial Bridge or build a new bridge to allow vehicle access to Iron Springs

# South Ridge Project | Construction Sequence

| | Year 1 | | | | Year 2 | | | | Year 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Construction | | | | | | | | | | | | |
| Site Operations | | | | | | | | | | | | |
| Site Closure | | | | | | | | | | | | |

## Access Road Construction

- Installation of access roads
  - Widen Main Haul Road to facilitate improved haulage access from AGS to South Ridge, and prevent public access to South Ridge to ensure community safety
  - Construct pit haul road and stockpile access roads

# South Ridge Project | Construction Sequence

| | Year 1 | | | | Year 2 | | | | Year 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Construction | | | | | | | | | | | | |
| Site Operations | | | | | | | | | | | | |
| Site Closure | | | | | | | | | | | | |

## South Ridge Site Construction

- Pit Preparation
  - Strip South Ridge Pit area
  - Install upper bench access
- Begin stripping of stockpile areas
  - Topsoil and overburden stockpiles
  - Two waste rock stockpiles
- First blast and production start
  - Staggered production to start while outer extent of stockpile areas is completed

# South Ridge Project | Key Project Activities

| | Year 1 | | | | Year 2 | | | | Year 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Construction | | | | | | | | | | | | |
| Site Operations | | | | | | | | | | | | |
| Site Closure | | | | | | | | | | | | |

## South Ridge Site Production

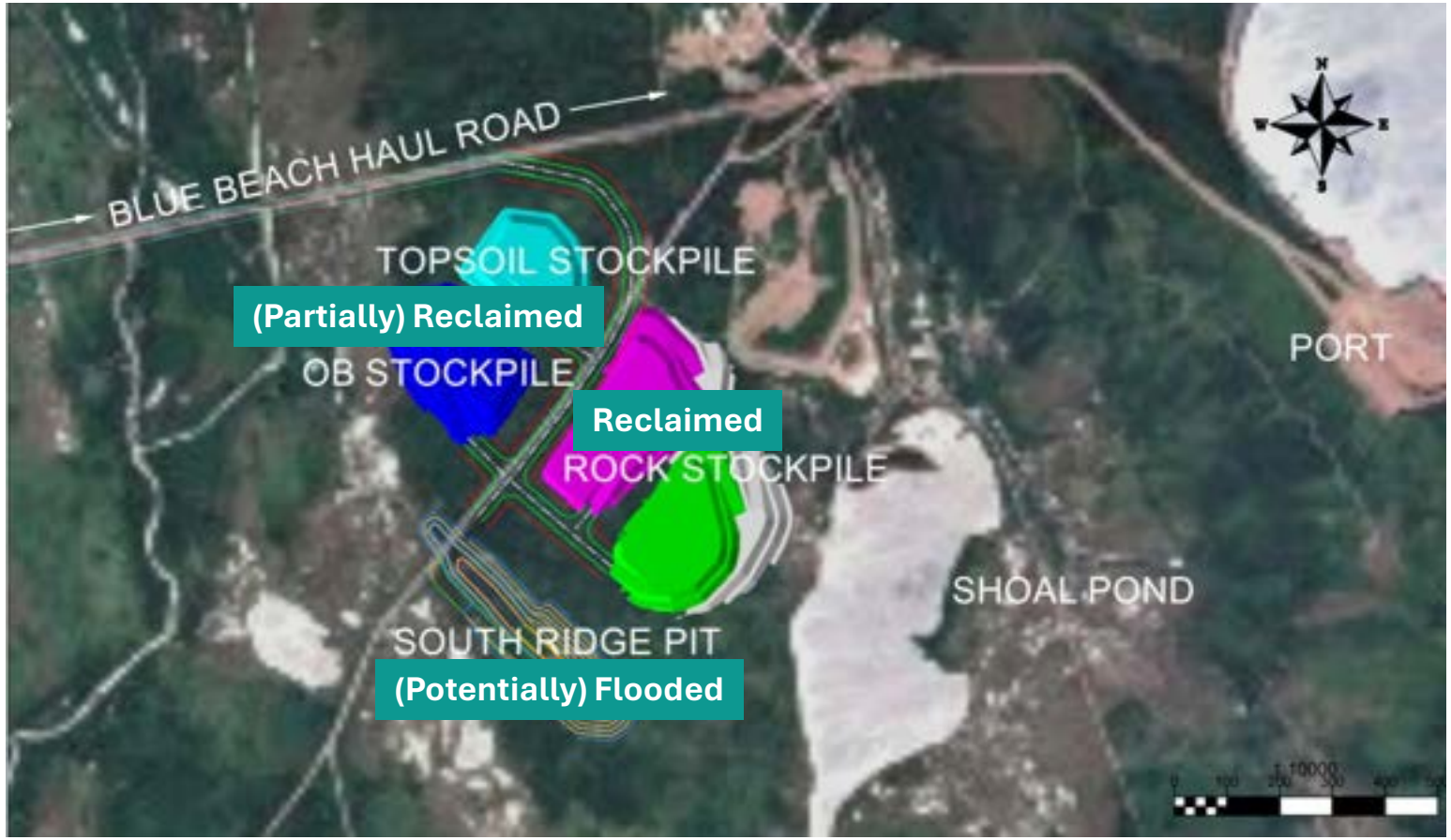
- Total production period projected to last approximately **18 months**
- Production ramps up as bulk of stripping occurs in first 7 months
- Total excavation rate to decrease steadily from months 8-18
  - Highest ore production during months 8-13
- Use of modern blast technology to reduce potential noise and vibration impacts.

# South Ridge Project | Key Project Activities

| | Year 1 | | | | Year 2 | | | | Year 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Construction | | | | | | | | | | | | |
| Site Operations | | | | | | | | | | | | |
| Site Closure | | | | | | | | | | | | |

## South Ridge Site Closure

- Waste rock stockpiles to be crushed down to aggregate and sold via Blue Beach Marine Terminal
- Topsoil and overburden stockpiles will be used to cap pit/stockpile access roads
  - Balance of remaining material to be reserved for future reclamation requirements
    (e.g. AGS reclamation)
- Pit intended to be used as future access to underground portal for North Ridge
  - Appropriate safety berms and signage installed as precautionary measures.
  - Depending on underground schedule, potential for the pit to be temporarily flooded.



# Environmental Responsibility

**Regulatory Oversight:** Project will be registered for assessment under Newfoundland & Labrador *Environmental Protection Act*.

**Comprehensive Studies:** Baseline environmental data collection and impact assessments underway under the guidance of international and local consultancies.

**Water Management:** Sediment control, erosion prevention, and water quality monitoring are matters of critical importance.

**Dust and Noise Control:** Active management plans to minimize disturbance.

**Reclamation Legacy:** Site to be reclaimed and restored to good condition for future generations to use.

# Jobs – Keeping Our Community and Region Working

**Protecting Existing Jobs:** South Ridge extends the life of AGS Mine operations, securing current employment.

**New Jobs and Opportunities:** Additional positions during construction plus potential of 35 new jobs in operation phase, prioritizing local hiring.

**Skills Development:** Training and advancement opportunities for local workers.

**Good-Paying Jobs:** Mining careers that support families and keep young people in the community.

# Community Investments and Benefits

**Supply Chain Opportunities:** Local procurement and services.

**Economic Ripple Effect:** Mining wages get spent in local stores, supporting everyone.

**Community Partnerships:** We're committed to building long-term relationships with local business and contributing to local initiatives and programs.

**Building on Local Heritage:** This community has deep mining expertise and deep family memories—we benefit from that knowledge and are committed to excellence to sustain this community's proud legacy.

**Provincial Leadership:** Supporting NL's vision as a critical minerals leader in Canada.

# **South Ridge Project** | Next Steps

**Engagement Assessment**

- Continue to engage with St. Lawrence to gather feedback and understand needs/concerns
- Consider input from community members to finalize project design components
- Conduct environmental effects assessment focusing on mitigating potentially adverse effects and addressing community concerns

→ **DEC. 2025**

**EA Review Process**

- Submit EA Registration Document – await feedback from public review period
- Work with community and NL EA Division to achieve release from Registration process

→ **JAN. 2026**

**Post-EA Permitting**

- Revise existing Environmental Protection Plan and all environmental monitoring/management plans for AGS to include South Ridge project area
- Amend existing mining/environmental permits for AGS to include South Ridge

→ **FEB. 2026**

↓

**FIRST ORE Q2-2026**

# Thank You

## Contact Information

### Project Information

southridge@canadafluorspar.com

### General Inquiries

info@canadafluorspar.com

### Telephone Inquiries

+1 (709) 702-5960

# Appendix 4-4: What We Heard from CFI Town Hall Meeting Q&A Session October 3

# What We Heard

from

## Town Hall Meeting, October 3, 2025

for

## Canada Fluorspar Inc. (CFI)

Prepared by

**Lorne Pike & Associates**

www.lornepike.com

Submitted October 20, 2025

# Town Hall Meeting for Canada Fluorspar Inc.

October 3, 2025

## Q&A Session: What We Heard

[Edited slightly for clarity]

Question: Karl Tarrant

Yes. Good evening. My name is Karl Tarrant. I'm happy to say that I'm one of the new councillors on St. Lawrence Town Council. I'm also vice president of the St. Lawrence Harbour Authority. My question is, east of Shoal Cove Pond, Redhead Road, is that road going to be left accessible?

CFI: Melissa Lambert

Redhead Road, yes. That will be left open and accessible. We're open to feedback if there's any areas that we can kind of help upgrade. We're happy to help in any way, in that area as well.

Question: Lisa Loder

My name is Lisa Loder and I, too, got elected here last night along with Karl on the town council. I'm also chairperson of the St. Lawrence Historical Society and we take care of the trails. My concern is the pedestrian bridge and trail for the walking trail. Putting in a bigger bridge. Would it affect the trails where people are not allowed to use vehicles?

CFI: Melissa Lambert

Thanks. So the intention is for CFI not to tell the community what bridge is going to go there. The intention is for us to work with the community, the town council, to make sure that we're putting in something with the realization that the plan, in order to lessen any environmental impact, is to divert traffic around through Director. So, we don't have any plans right now to just bulldoze and make sure that we put something brand new in. It's to work with the community, figure out what the best method is, whether it is a brand new bridge or whether it is to upgrade the existing one, of course, with respect to the area.

And then there is also potential — we've kind of talked about this internally as well as home, around with mom and dad — but again, working with the community and the historical society, do you need a gate to make sure that you can control traffic out to Chamber Cove? What mitigations can we both agree on that would work for the local community?

I will say that I see that Colleen and Kevin are here. I can see them and Ernie. We did engage with the previous town council back in August as well and gave them the overview of this project. Obviously, we knew that it was going into an election so that there may be some turnover. Just for timeline wise, we wanted to make sure we could get this early engagement out to the community. And of course, once the new town council is established, we will call for a meeting and make sure that we can go through these processes.

### Follow-Up: Lisa Loder

Okay. Thank you.

### Question: Kevin Pittman

Kevin Pittman, with the old council and new council. My question, I asked this to the group when we met previously. i think it's important to ask where the people here are now. The 35 new jobs that are being created at South Ridge. My understanding is that they are estimation jobs. Contractor jobs. I know that CFI has made a commitment to the town that they will be hiring locally. However, the estimation company, ECM, is not known for hiring locally. And I'll add to that, or women. What will CFI do to ensure that these 35 new jobs will be primarily local jobs and not brought in from outside the province?

### CFI: Colleen Cashin

So I've already engaged with ECM management. They will be coming back to sites sometime probably late October, maybe early November, my understanding is. So, I've already engaged with their management. I've already put it right up the food chain because I heard before that, I heard, well everything, they never hired local, and our commitment is local, and any subcontractor needs to have the same values we have.

I heard that last time they came in, they brought in a superintendent from Gander Bay, one from the West Coast, they hired their circle, they were paying guys to come in, we had laborers from Gander, I heard all of these different things. So I brought it to their attention. I told them that we need to focus on hiring locally. They had a job fair before. They had great turnout, and I heard no one got jobs, and it's not acceptable. Not only that, from a business standpoint, it makes economic sense for our company, right? It's cheaper for us to have instead of paying them to have LOAs out in the community. We need to have people in the community. It makes more economic sense for us as the employer, right, of the subcontractor as well. So we've already had engagement talks with ECM and getting commitments from them for more local hiring when they come back.

Of course, it was always, they have to bring in certain personnel from away to hold to their standards and values and know their processes, and they're supposed to be phased out as mining goes on. So we just need to hold them to those standards. Last time we never got to the place in mining before the pause for them to be phased out. So we plan on holding them more accountable this time around.

### CFI: Niel Jacobs

Just to add to that, one of the reasons we haven't signed an agreement with ECM yet is this is a very big definition for us. I have personally spoken to a bunch of people here who have made it clear that the hiring practice of ECM is not favourable toward St. Lawrence. Which, to be honest to you, was quite a shock for us, because we made it clear initially that that was very high on the priority list.

So, for the last couple of months, it's been going back and forth, to ensure that is definitely the job creation from St. Lawrence. We're not just going to pay them the amount of money that they're going to get and they're not going to give in return back to the community. They have a very big responsibility, and I have to say that it is going to be difficult for them. Without having signed an agreement, they have made it clear that they do understand this and will be working toward it.

But this is something that we can undertake to keep you updated as well as we go along. We are very happy to do that, because it is important for us to make them see, who spoke to us a couple of months ago, that we see this as solely a collaboration between us and the town. We feel done in if we hear that that is the case, and it's not happening. So this will keep you abreast of what is happening with that, but I can guarantee you that it is very high on the priority list for us at the moment.

### Question: Jason Pike

My name is Jason Pike. I'm from here in St. Lawrence. My question is in regard to water management. To the best of my knowledge, and it's common knowledge, that there's a significant amount of water in the South Ridge area. What I'd like to know is, what the plan is for diversion of that water, where it will be pumped to, and if it will be pumped towards the beach area, because. I think the ecological impact there will be devastating if it's pumped towards the beach because it will wash that beach out.

### CFI: Melissa Lambert

Great question. So, to put this map back up here that shows the watershed, the majority of the pit actually sits in what they call the Salt Cove Watershed. So, regulation wise, we anticipate the approvals from the government stating that any water that is collected from

South Ridge would be pumped back into its natural watershed which is Salt Pond. So that would drain down through that way. However, we're still in collaboration with multiple firms for an optimal water management strategy. There is no intention to direct pump out without making sure we understand these impacts. So there will likely be multiple sediment ponds in order to make sure that before anything is pumped out into the environment that it is safe to do so, with constant — daily, hourly — monitoring to make sure that those impacts would be identified in the event there are some elevated levels.

### CFI: Niel Jacobs

I just want to make a point here on the process as a whole. We have decided to engage consulting firms which specializes in all of these things, which aretop of their class. So the decision that is being made is very much in consultation with the best of the best in Newfoundland and in Canada to make sure that the base decisions are actually acted on. These kind of things like water, luckily it's not 1890 anymore, so we've gone to repop it back into drinking water. But the regulations are of such nature that we have to engage with these people to make sure that it's dealt with the best way. So, anything that will come alike whether it's the roads or whether it's water, you know, rest assured that it's not just us trying to do something to cut costs. It will be done in the best way possible to make sure that that it's safe.

### CFI: Melissa Lambert

I'm going to add just a little bit on that. Not only are we engaging with the consultants as well, that's obviously from a business and environmental impact point of view but we've been having regular meetings with government officials, water resources, climate change. We even had a meeting with tourism to see, you know, the main areas that they would be concerned that this project could affect. Those meetings are anticipated to continue, until any sort of mine approval process goes down the line.

### Question: Ernie Lundrigan

Ernie Lundrigan, St. Lawrence.

Shoal Cove Ridge is a lot closer to the community, obviously, than AGS, so blasting and dust issues. Do you foresee any issues with that, and do you have anything in place to mitigate that?

### CFI: Isaac Sam

I'll take this one. So when we first started AGS, we looked at various blasting technologies, and we've been trying electronic blasting which, literally when you are blasting, you can

actually time each hole to go at a time, so you have so much more control than the non-electronic, where you don't have that control, where you can have four or five holes going at the same time. So that same technology is what we are going to be implementing in South Ridge to make sure of that.

First of all, the community is two kilometers away, which is almost more than double or three times as far from the impact of blasting, and this technology will be used. It's just very, very — in terms of air blast and in terms of the vibration — it's very minimal. We tried it when we started AGS and it's working.

And the same thing, we are going to do it also for the dust. We're looking at other methods like the calcium where you could put environmentally friendly chemicals on the ground so they don't have to use a lot of, these dust operating traps and stuff. All this, again, as Neil pointed out, we have a whole development plan, and these are the impacts we know, so we are going to make sure that all these controls are going to be put in place before we even start mining.

And that's what we always say. We have to be responsible. So even if it costs us more — because they're electronic and if you look at the cost, the electronic is almost four times the cost — we want to use that. And that's what we've been using in AGS as well.

### Question: Harvey Beck

My name is Harvey Beck. I'm from here in St. Lawrence. My question is about the wharf.

Minworth came in here and try to mine. It didn't work. They didn't have no wharf. No way of getting it out. The last CFI came in here and tried to mine. No wharf. They had trouble getting it out.

So you fellows come in and you're trying to mine. Never put no wharf in. And what makes you think that these other mines came in here and no wharf. It didn't work. Can you explain to me how you fellas are gonna make it work?

And another question is about South Ridge. You're coming out there now to tear and blast and drill that. You're not finished mining where you're to. You're supposed to have 25 years in that mine. Why tear up somewhere else when that's not finished?

### CFI: Niel Jacobs

On the wharf issue, I don't disagree with you. So from the get go, the wharf was part of our plan to install something permanent. Firstly, I can say that the engineering of the current system that we have is way different than the previous ones. They cut corners and did it completely wrong, so that's already more stable. That being said, we're in discussions at

the moment with the federal government to get assistance on planning to build a permanent system there. So that is ongoing. We also want to build the permanent system there. That's definitely on our hearts. We're not disregarding that at all. It's another thing we can keep you updated as we're going along, but that's something that we're actively working on.

### CFI: Isaac Sam

The other question is “You have AGS. Why are you going to South Ridge?”

I don't know if any of you have been to AGS right now, but currently, when you go to AGS, you could see most of the ore is mined by the old CFI. So currently, what we are doing is we are expanding the pit. Right? So as we are expanding, there's a lot of waste stripping that we are doing. So now South Ridge has always been as part of, you know, it's within the mining lease, it's always been as part of, you know, the mine plan. So now the whole strategy is you take the South Ridge Low Strip, you know, the ore is just beneath the surface. You use that ore to supplement the AGS as you expand the AGS for as long as you said, you know, AGS is gonna take us almost up to in or around 2034 there, right?

But now, the South Ridge comes in as a low strip for us to be able to run the mill, and hydrate, and also hydrate. Because if you look at the whole geology of the ore, most of it, it's very high grade at the very top, and as it goes down, the grade reduces, and that is what AGS is now. Right? So you always need that land from another pit. Also, one thing with South Ridge is it gives us the opportunity to actually use it as a portal for underground to also support AGS.

You look at the whole mine plan, and then you come up with a mine plan which is sustainable, which is profitable, and again, economic. So that's the whole strategy. It's not like we are abandoning AGS. We're still going to mine AGS, as well as mine the South Ridge.

### Follow-Up: Harvey Beck

The question no one else, the other companies come in here and they took the bit of mineral that was on the surface and they left. What guarantees are we going to get that you're not going to take what's on the surface and pull out like the rest of them did?

### CFI: Niel Jacobs

I can tell you right now that we've basically got too much time and money into this. The difference here is, I can put it for you in a nutshell now. And I can tell you all about philosophies and how people differ. But the real difference here is that the previous company that was here wasn't a mining company. It was an investment company that

wanted to open a mine. We're a mining company. We've been doing mining, between all of us that work in mines, have been doing it for over 40 years. We want to make a mine. We're not here to make money and just scrape the surface of the high relief. This is not what we're in for. We want to build a world-class mine. That's our commitment to it.

I don't think that any one of us that's sitting here, at least I know that none of us that's sitting here is here to scrape something from the mine. I mean, to be honest with you, if that was the case, I would have played the lottery. I would make more money easier that way, or just throw more money away. But. I think for us, it's very important to make this asset work as good as it can. It's got so much potential. This asset is fantastic.

But unfortunately for us, we can't even just scrape from the top, because it's been done. There's nothing left to do like that. We have to go deeper, and in order to do that, it takes a lot of time and money, and there's no way you can get yourself out of that position. Once you're in, you're in. So we're basically not going anywhere. This is something that we're very much invested into.

### Question: Bert Turpin

My name is Bert Turpin and I live in St. Lawrence. My question for you is who told you you were mining at Shoal Cove Ridge? To me, that's not Shoal Cove Ridge. That's Hare's Ears Ridge.

### CFI: Melissa Lambert

It's in the general vicinity. I will apologize if we've got the area incorrect. There are some maps at the back if we want to just clarify that. But it's where we call the southern extension of Director. Right where that old mine road cuts across from Iron Springs over to Director. So, that's the exact area. If you want, on the maps later we can just point it out a little bit easier. Some of the pictures on here are a little bit hard to see.

### Lorne Pike

[Thanked everyone for attending and a reminder that everything said was recorded as part of the environmental assessment process.]

[Final call for any remaining questions, and encouraged people to visit the three tables, with Ian Holl and Kyla Rennie for Operations, Colleen Cashin and Niel Jacobs for HR, Jobs and General Counsel, and Isaac Sam and Melissa Lambert for Mining and Geology.]

# Appendix 4-5: Canada Fluorspar South Ridge Development brochure March 9

**Public Engagement Session**
March 9, 2026
6-8 pm
Stella Maris Hall
St. Lawrence, NL

## Your Community
## Your Voice
## Our Commitment

## Planning our Next Chapter in Support of St. Lawrence

**Topics:**

- Project updates and timelines
- Overview of effects assessments
- Health, safety, and environmental initiatives
- Open discussion and Q&A

## Contact

1 Clarke's Pond Road
St. Lawrence, NL, CA
southridge@canadafluorspar.com
info@canadafluorspar.com
www.canadafluorspar.com

# Canada Fluorspar

**SOUTH RIDGE DEVELOPMENT**

CFI
CANADA FLUORSPAR INC.

# Next Steps

**Engagement Assessment**

- Complete environmental and socioeconomic studies
- Submit EA Registration

**Timeline: April 2026**

**EA Review Process**

- Follow EA Review Process

**Timeline: 45-days from submission**

**Post-EA Permitting**

- Amend Mining Permits
- Amend Environmental Permits

**Timeline: June 2026**

*We're committed to keeping the community involved every step of the way!*

# The Project

**What It Is**

A small satellite open pit supporting AGS Mine, located 2.5 km southwest of St. Lawrence.

**Purpose**

Our goal is to ensure sustainability, extend the life of the AGS Mine, protect current jobs, and create new employment opportunities.

**Smart Approach**

Built on existing roads, mill, and port—no major new infrastructure needed.

**The Big Picture**

Advancing the NL Critical Minerals Strategy and boosting rural economic development in St. Lawrence.

# The Benefits

**Environmental Responsibility**

- Small footprint, maximizing rehabilitation.
- Enhanced environmental monitoring.
- Use of existing infrastructure and roads.

**Community Investment**

- Preservation of heritage areas and trails.
- Upgrading access to recreation sites.
- Collaboration with the Community.
- Local procurement and services.

**Employment Investment**

- Maintain current employment at AGS.
- Create new job opportunities to support South Ridge operations, with a strong focus on hiring locally.

# Appendix 4-6: Canada Fluorspar South Ridge Development Presentation March 9

CFI
CANADA FLUORSPAR INC.

# South Ridge Development

## Your Community, Your Voice, Our Commitment

*Planning our Next Chapter in Support of St. Lawrence*

Prepared by Canada Fluorspar Inc.

**March 9, 2026**

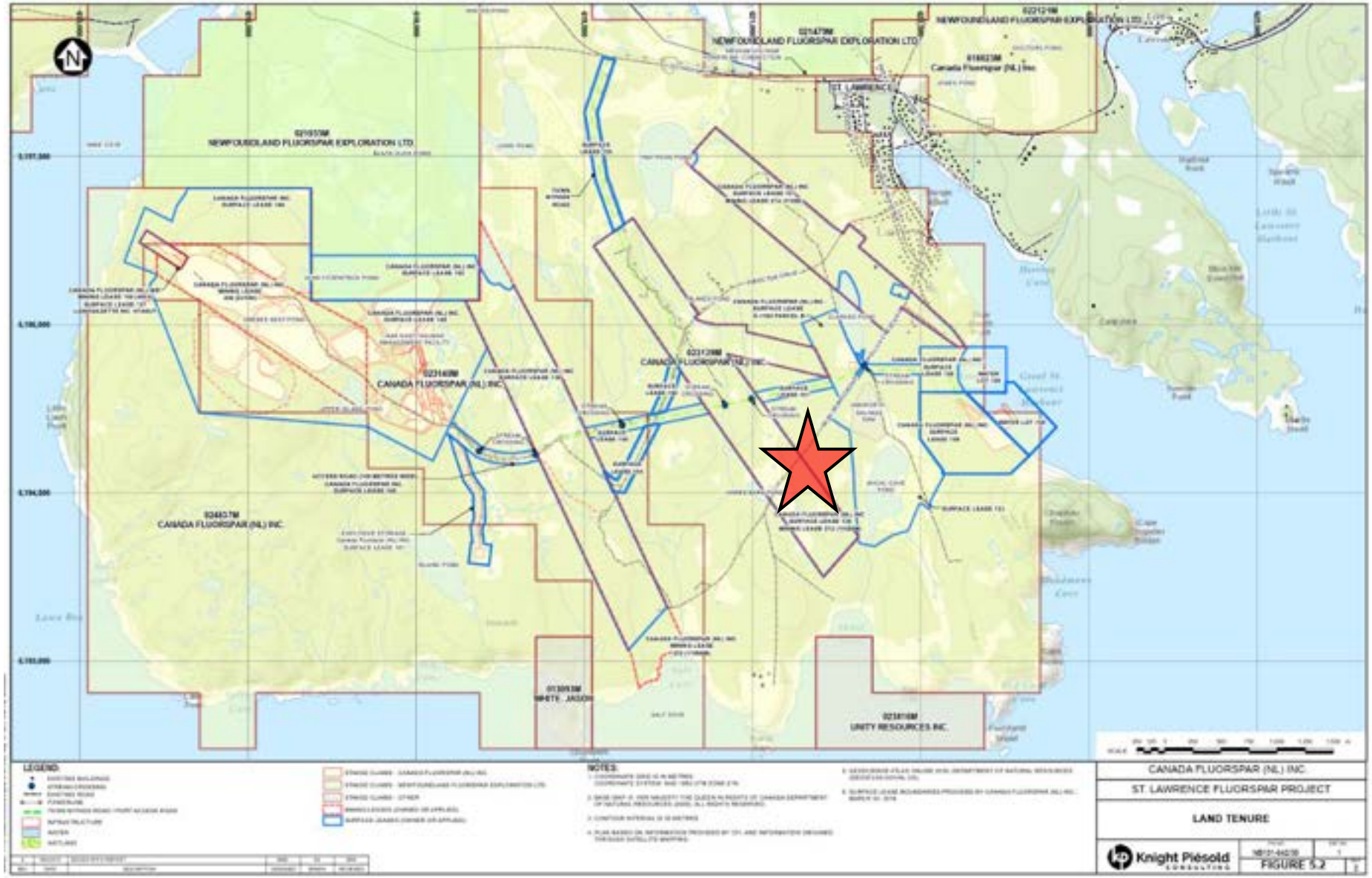
# Meeting Objectives

This session is about sharing information on the proposed South Ridge Project prior to submission of the Environmental Assessment Registration Document (EARD).

- Project Overview
- Project Updates
- Discussion & Feedback

**Your input matters.** We want to understand your concerns, answer your questions, and work together to ensure this project benefits St. Lawrence.

# CFI Land Tenure



# **South Ridge Project** | At A Glance

**What it is:** Small satellite pit supporting the existing AGS Mine.

**Where it is:** 2.5 km SW of St. Lawrence; along Iron Springs Road, between AGS Mine and Blue Beach Marine Terminal

**Purpose:** Extends the mine life, maintains existing AGS jobs while adding new jobs over 2 years of construction/production.

**Smart approach:** Uses existing mill facilities, roads, and port—no new major infrastructure needed.

**The big picture:** Supports St. Lawrence and Newfoundland & Labrador's Critical Minerals Strategy and rural economic development.

# **South Ridge Project** | Proposed Site Plan

**Compact Operation:** Total disturbance area just over 50 hectares.

Small footprint designed to minimize environmental impact, streamline production

- **One pit** (single, high-grade, low-strip pit)
- **Four stockpiles** (topsoil, overburden, two waste rock stockpiles)
- **Aggregate potential –** "Waste rock" is actually high-quality granite material
- **No new mill needed** – all ore will be processed at AGS
- **No new port needed** – concentrate shipped via Blue Beach Marine Terminal
- **Use existing road network** – minimal new road construction required
- **Proven environmental monitoring** – we'll build on established processes

# **South Ridge Project** | Environmental Responsibility

**Regulatory Oversight:** Project will be registered for assessment under Newfoundland & Labrador *Environmental Protection Act*. Registration document compilation is ongoing with the following target submission dates:

- Draft EA registration document – March 13th, 2026
- Final EA registration document – end of April 2026

**Comprehensive Studies:** Baseline environmental data collection and impact assessments underway.

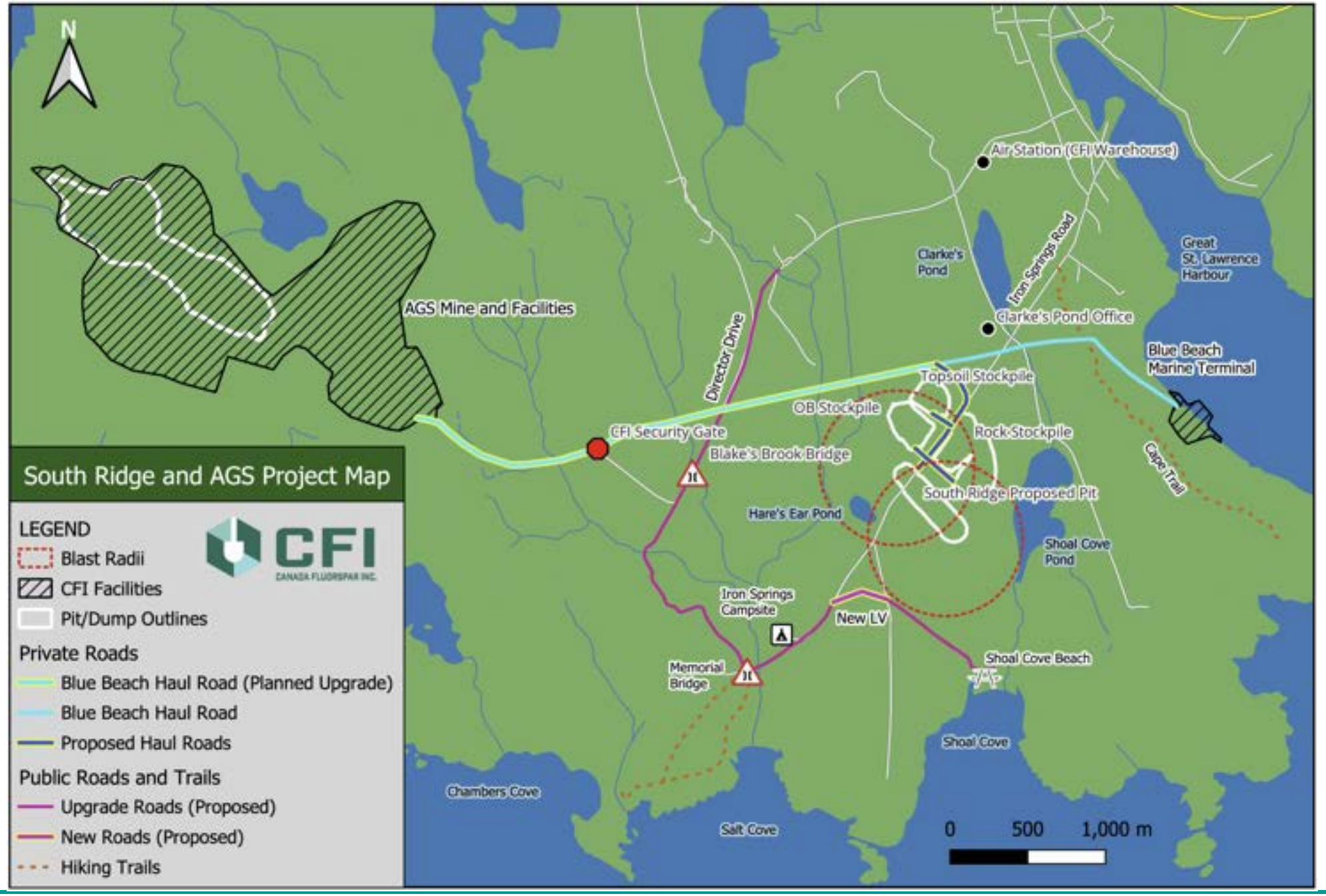
**Water Management:** Sediment control, erosion prevention, and water quality monitoring are matters of critical importance.

**Dust and Noise Control:** Active management plans to minimize disturbance.

**Reclamation Legacy:** Site to be reclaimed and restored to good condition for future generations to use.

# **South Ridge Project** | Project Updates

| Completed to date | Work ongoing |
|---|---|
| ✓Air Emissions Inventory<br>✓Air Quality Dispersion Modelling<br>✓Fish Habitat Survey<br>✓Noise Assessment<br>✓Geochemical Characterization – Static Testing (Phase 1)<br>✓Regulatory and Community Engagement<br>✓Groundwater field program | • Groundwater characterization study<br>• Predictions of water flow and quality<br>• Comprehensive fish and fish habitat impact assessment<br>• Geochemical Characterization – Kinetic Testing (Phase 2)<br>• Bridge designs and structural assessments |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AGS Mine and Facilities
Air Station (CFI Warehouse)
Clarke's Pond
Iron Springs Road
Great St. Lawrence Harbour
Clarke's Pond Office
Director Drive
Blue Beach Marine Terminal
Topsoil Stockpile
OB Stockpile
CFI Security Gate
Rock Stockpile
Blake's Brook Bridge
Cape Trail
South Ridge Proposed Pit
Hare's Ear Pond
Shoal Cove Pond
Iron Springs Campsite
New LV
Memorial Bridge
Shoal Cove Beach
Shoal Cove
Chambers Cove
Salt Cove
0
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1,000 m
South Ridge and AGS Project Map
LEGEND
Blast Radii
CFI Facilities
Pit/Dump Outlines
Private Roads
Blue Beach Haul Road (Planned Upgrade)
Blue Beach Haul Road
Proposed Haul Roads
Public Roads and Trails
Upgrade Roads (Proposed)
New Roads (Proposed)
Hiking Trails

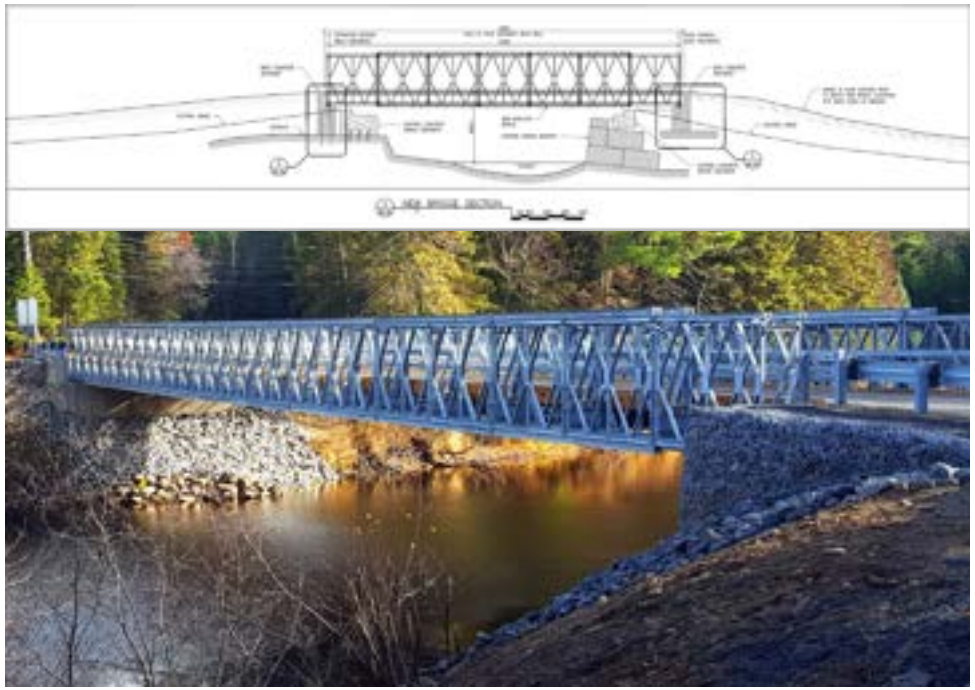
# **South Ridge Project** | Access Roads

# Blake's Brook Bridge Access

CFI has procured an engineering company to assess the structural stability and bridge design options to ensure safe access to recreational areas.

# Memorial Bridge Access

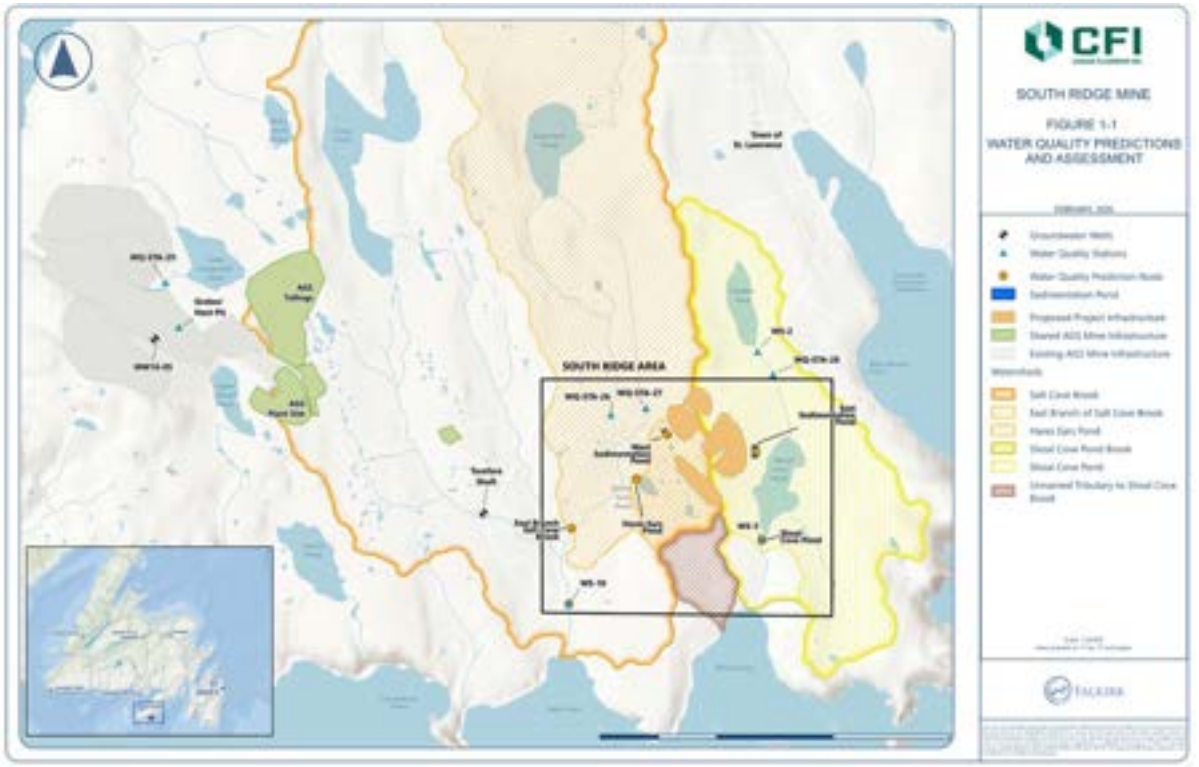
CFI has procured an engineering company to develop a new bridge design upgraded to provide vehicular crossing to ensure safe access to recreational areas.



# **South Ridge Project** | Water Quality

**Potential effects from the Project include:**

- Changes to water flows and levels due to pit dewatering, water diversions and land use changes.
- Changes to water quality due to contact water discharge from East and West ponds and pit dewatering.




**Key findings:**

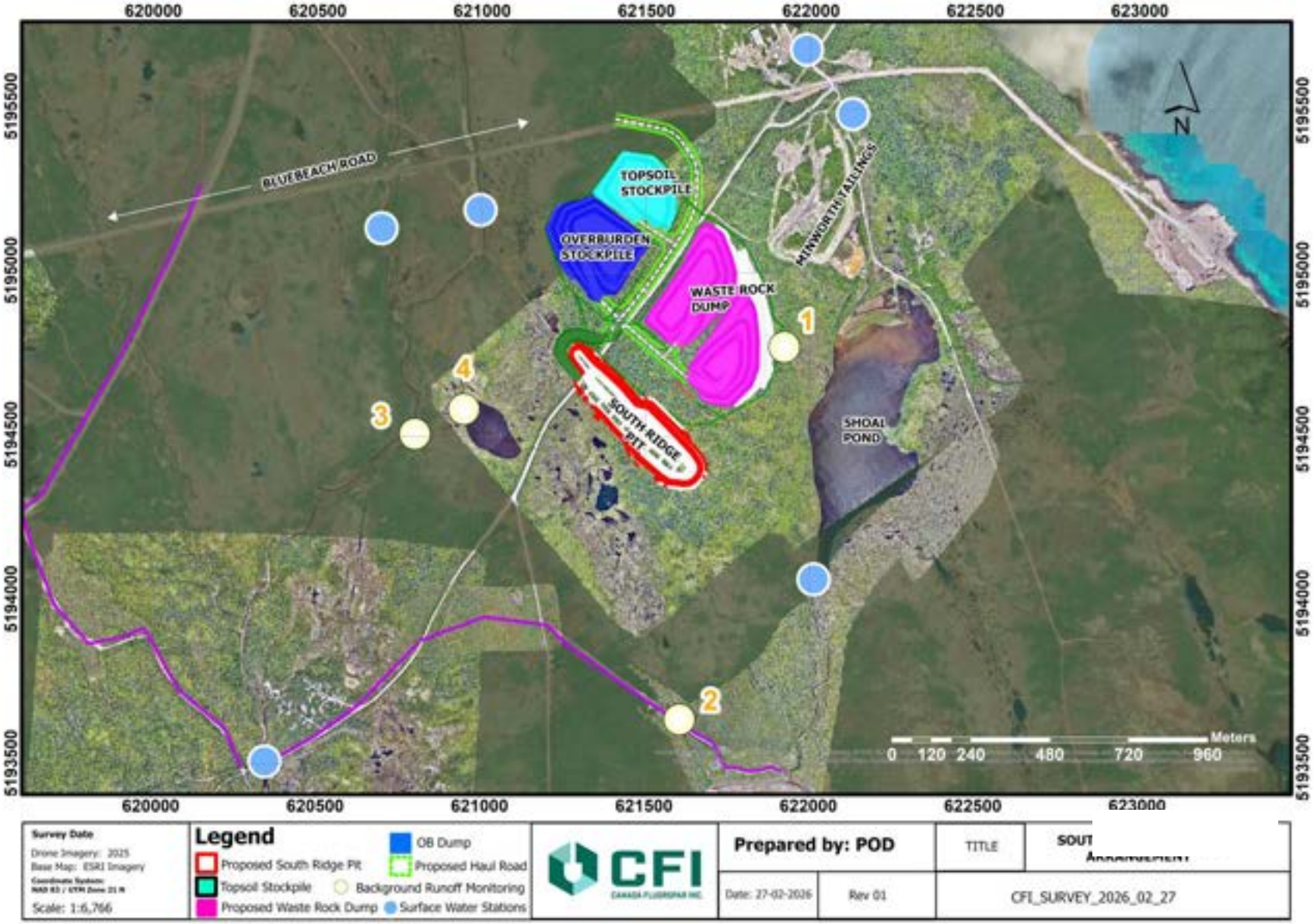
- Projected concentrations of all parameters are below the NFLD ECWSR 65/03 limits.
- Projected concentrations of cadmium (Cd) and zinc (Zn) in the discharge from the East and West ponds are above the CCME guidelines for the protection of aquatic life.

# **South Ridge Project** | Water Management

**Key mitigation measures include:**

- Implementation of an erosion and sediment control plan and water management plan.
- Directing diverted water back to the same watercourse to maintain characteristic water level conditions upstream and downstream of the construction area
- Minimize rate and duration of dewatering to that necessary for safe mining.
- Divert non-contact water to limit contact water.
- Implement measures to reduce the potential for blasting residues to infiltrate into groundwater.

# **South Ridge Project** | Water Management



# **South Ridge Project** | Dust Management

An air dispersion modelling assessment was completed to assess the potential effects of the Project on ambient air quality against ***Newfoundland and Labrador Air Quality Standards (AQS)*** and to predict ground level concentrations of NO2, SO2, CO, TPM, PM10, and PM2.5.

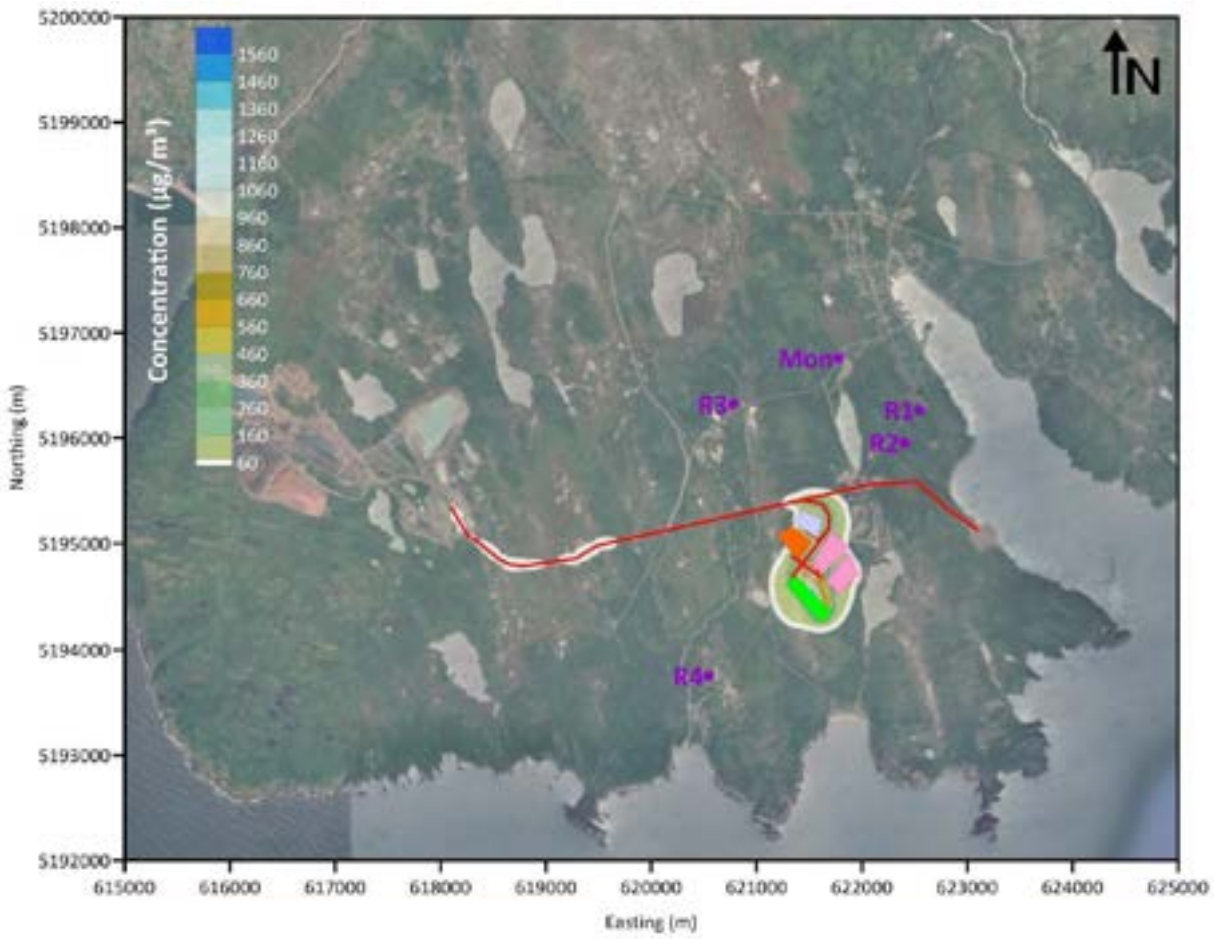
- Conservative scenario based on uncontrolled emissions from maximum expected activity rates.

- The resulting concentrations, indicated that on rare occasions, 24-hour concentration of PM10 and TPM may exceed the NL AQS at nearby sensitive receptors if winds are strong, the roads, stockpiles and pit are extremely dry and production is at maximum.

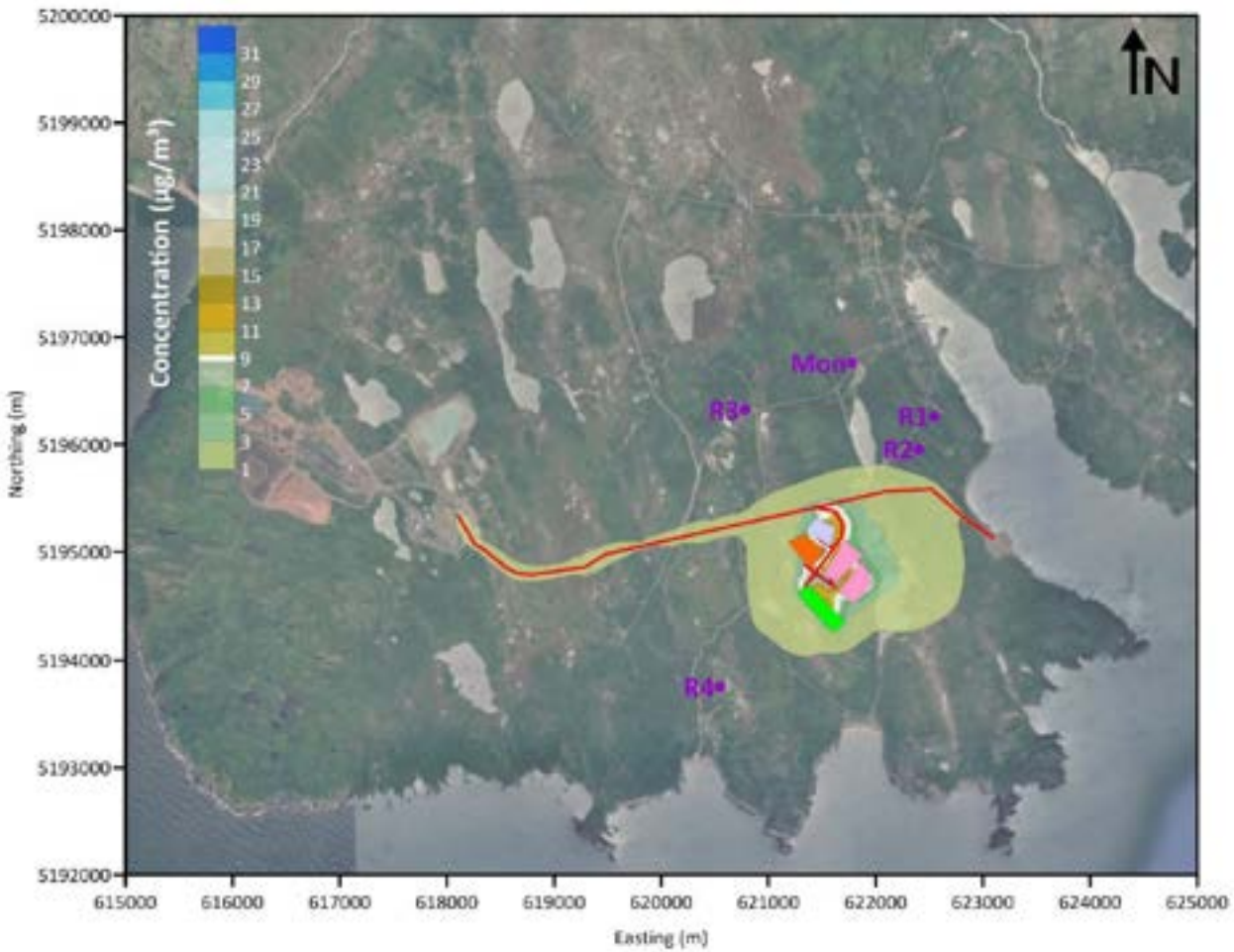
- Standard mitigation measures including road watering and adherence to existing plans for fugitive dust management during such events will curb emissions by 50%, indicating that compliance can be achieved at the sensitive receptors.

# **South Ridge Project** | Dust Management (Annual)

Total Particulate Matter (TPM)



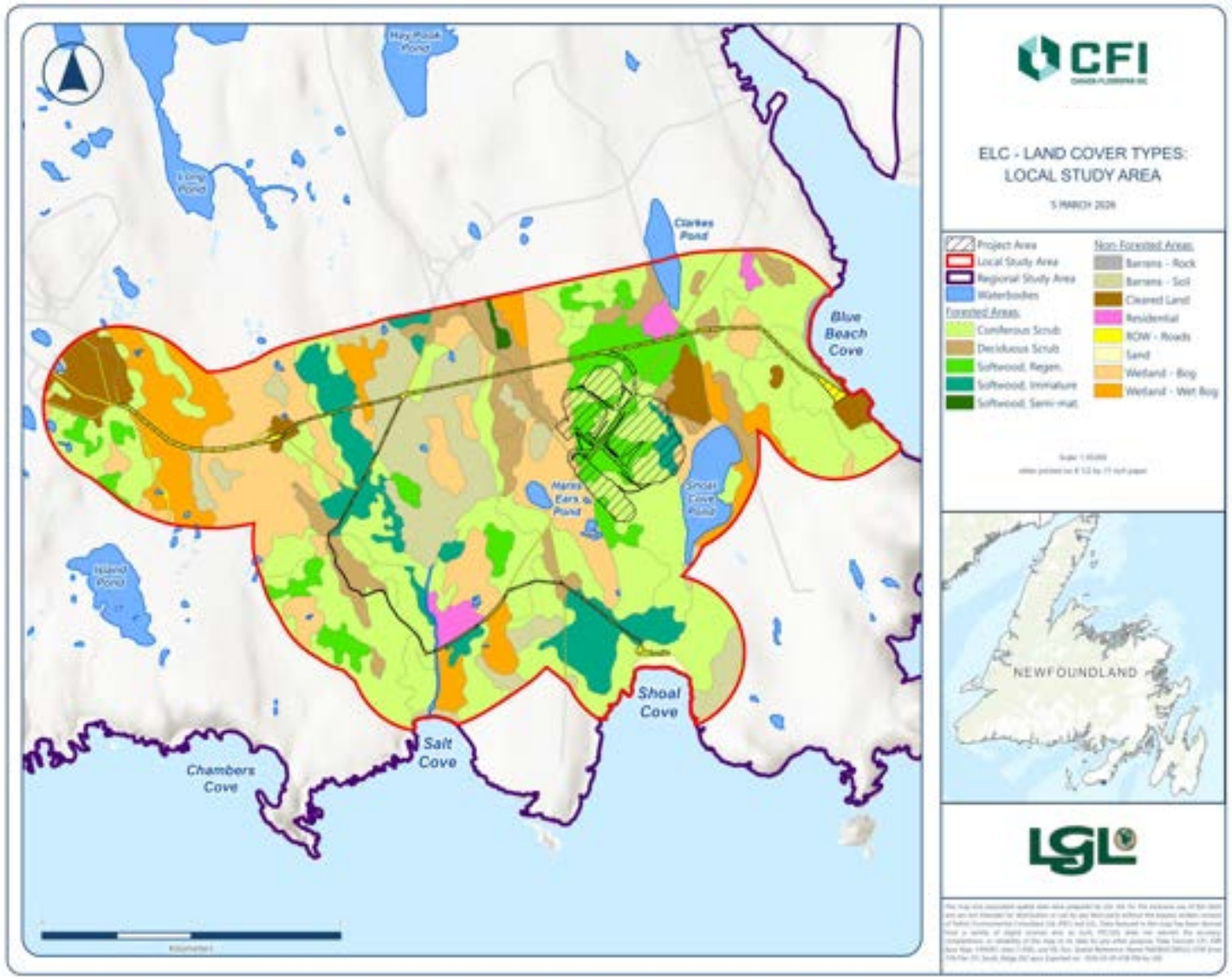

Particulate Matter (PM₁₀)



# **South Ridge Project** | Wetlands & Vegetation

Within the Project Area:

- Forested habitat covers over **72% (42.4 ha)** of the area, primarily consisting of windswept and stunted ‘tuckamore’.
- **19.6% (11.4 ha)** is considered already disturbed (i.e., existing roads).
- Wetlands and waterbodies make up **7.0% (4.1 ha),** largely consisting of bog.



# **South Ridge Project** | Potential Effects on Wetlands & Vegetation

## Loss of Vegetation, changes in species and community diversity

- **42.4 ha** of Forest cover will be removed/disturbed.
- Habitat clearing and changes to hydrology can result in changes in microclimate, vegetation structure, plant dispersal and species composition.
- Fugitive dust from roads, blasting, and exposed waste stockpiles may alter soil chemistry and cause physiological effects in vegetation.
- Vehicle movement and disturbed areas can facilitate the spread of non-native and invasive species within Project Area and adjacent habitats.

## Loss of wetland habitats and changes in wetland function

- **4.1 ha** of wetlands will be lost/disturbed.
- Disturbance to wetlands and alterations to wetland hydrology can affect wetland species composition, wetland function both within Project Area and at watershed level.
- Changes to wetland function could indirectly affect surface and ground water quality, quantity, and flow.

# **South Ridge Project** | Key Mitigation Strategies

**Minimize disturbance:** use existing disturbed areas where possible and clearly flag limits of disturbance. Maintain protective buffer zones around wetlands and waterbodies.

**Erosion & sediment control:** install and regularly maintain sediment controls to prevent runoff into wetlands. Stabilize exposed soils and slopes using grading or erosion-control materials.

**Water management:** Collect and treat contact water using sediment ponds; design drainage systems to manage stormflows. Implement comprehensive surface and groundwater monitoring programs to detect changes early and guide adaptive management.

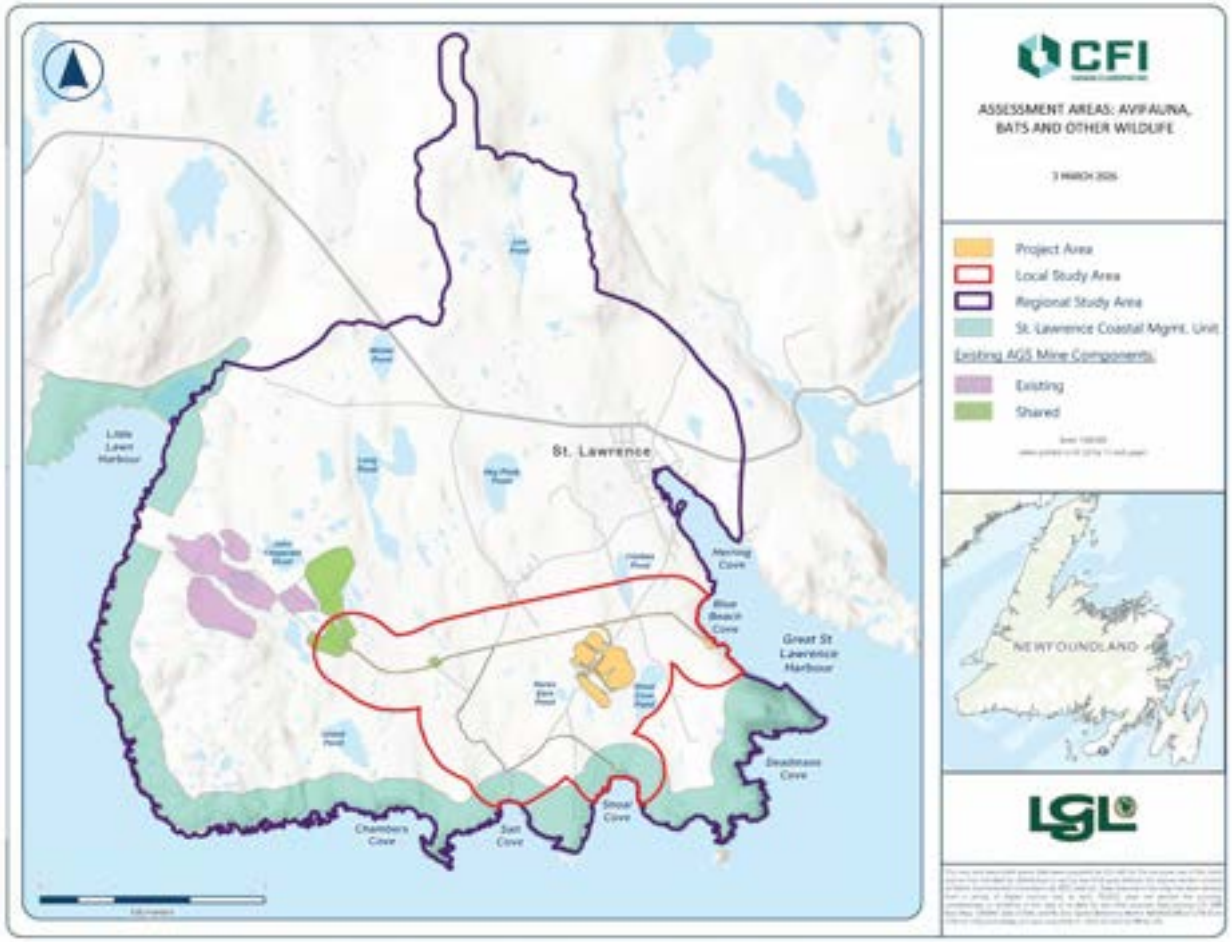
**Hazardous materials management:** enforce strict controls on hazardous materials; secure storage, spill-response procedures, and restrictions on equipment near watercourses.

**Reclamation & closure:** Regrade haul roads and stockpile areas to match natural topography. Re-seed with native vegetation matching original habitat. Post-closure follow-up monitoring will be conducted to determine the effectiveness of decommissioning.

# **South Ridge Project** | Fish, Avifauna, Bats, and Other Wildlife

The potential for occupancy of fish, birds, and bats and other wildlife (including SAR/SOCC) within the Project Area and potential Project related affects were assessed by professional consultants.

- **Project Area (0.58 km$^2$)**
- **Local Study Area (29.6 km$^2$)**
- **Regional Study Area (57.3 km$^2$)**



# South Ridge Project | Fish

**There are three fish SAR / SOCC that could potentially occur in the Project LSA.**

| Species[1] | Status[2,3] | | | Habitat Preferences[4] | Probability of Occurrence in LSA |
|---|---|---|---|---|---|
| | SARA | COSEWIC | NLESA | | |
| Banded Killifish (*Fundulus diaphanus*) | Special Concern | Special Concern | Vulnerable | Shallow, clear water, low current, sandy/muddy substrate and aquatic vegetation | Low |
| American Eel (*Anguilla rostrata*) | Not listed | Threatened | Vulnerable | Freshwater and estuarine habitats; rivers and ponds used for rearing, migration, and overwintering | Moderate to High |
| Atlantic Salmon (*Salmo salar*) (South Newfoundland East) | Under Consideration | Special Concern | Not listed | Rivers and streams with gravel substrates for spawning; rearing and migration habitat in streams and ponds | Moderate to High |

# **South Ridge Project** | Birds

Information gathered from:

- Previous CFI reports
- Bird surveys conducted for St. Lawrence Wind Demonstration Project
- Atlantic Canada Conservation Data Centre (AC CDC)
- Newfoundland Breeding Bird Atlas and other Regional Bird Monitoring Programs
- eBird Database

Three Bird Species At Risk (SAR) and four bird Species of Conservation Concern (SOCC) observed within LSA

© Brett Fried

© Bob Lalonde

© tozjohn

© Jef B.

Seven SAR/SOCC that are not confirmed but are possible or probable within LSA

# **South Ridge Project** | Bats & Other Wildlife

- No existing data on Bat Species that could occur within the LSA.
- Low expected occurrence due to limited suitable habitat and existing disturbances
- Three bat species can occur within the LSA — all are listed as provincial and/or federal SAR.

- No mammal SAR or SOCC that are expected to occur in or near the LSA.

- Four insect SAR/ SOCC have ranges which overlap with the LSA. But likely do not occur within the LSA in high density.

# **South Ridge Project** | Potential Effects on Birds, Bats & Other Wildlife

## Habitat Loss/ Alteration

- Direct loss of breeding and foraging habitats.
- Habitat fragmentation due to vegetation clearing can alter movement patterns.

## Behavioural Disturbance

- Project activities can result in sensory disturbances due to noise, dust, light, pollution, vibrations, human presence.

## Change in Health and Mortality Risk

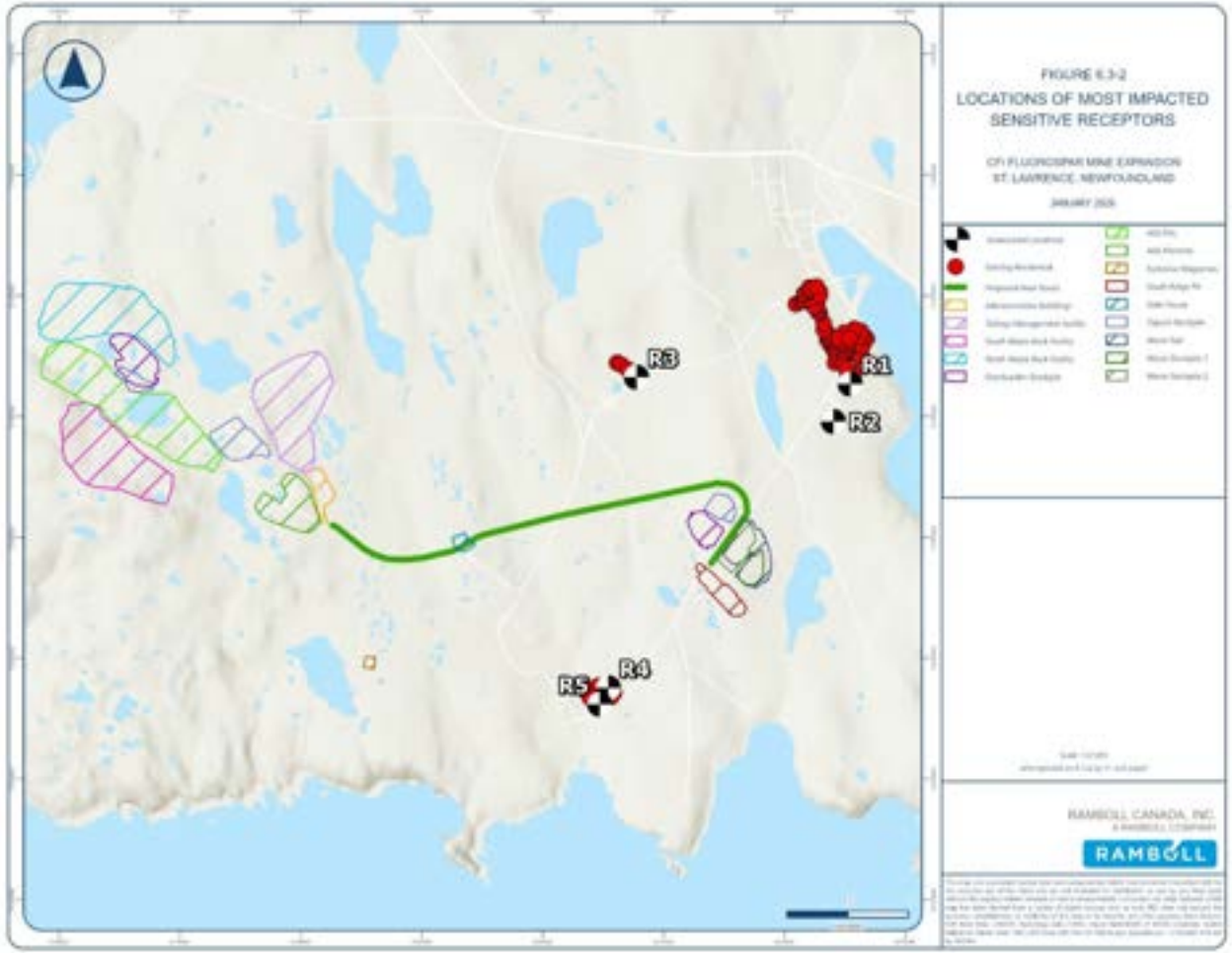
- Direct mortality due to Project activities such as habitat clearing and increased traffic.
- Increase in predation and hunting because of improved access or other habitat changes
- Changes in health due to exposure to toxic substances or waste.
- Changes in wildlife health and survival, including increased stress and/or reduced body condition can indirectly increase mortality risk.

# **South Ridge Project** | Key Mitigation Strategies

- Limit vegetation clearing, optimize project layout, and clearly flag disturbance boundaries.
- Retain undisturbed vegetation buffers around wetlands, watercourses, and other sensitive habitats where feasible.
- Avoid clearing during critical breeding periods; conduct nest surveys before habitat clearing where avoidance is not possible.
- Establish protective buffers around active nests or roosts and ensure compliance with applicable wildlife protection regulations.
- Implement dust suppression measures.
- Reduce noise emissions and limit/shield lighting to minimize disturbance.
- Proper storage and management of fuels, hazardous materials, and wastes to prevent contamination of wildlife habitat.
- Regrade disturbed areas and revegetate with native species during closure to restore wildlife habitat.

# **South Ridge Project** | Noise and Vibration Management

A comprehensive assessment of the Noise and Vibration was completed for the project area to characterize the residual effects of the Project, and the effectiveness of proposed mitigation measures.



# **South Ridge Project** | Noise Management - Construction

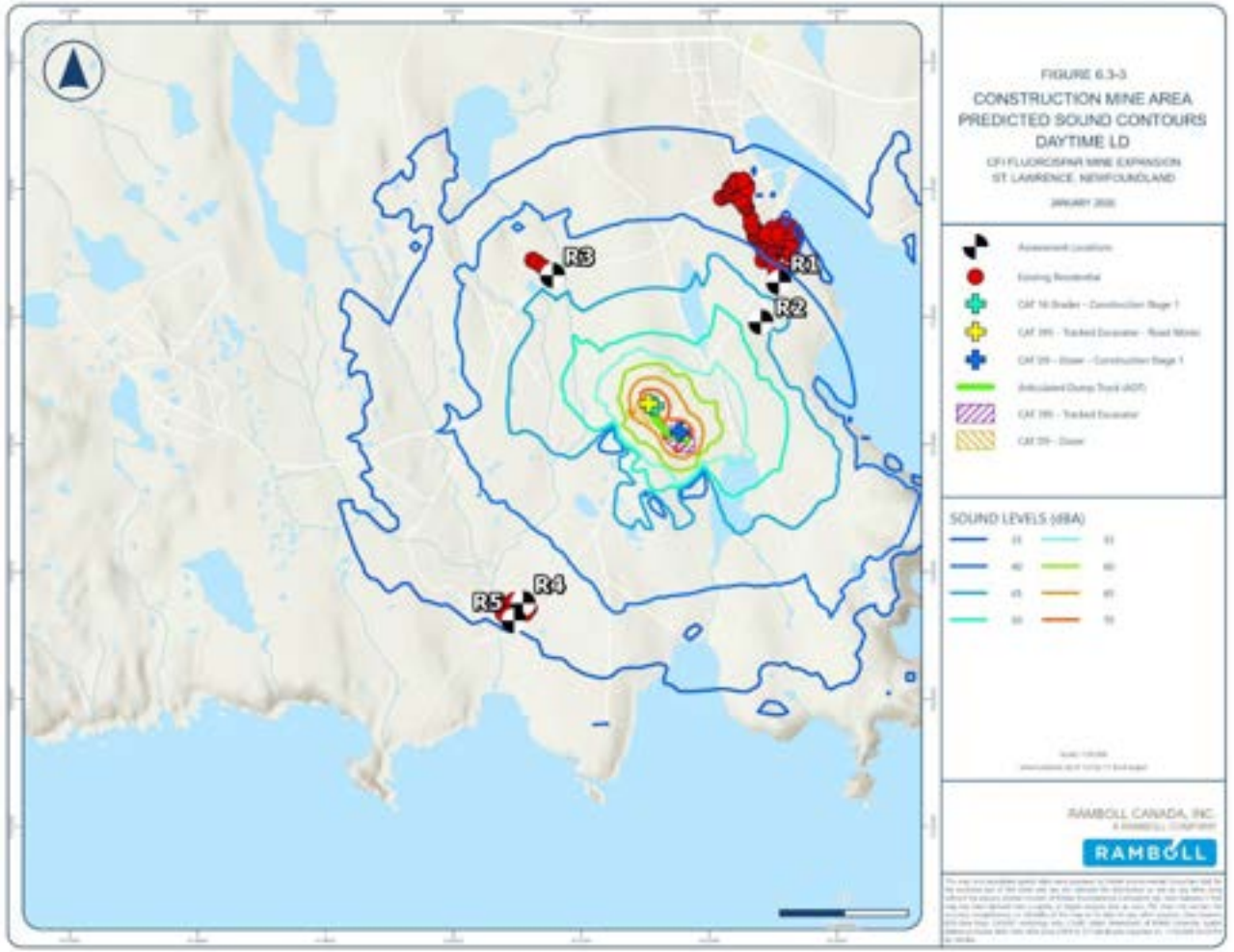
**Daytime-only operations**

Below the 6.5% Health Canada threshold, indicating a low potential for annoyance.

**Nighttime construction**

Predicted increases in nighttime noise at R2, where the proximity to stockpile activities results in elevated noise exposures.

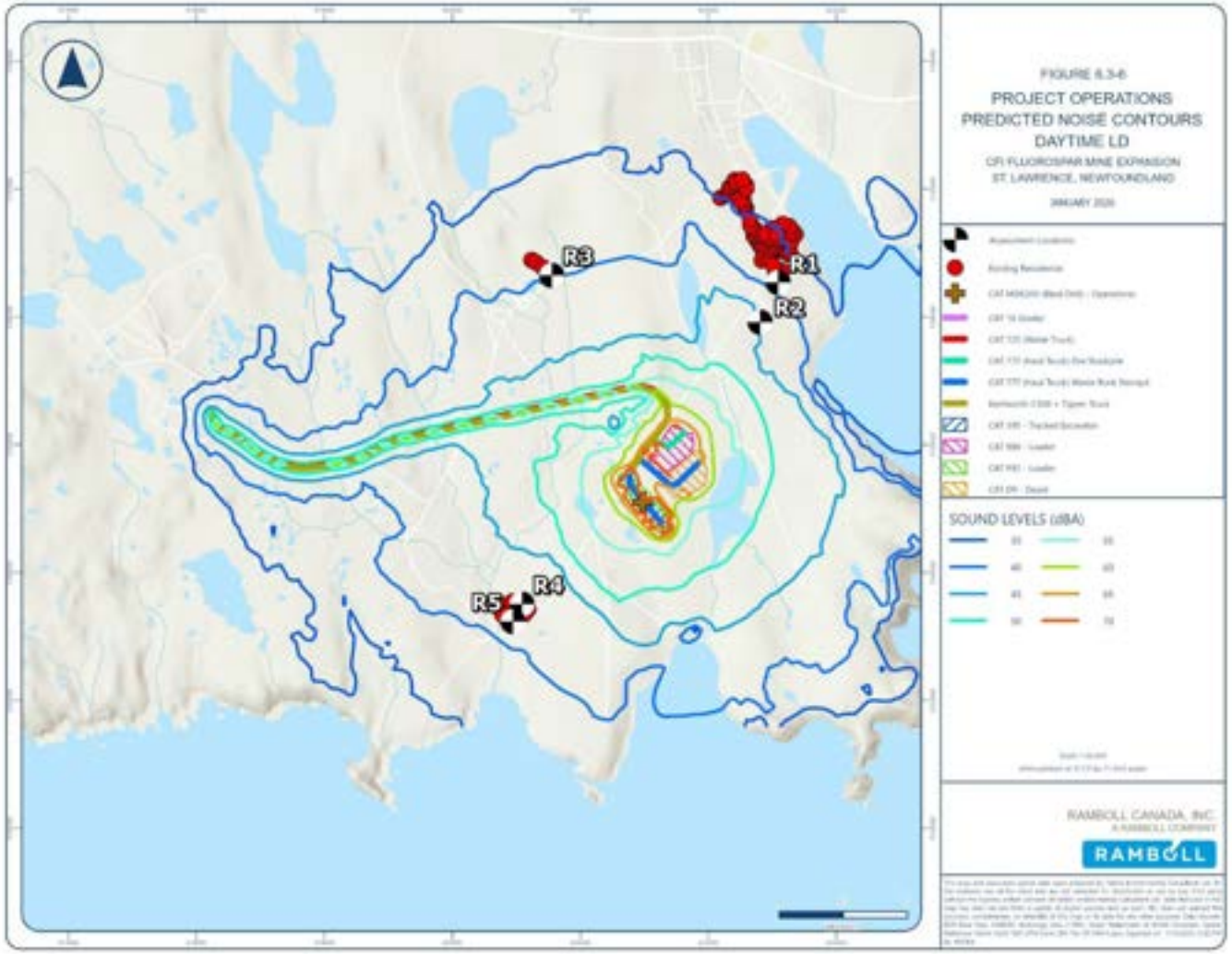
This potential exceedance can be reduced by implementing broadband (non tonal) backup alarms on earthmoving equipment, which would be sufficient to meet the Health Canada nighttime cumulative sound level of 45 dBA for partially open windows.



# **South Ridge Project** | Noise Management - Operations

**Daytime-only operations**

The predicted results are less than Health Canada guidelines at all receptor locations, indicating a low potential for complaints.

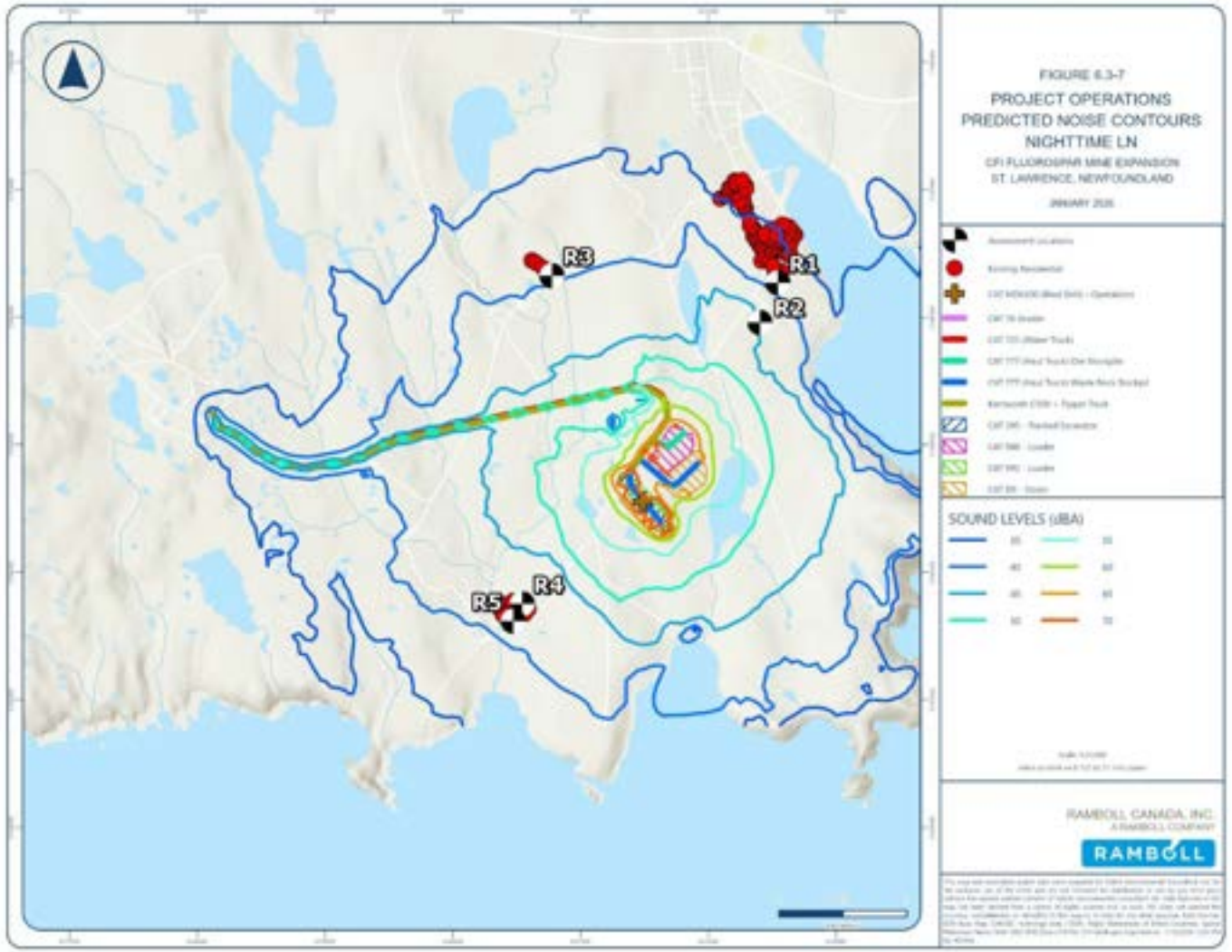


# **South Ridge Project** | Noise Management - Operations

**Nighttime operations**

The results indicate that cumulative nighttime sound levels will be less than or equal to the recommended Health Canada guidance at all receptors.

A potential exceedance may occur at R2, which can be mitigated by using non-tonal backup alarms.



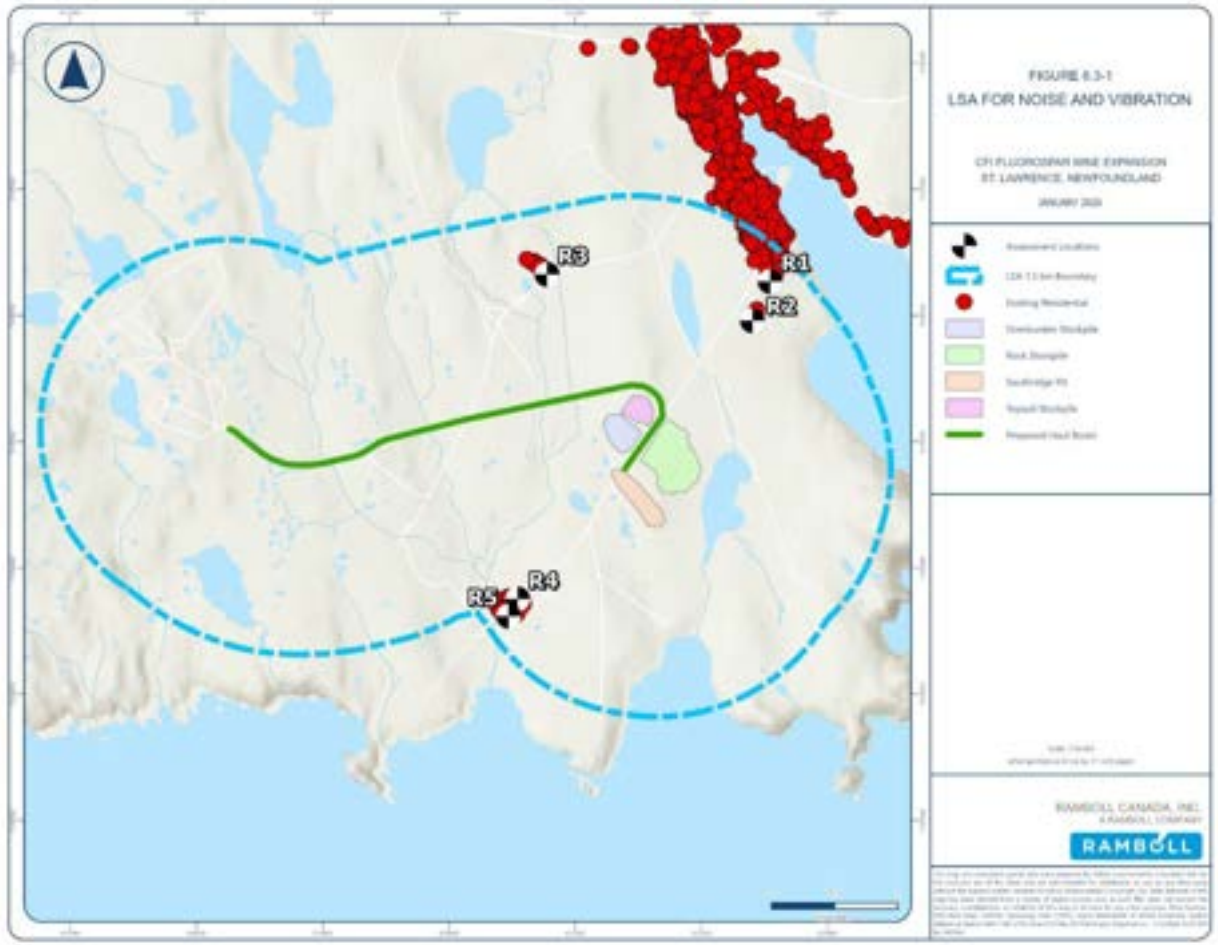
# **South Ridge Project** | Vibration

Blasting during the operations phase is expected to occur at the ore pit. Assessment of potential impacts from vibration and overpressure was conducted.

The results indicate that vibrations will be below the guidance limits found in NPC-119, and damage to structures is not expected, however, vibrations will be perceivable at residential locations.

Potential vibration effects, primarily associated with blasting activities, will be managed through mitigation measures designed to minimize ground vibration transmission and ensure community awareness:

- Electronic detonators
- Advance notification to Community



# **South Ridge Project** | Key Project Activities

| | Duration | Year 1 | | | | Year 2 | | | | Year 3 | | | | Year 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site Construction** | 6 months | | | | | | | | | | | | | | | | |
| **Site Operations** | 18 months | | | | | | | | | | | | | | | | |
| **Site Closure** | 24 months | | | | | | | | | | | | | | | | |

**Phase 1A: Road Revitalization & Construction**

- Revitalize Director Drive road route to provide uninterrupted access to recreational areas
- Make minor improvements to Blue Beach Haul Road while constructing pit/stockpile access roads

**Phase 1B: South Ridge Site Preparation**

- Clear and strip the pit area; build upper bench access
- Clear and strip stockpile areas
- First blast planned for approximately 6 weeks after starting pit preparation

**Phase 2: South Ridge Production Phase**

- Begin production from South Ridge pit while completing stockpile site development
- South Ridge production expected to last for approximately 18 months

**Phase 3: South Ridge Site Closure**

- Cover haul roads with topsoil and re-seed
- Crush rock piles and haul to Blue Beach for sale as construction aggregate material
- Seed and store remaining soil for future reclamation requirements (e.g., AGS)
- **Option** to flood pit, install safety berms and signage

# **South Ridge Project** | Community Engagement

| Audience | Date |
|---|---|
| St. Lawrence Town Council | 11-Aug-25 |
| Public Meeting | 03-Oct-25 |
| St. Lawrence Town Council | 21-Nov-25 |
| Public Meeting | 27-Nov-25 |
| St. Lawrence Town Council | 22-Jan-26 |
| Iron Springs Committee | 19-Feb-2026 |
| Historical Advisory Committee | 4-Mar-2026 |
| St. Lawrence Town Council | 4-Mar-2026 |
| Public Meeting | 9-Mar-2026 |

# Community Investments and Benefits

**Protecting Existing Jobs:** South Ridge extends the life of AGS Mine operations, securing current employment (over 100 employees). Mining careers that support families and keep young people in the community.

**New Jobs and Opportunities:** Additional positions during construction plus 35 new jobs in operation phase. St. Lawrence residents and Newfoundland & Labrador workers come first.

**Supply Chain Opportunities:** Fuel, equipment, maintenance, catering, transportation, local procurement and professional services.

**Economic Ripple Effect:** Mining wages get spent in local stores, supporting everyone.

**Community Partnerships:** CFI is committed to building long-term relationships with local business and contributing to local initiatives, programs, and infrastructure.

**Building on Local Heritage:** This community has deep mining expertise and deep family memories—we benefit from that knowledge and are committed to excellence to sustain this community's proud legacy.

**Provincial Leadership:** Supporting NL's vision as a critical minerals leader in Canada.

# **South Ridge Project** | Next Steps

**Engagement Assessment**

- Continue to engage with St. Lawrence to gather feedback and understand needs/concerns
- Consider input from community members to finalize project design components
- Complete environmental effects assessment focusing on mitigating potentially adverse effects and addressing community concerns

**EA Review Process**

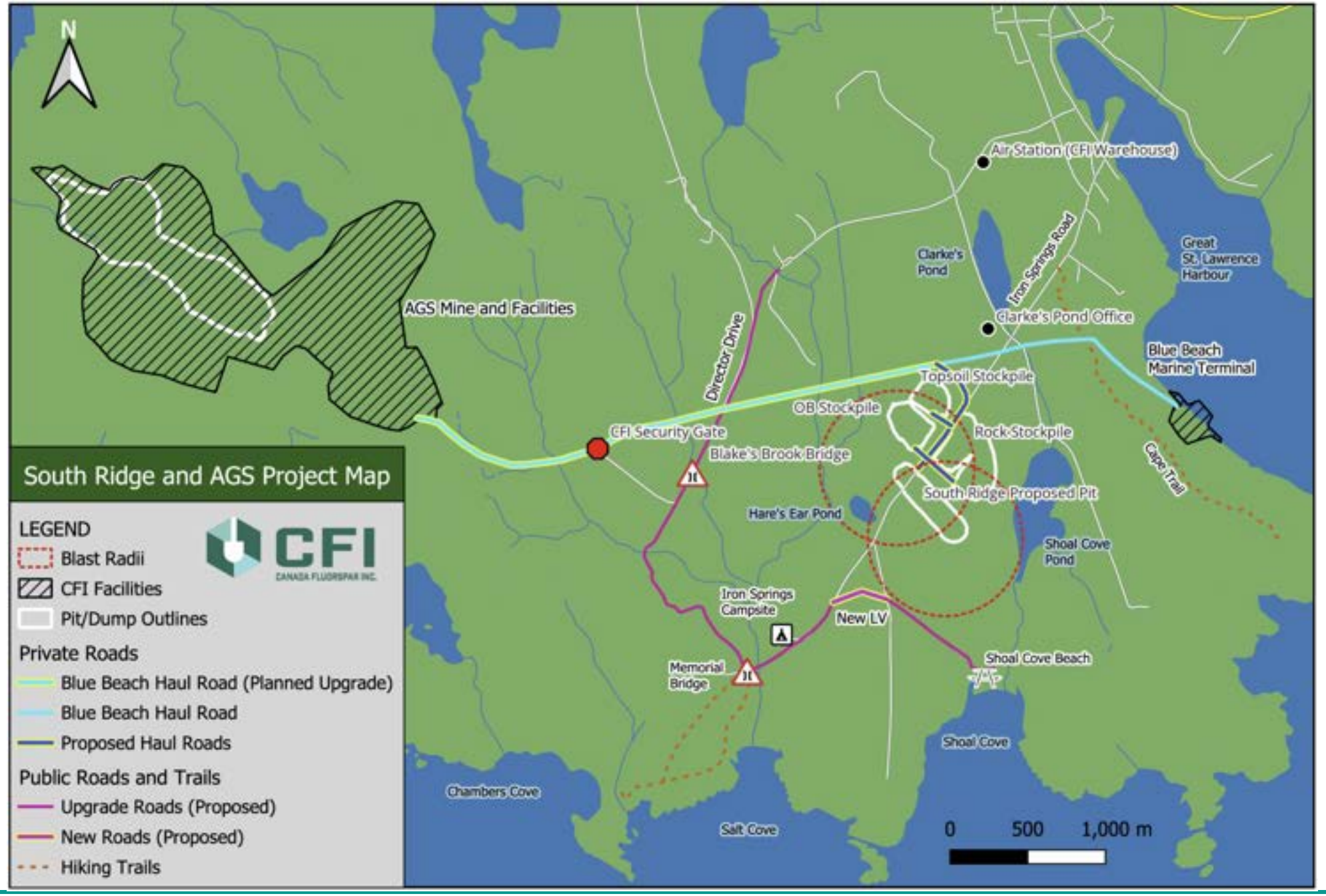
- Submit EA Registration Document – await feedback from public review period
- Work with community and NL EA Division to achieve release from Registration process

**Post-EA Permitting**

- Revise existing Environmental Protection Plan and all environmental monitoring/management plans for AGS to include South Ridge Project area
- Amend existing mining/environmental permits for AGS to include South Ridge

## Contact Information

southridge@canadafluorspar.com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Public Roads and Trails
Upgrade Roads (Proposed)
New Roads (Proposed)
Hiking Trails

# Appendix 4-7: Public Notice Public Information Session on the Proposed South Ridge Project March 9

# PUBLIC NOTICE

Public Information Session on the Proposed

***South Ridge Project***

Shall be held in-person at:

| Community | Date & Time | Location |
|---|---|---|
| St. Lawrence, Newfoundland and Labrador | March 9, 2026<br>6:00-8:00 pm | Stella Maris Hall, 21-23 Water St. E<br>St. Lawrence |

The sessions shall be conducted by the Proponent

*Canada Fluorspar Inc.*

as part of the environmental assessment for the Project.

Contact Information:

southridge@canadafluorspar.com

The purpose of the session is to describe all aspects of the proposed Project, to describe the activities associated with it, and to provide an opportunity for all interested persons to request information or state their concerns.

**ALL ARE WELCOME**

# Appendix 4-8: Public Engagement Session poster for March 9

CFI

CANADA FLUORSPAR INC.

SOUTH RIDGE DEVELOPMENT

# PUBLIC ENGAGEMENT SESSION

YOUR COMMUNITY, YOUR VOICE, OUR COMMITMENT

| | | |
|---|---|---|
| March 9, 2026 | 6-8pm | Stella Maris Hall, St. Lawrence |

| | |
|---|---|
| EMAIL | southridge@canadafluorspar.com |

# Appendix 4-9: Exit Survey Public Information Session March 9

# EXIT SURVEY
# Public Information Session
# March 9, 2026

*We appreciate your interest in this Public Information Session for the*
***Proposed South Ridge Project**.*
*Please take a few minutes to complete this survey. Your feedback is very important to us.*

1. **How did you learn about this Public Information Session (please check all that apply)?**

- ❑ Online Telegram Newspaper Ad
- ❑ Notice Posted in Community
- ❑ Other
- ❑ Facebook
- ❑ Friend / Word-of-Mouth

_____

2. **In which community do you live?** _____

3. **Was the information in the presentation and at the information stations useful?**

- ❑ Very useful, a lot of new information
- ❑ Somewhat useful, some new information
- ❑ Neutral, no new information
- ❑ Not very useful, need more information

4. **What types of recreational activities (if any) do you participate near the proposed South Ridge Project?**

- ❑ Walking/Hiking
- ❑ Cross-Country Skiing
- ❑ ATV
- ❑ Trouting
- ❑ Swimming
- ❑ Camping
- ❑ Bird Watching
- ❑ Other _____

Please explain where: _____

5. **Do you or anyone in your family work with CFI or with a CFI contractor or supplier?**

- ❑ Yes
- ❑ No

6. **Do you support the Proposed South Ridge Project?**

   ❑ Yes ❑ No

7. **Please rank the following in order of importance to you. 1 is the most important, 5 is the least important.**

| | | | |
|---|---|---|---|
| Health/Safety | _____ | Local Benefits | _____ |
| Jobs /employment | _____ | Other (describe) | _____ |
| Environment | _____ | _____ | |

8. **What advantages do you see for proposed Project?**

_____

_____

9. **What disadvantages do you see for proposed Project?**

_____

_____

10. **Please provide any additional questions or comments related to the Project. List any information you need. (you can also use the comments sheet at the entrance to the room)**

_____

_____

**OPTIONAL: Please provide your contact information below if you would like to receive Project update information. Note that the answers to your questions will remain confidential.**

**Your Name/Email/Phone** _____

***Thank you for taking the time to fill out this survey.***
***For more information, please contact us at [southridge@canadafluorspar.com](mailto:southridge@canadafluorspar.com)***

# Appendix 4-10: CFI Public Information Session for South Ridge Project Report

**CFI Public Information Session for South Ridge Project Report**

March 9, 2026

Stella Maris Hall, St. Lawrence

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Public attendance:  59 signed in plus CFI employees and contractors

At entry, most attendees signed registration form, were provided with an updated brochure, a survey and comment sheet to voluntarily complete by the end of the session,

Mayor Kevin Pittman

- Welcomed residents of St. Lawrnce
- Explained that there were Town Council several meetings with the company express interests and raise and address concerns from citizens and council, and to review proposed mitigations and plans
- Encouraged those attending to review the presentation and information materials, ask questions and seek clarity on the development of South Ridge

Interests and Concerns discussed:

- Concern about vehicle access to Chamber Cove if Memorial Bridge provides vehicular access – CFI is discussing options with the Historic Advisory Committee, that could include restricting vehicular access to the memorial site
- Interest in accessing Environmental Assessment Registration document to review and provide comments – CFI to provide detailed information on where to find it on Govt NL website; CFI team available via the southridge@canadafluorspar.com email; CFI explained the timeframe for public and government review once the final document is submitted at the end of April 2026
- Interest in timeline and length of South Ridge Project – CFI responded it is intended to be two-year operation for mining fluorspar; four years with construction of roads in the beginning, and closure afterwards
- Concern about noise levels at Shoal Cove Beach – CFI responded that noise baseline study concluded there would be little or no noise impact at the beach, and intended mitigations using noise reduction equipment and newer blasting processes and techniques
- Concern about contaminates in dust and water – CFI explained that baseline studies determined minimal levels that would mitigate by dust management and water filtration and management practices
- Concern about water drainage to Shoal Cove Beach – CFI responded that water would be contained and mitigated if needed, and prevented from intersecting within

two water shed areas before discharge into the environment. Continuous monitoring and sampling occur.

- Interest in if additional environmental assessment will be required for the open pit itself – CFI responded that this EARD will be for the full South Ridge Project, including pit construction, mining operations, as well as rerouting roads from Iron Springs Road closest to the operation.
- Concern about water contamination and management, and if it would be better than former operations that at times killed fish and produced brown water – CFI responded that there were extensive improvements and installations for water management, and compliance with regulations.
- Interest if the new Memorial Bridge would be accessible for driving and towing campers and recreational vehicles, and waste management trucks to collect garbage at Iron Springs Campground – CFI responded the bridge will have accessibility for such vehicles, as well as for ambulances and other light trucks but not heavy mine haul trucks
- Concern about dust management when construction combines with typical dry summertime conditions, thereby creating overflow dust – CFI described intended dust management, including water and calcium chloride on graded roads, and water on roads and areas of South Ridge construction noting that results indicate minimal dust exceedances that can be mitigated with management practices
- Interest in number and types of water trucks – CFI explained there will be three new trucks in a new yellow fleet, that will expand its capacity and reach in dust management on roads, the AGS mine, and South Ridge. The trucks will be similar
- Question about Blue Beach repairs, if there will be anchoring for the barge, and continued investment in a permanent wharf – CFI responded that while the public meeting was focused on the South Ridge Project, the company is conducting full engineering reviews to determine designs that will be more functional, including using anchoring systems when the barge is being used until a more permanent facility is developed in the future if an when viable
- Question if the new road reroute from Director Drive will be close to sink holes – CFI responded it would not, demonstrating location on the map; and that Govt NL continues to monitor sink hole situations and did not pose any concerns with the proposed road layout
- Question if there is any other drilling for potential fluorspar ore near Iron Springs Road and South Ridge – CFI responded that there has been no indication of ore bodies in the area, having completed condemnation drilling to determine locations

for stockpiles; there are mining leases in the area should CFI explore further in the future

- Concern for protecting children who are known to use Iron Springs Road, on their way to Shoal Cover Beach and in the general area, when construction begins - CFI responded it would have a full program of safety measures, including fencing, security, and public awareness with youth and with parents to ensure there is full knowledge about the changes to the area

Addition interests and concerns submitted on comment forms

- Recommendation for school presentation to youth about the project and safety
- Concern about small red birds nesting by Iron Spring Road, and what is acceptable fatality rates for birds
- Interest in other options for road routes e.g. from Blake's Brook, before the bridge, to connect to Shoal Cove Road.
- Interest in the type, and length of time, of disruption during bridge construction.
- Interest in the amount of drilling completed at Director, and the findings.
- Interest in if underground mining plans are included in this EARD.
- Interest if CFI has explored the Tarefare 2 deposit – the shaft was sunk but no ore was hauled out when the former company closed operations.
- Interest in plans for waste stockpiles and aggregate process.
- Interest in weight capacity of bridges, and whether they are accessible to graders, loaders and dump trucks with materials for road maintenance to Iron Springs and beach road.
- Interest in expected tonnage from South Ridge, and its grade, and contaminants.
- Interest in expected recovery rate of mill, compared to AGS.
- Interest in being able to fish at Salt Cove Gut; and if it will be contaminated as seen before at AGS.
- Support for production and jobs for the area.
- Support overall improvement in road network when pit is closed.

# Appendix 4-11: CFI South Ridge Support Letter

# Town of St. Lawrence

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**Kevin Pittman**
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Councillor

**Colleen Miller**
Councillor

**Lisa Loder**
Councillor

**Karl Tarrant**
Councillor

**Amanda Edwards**
Clerk/Manager


March 10, 2026

Canada Fluorspar Inc. (CFI)
PO Box 337
St. Lawrence, Newfoundland
A0E 2V0

**Re: Letter of Support – Canada Fluorspar Inc. (CFI) – South Ridge Development**

On behalf of the Town of St. Lawrence, we formally extend our support to Canada Fluorspar Inc. (CFI) for the operation of the proposed South Ridge Development within our community. As the governing council for St. Lawrence, we acknowledge that Canada Fluorspar Inc. (CFI) has addressed community, environmental, and tourism concerns regarding their mining development. CFI has committed to safety, land preservation, and maintaining access for both residents and visitors to enjoy the area's scenic features.

The mining of the mineral Fluorspar in St. Lawrence, Newfoundland, is an opportunity for Canada Fluorspar Inc. (CFI) to position the province as the sole producer of this critical mineral in North America. Fluorspar, the primary source of fluorine, is emerging as a pivotal mineral in industries ranging from nuclear energy to electric vehicle (EV) battery production. A Critical Mineral in the Global Energy Transition.

The Town of St. Lawrence fully supports the strategic move to mine the high-grade quality of the mineral at the South Ridge Site to broaden the supply chain for the critical mineral. The project will also benefit the economic priorities of the community and the province. Mining at this proposed location will help grow the company and support the development of its workforce.

We request your consideration of the entire project, including its benefits for St. Lawrence, the region, and Newfoundland.

Kind Regards,

*Kevin Pittman*

_____

**Mayor Kevin Pittman**
**Town of St. Lawrence**

# Appendix 6.2-1: South Ridge Project Air Emissions Assessment Report

# Appendix 6.2-1

## South Ridge Project Air Emissions Assessment Report

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# Appendix 6.2-1
## South Ridge Project Air Emissions Assessment Report

| | |
|---|---|
| Project name | **CFI South Ridge Project EA Registration – Air Quality Assessment** |
| Project no. | **324001177** |
| Recipient | **Canadian Fluorspar Inc.** |
| Document type | **Report** |
| Version | **Final** |
| Date | **April 2026** |
| Prepared by | **James Hindson, Tuğçe Erdem, Lulu Li** |
| Checked by | **Xiaoxi Song** |
| Approved by | **Francis Ries** |
| Description | **Air Emissions Assessment Report** |

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– Process Flow Diagrams
Attachment 2
– Summary of Input Parameters (A: Baseline; B: Effect Assessment)
Attachment 3
– Air Emission Calculation Sheets (A: Baseline B; Effect Assessment)
Attachment 4
– GHG Emissions Calculation Sheets

# Acronyms and Abbreviations

| | |
|---|---|
| BACT | Best Available Control Technology |
| BMPs | BMPs |
| CFI | Canada Fluorspar (NL) Inc. |
| DMS | Dense Media Separation |
| DPM | Diesel Particulate Matter |
| EA | Environmental Assessment |
| FDMP | Fugitive Dust Best Management Practices Plan |
| GHG | Greenhouse Gas |
| GHGPRP | Greenhouse Gas Emissions Reporting Program |
| GNP | Grebes Nest Pit |
| hp | Horsepower |
| MECP | Ministry of the Environment, Conservation and Parks |
| MW | Megawatt |
| NL | Newfoundland and Labrador |
| $NO_2$ | Nitrogen Dioxide |
| NOx | Oxides of Nitrogen |
| PM | Particulate Matter |
| PDCA | Plan-Do-Check-Act |
| ROM | Run of Mine |
| $SO_2$ | Sulfur Dioxide |
| TMF | Tailings Management Facility |
| TSP | Total Suspended Particulates |
| WMO | World Meteorological Organization |
| WRI | World Resources Institute |



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# 1. Introduction

This Air Emissions Assessment Report was prepared by Ramboll Canada Inc. (Ramboll) on behalf of Canada Fluorspar (NL) Inc. (CFI) and is part of the Environmental Assessment (EA) Registration for the proposed South Ridge Project (the Project). This report documents the assumptions, input parameters and methodologies used to develop the air emissions assessment which evaluates air and GHG emissions on an annual basis.

A CALPUFF air dispersion modelling study, focusing on short-term air quality impacts from the Project using a worst-case scenario along with a dust mitigation measure memorandum are prepared by Independent Environmental Consultants (IEC) and presented under a separate cover.

Detailed descriptions of the operating phases are presented in Section 2. Section 3 summarizes the sources and associated compounds that are emitted as well as which sources were not considered to be significant, and therefore, were not included in the inventory. Discussion of the baseline emissions assessment is provided in Section 4. Emissions inventories, input parameters and comparison to the baseline assessment are provided in Section 5.

# 2. Project Overview and Operating Phases

The Project is a proposed satellite pit located East of the AGS Mine site, and West of the Blue Beach Marine Terminal, which is part of AGS Mine's supporting infrastructure. The Project would operate as a hub-and-spoke extension of the existing AGS mine and no new processing or tailings facilities are proposed; the Project will make use of the existing haul roads, AGS Mine mill, and Blue Beach Marine Terminal for ore transport/processing/ haulage functions. The Project is approximately 4km S-SW of the Town of St. Lawrence and falls within an area zoned by the Town of St. Lawrence for mining activities. The overall Project location is shown on Figure A1 below.



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**Figure A1: Project Location**

The Project will include construction, operation, closure of the proposed South Ridge pit located East of the AGS Mine site.



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Construction activities will take place during the first 6 months of the South Ridge project. Some operational activities will commence as early as Month 2 and ramp up to reach peak production by the end of Year 1 and last for a total duration of approximately 18 months. The closure phase will take place for 6 months at the end of the operation phase. Recognizing that there are overlapping periods and common equipment used during transition periods, the project phases for the purpose of this study are defined as follows:

- Construction Phase: Month 1 to Month 6
- Operation Phase: Month 7 – Month 18
- Closure Phase: Month 19 – Month 24

Of the three phases of the Project, the construction and operation phases have the potential to result in adverse impacts on local air quality. The closure phase is expected to have similar activities to the construction phase; however, given the reduced number and areas of activities that will occur during this phase, the magnitude of the associated emissions will be lower. It is also expected that the revegetation of disturbed areas during closure will reduce fugitive dust emissions from wind erosion across the Project area.

An air emission inventory was developed for Year 1 of South Ridge Project when the highest annual emissions are expected. The Year 1 air emission inventory considered emissions from both the construction and operation phases, as described in Section 2.1 and Section 2.2 below.

Process Flow Diagrams for the activities occurring during construction and operation are provided in Attachment 1.

## 2.1 Construction Phase

During the Construction Phase of the Project, bulldozing will occur in the overburden dump, waste rock dump and topsoil storage areas to prepare the sites for material storage. Material will be loaded into the overburden, waste rock and topsoil stockpiles, as areas are cleared for pit development to occur. During the site preparation and construction phase, fugitive dust, metals and vehicle exhaust emissions will occur due to movement of equipment and handling of dust generating materials. Drilling and blasting activities will occur at the open pits to support pit development. There will also be emissions from the surface of the pits.

The South Ridge pit will be dewatered to allow for the excavation of a portion of pit during construction. A 150 horsepower (hp) diesel pump has been assumed for pit dewatering.

CFI has implemented a Fugitive Dust Best Management Practices Plan (FDMP) for the control of fugitive dust emissions for the construction and current operation of the AGS mine. CFI will expand this FDMP to provide dust suppression measures for activities that generate fugitive dust throughout the different phases of the South Ridge Project.

## 2.2 Operation Phase

Activities taking place during the Operation Phase of the Project are expected to be very similar to those during the Operation Phase of the current AGS mine with the exception that the extraction activities will take place in the South Ridge pit and the extracted ore materials from the South Ridge Pit will be transported to the Run of the Mill (ROM) pad at the AGS mill via haul trucks.

Drilling will take place in the South Ridge open pit in preparation for blasting. Both ore and waste rock material will be blasted in the open pit.



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Information on the open pit mining diesel equipment fleet for both the construction and operation phases was provided by CFI. This fleet includes a variety of different pieces of equipment, all of which have been assumed to be operating simultaneously during each phase.

Ore extracted from the South Ridge pit will be transported to the ROM at the AGS mill via haul trucks. Waste rock extracted will be stockpiled on the surface at designated stockpile areas near the South Ridge pit[1]. There will also be various transfer points where ore or fluorspar concentrate will be transferred via conveyors or loaded into product stockpiles in the concentrate storage building at the AGS mill. Fugitive dust emissions will occur from haulage on unpaved roadways as ore is hauled out of the pits to the mill, as waste rock and overburden is hauled from the mines to the dumps, and as fluorspar concentrate and dense media separation (DMS) float products are hauled from the mill site to the Marine Terminal, where they are loaded onto ships. Fluorspar concentrate and DMS float products will be stored at the mill site until transport; therefore, there will be no stockpiling of materials at the Marine Terminal. Annual projected throughputs for each individual material handling activity provided by CFI were used for the purpose of this inventory.

Emissions from the auxiliary engines of ships docked at the Marine Terminal have also been accounted for in this assessment, based on data provided by CFI.

CFI has implemented a Fugitive Dust Best Management Practices Plan (FDMP) for the control of fugitive dust emissions for the construction and current operation of the AGS mine. CFI will expand this FDMP to provide dust suppression measures for activities that generate fugitive dust through out the different phases of the South Ridge Project. A baghouse dust collection system will serve the mill crushing circuit and collect dust from the primary, secondary and tertiary crushers; screening; transfer points; and fine ore bin loading.

After ore is crushed in the crushing circuit, the material will be screened and washed. Hydrocyclones will de-slime and further separate materials by particle size, with oversize particles undergoing further grinding in a ball mill. Ball mill hydrocyclones will separate the re-ground products, with undersize material proceeding to the sulphides/slimes flotation circuit to remove sulphides from the ore prior to fluorspar concentrating. Material will flow through a series of flotation cells, with a 10% potassium amyl xanthate solution as the flotation collector. The use of the potassium amyl xanthate product in the flotation circuit has been assumed to result in emissions to air of carbon disulphide and pentanol.

Flotation tailings generated at the mill will be discharged into a TMF centred on Shoal Cove Pond, where tailings were disposed of historically. Material will be conveyed as a slurry by pipeline. The pond liquor may contain residual potassium amyl xanthate from the flotation processes, which has been assumed to have the potential to result in further carbon disulphide and pentanol emissions.

# 3. Assessment of Compounds and Study Scope

## 3.1 Sources and Contaminants Considered in the Assessment

Table A1 provides a summary of the activities related to Year 1 of the Project for which emissions were estimated as well as a summary of the compounds released.

[1] The waste rock materials will be crushed by a mobile portable crusher and shipped to the marine terminal by truck during the last 6 months of the operation phase in Year 2.



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Consistent with Golder Associates 2015 Air Emissions Inventory Report [1] developed support of the Environmental Assessment for AGS Mine, metal speciation was included for certain sources where metals were expected to be present in the dust generated. Specifically, sources involving ore and waste rock included speciation for metals such as antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lithium, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc. These sources include various material handling, bulldozing, stockpile wind erosion, drilling, blasting and vehicle travel on onsite roads associated with the project construction and operation phases. Sources that did not involve ore and waste rock, such as general material handling, bulldozing activities, and vehicle travel on public roads, did not include metal speciation.



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**Table A1: Sources and Contaminants Released Associated with the Project (Year 1)**

| Source ID | Description | Expected Contaminants* |
|---|---|---|
| OB_MH | Overburden Material Handling | PM, $PM_{10}$, $PM_{2.5}$ |
| OB_BD | Overburden Bulldozing | PM, $PM_{10}$ $PM_{2.5}$ |
| C_WR | Waste Rock Material Handling | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| WR_BD | Waste Rock Bulldozing | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| TP_BD | Topsoil Bulldozing | PM, $PM_{10}$ $PM_{2.5}$ |
| TP_MH | Topsoil Material Handling | PM, $PM_{10}$ $PM_{2.5}$ |
| Stockpile_OB | Wind Erosion from Overburden Stockpile | PM, $PM_{10}$ $PM_{2.5}$ |
| Stockpile_Topsoil | Wind Erosion from Topsoil Stockpile | PM, $PM_{10}$ $PM_{2.5}$ |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| SRP_DWP | Diesel Powered Dewatering Pump | PM, DPM, $PM_{10}$, $PM_{2.5}$, CO, $NO_x$, $SO_2$ |
| PIT_DB | Open Pit Drilling and Blasting | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc, CO, $NO_X$ |
| PIT_EQUIP | Open Pit Mining Equipment | PM, $PM_{10}$, $PM_{2.5}$, CO, $NO_X$, $SO_2$ |
| MILL_EPG | Emergency Diesel Generator at Mill | PM, DPM, $PM_{10}$, $PM_{2.5}$, CO, $NO_X$, $SO_2$ |
| ORE_MH | Above-Ground Ore Material Handling | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| OP_WR | Waste Rock Material Handling | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| ONSPEC | On-spec Concentrate Stockpile Loading | PM, $PM_{10}$ $PM_{2.5}$ |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | PM, $PM_{10}$ $PM_{2.5}$ |
| DC | Ore Crushing Circuit Dust Collector | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| SULPH | Sink Product Sulphide Flotation | Carbon Disulphide, Pentanol |
| TL | Haul Truck Loading for Transport to Marine Terminal | PM, $PM_{10}$ $PM_{2.5}$ |
| MAR_TD | Transfer from Trucks into Ship Feeder | PM, $PM_{10}$ $PM_{2.5}$ |
| MAR_CONV | Loading onto Ship via Covered Conveyor | PM, $PM_{10}$ $PM_{2.5}$ |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | PM, $PM_{10}$, $PM_{2.5}$, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc |
| UPR4 | Unpaved Road from AGS to Marine Terminal | PM, $PM_{10}$, $PM_{2.5}$ |
| TAILS | Tailings Pond | Carbon Disulphide, Pentanol |
| SHIP_1 | Auxiliary Engine 1 | CO, $NO_X$, PM, DPM, $PM_{10}$, $PM_{2.5}$, $SO_2$ |
| SHIP_2 | Auxiliary Engine 2 | CO, $NO_X$, PM, DPM, $PM_{10}$, $PM_{2.5}$, $SO_2$ |
| SHIP_3 | Auxiliary Engine 3 | CO, $NO_X$, PM, DPM, $PM_{10}$, $PM_{2.5}$, $SO_2$ |

*Consistent with the original Environmental Assessment (EA), metal speciation was included for sources involving ore and waste rock, such as material handling, bulldozing, drilling, blasting and vehicle trave on onsite roads. Alternatively, sources without ore and waste rock, including general material handling, vehicular travel on public roads, did not include metal speciation. The expected contaminants identified in this study are consistent with the previous EA where direct comparisons are available.



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## 3.2 Activities Not Considered in the Assessment

There are many activities associated with the Project that may produce emissions; however, some activities produce emissions that are not significant in comparison to the overall emissions of relevant compounds from the Project. Compounds that are discharged from sources in negligible amounts and/or activities that discharge a compound in a negligible amount were not included in the inventory. Table A2 lists the activities and/or equipment that were not assessed and the accompanying rationale.

**Table A2: Insignificant Emissions Associated with the Project**

| Activity/Equipment | Rationale for Excluding from the Assessment |
|---|---|
| **Construction Activity** | |
| Emergency Diesel Power for Construction Phase | No emergency diesel power is anticipated during the Project Construction Phase |
| Temporary Oil and Fuel Storage Tanks | Potential emissions from these types of sources are negligible |
| Temporary Portable Office/Dining Trailers Comfort Heating | Trailers will be heated by electric heaters |
| **Operation Activity** | |
| DMS Feed Prep Screen, De-Sliming Process, Transfer to Dense Media Separator | No emissions – feed is wet |
| De-Sliming Hydrocyclones | No emissions – material is fed as a slurry |
| Dense Media Separator | Closed process. Also, ore is fed with a stream of slurried ferrosilicon, therefore, feed is wet. |
| DMS Sink and Float Wash Screens | No emissions – products are washed with process water, and therefore, it is wet |
| Screened Float Product Stockpiling | No emissions – products are washed with process water, and therefore, it is wet |
| Sink Product Ball Mill Grinding and Ball Mill Hydrocyclones | Closed circuit, material processed as pulp or slurry |
| Pulp Thickening and Conditioning | No emissions associated with this process |
| Rougher and Scavenger Flotation, Flotation Cleaner Circuit | No emissions associated with this process |
| Final Concentrate Thickening and Filtration | No emissions associated with this process |
| Concentrate Stockpile Conveyor Transfers | No emissions – high moisture content in concentrate |
| Comfort Heating | Operational heating will be electric |

In addition to the activities / equipment listed in Table A2, there may be general ventilation from buildings related to the Project that only discharge air from the workspace that may include compounds that will come from commercial office supplies, building maintenance products or supplies and activities. These types of ventilation sources are considered to be negligible sources of emissions and were not identified as sources for the Project. General ventilation located in the process area that does not vent process emissions is also considered to be negligible and is therefore, not included in this assessment.



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# 4. Baseline Air Emissions Assessment

The baseline study consists of a review of the air emissions inventory [1] completed in support of CFI's original environmental assessment (EA) [2] in 2015, combined with information collected and studies completed after the release of the original EA. This information includes historical ambient monitoring data, BACT analysis [3], and the fugitive dust management plan [4] along with associated records for the existing operations. The baseline greenhouse gas (GHG) assessment is detailed in Section 7 and Attachment 4 of this report.

## 4.1 Baseline Air Contaminant Emission Inventory

A baseline air contaminant emissions inventory for the CFI AGS mine was developed as part of the 2015 EA. The original air emissions inventory quantified $NO_x$, TSP, $PM_{10}$, $PM_{2.5}$, $SO_2$, CO, and trace metals for both the construction and operation phases of the AGS mine. An updated annual baseline air emission inventory for the South Ridge project was developed based on the AGS operation phase emissions inventory with updates to reflect actual operations as appropriate. This baseline air emission inventory represents the annual total air emissions for each air contaminant that are currently approved for the AGS project, forming the baseline against which air emissions associated with the South Ridge Project are assessed. It provides the baseline values for key contaminants, which will be used to evaluate potential changes in emissions resulting from the various activities from the Project. By establishing these baseline emissions, the inventory enables comparison of Project-related emissions against existing conditions and supports the identification and management of potential air quality and GHG impacts.

Detailed emission calculation sheets for the baseline are presented in Attachment 3.

## 4.2 Review of Best Available Control Technology

The Best Available Control Technology (BACT) Assessment [3] undertaken by Canada Fluorspar (NL) Inc. for the St. Lawrence Fluorspar Project details the systematic evaluation and selection of technologies to mitigate particulate matter emissions from the crushing circuit in the processing area of the AGS Mine. The assessment, which follows the guidelines provided in the Ontario Ministry of the Environment, Conservation and Parks (MECP) "Top-Down Best Available Control Technology Guidance Document" [5], aims to ensure compliance with environmental regulations [6] and reduce emissions impacts effectively.

The BACT Assessment [3] uses a structured approach to identify, evaluate, and select the most suitable technologies for controlling dust emissions. The process involves identifying several possible control technologies, eliminating those that are technically infeasible, ranking the remaining technologies based on their effectiveness, evaluating the most effective options, and selecting the final BACT.

Several control technologies were evaluated to identify the most suitable and industry-relevant methods for effectively controlling particulate emissions, ensuring they are appropriate for the specific operational conditions and requirements of the facility.

Fabric filter baghouses were selected due to their high efficiency, practicality, and cost-effectiveness, with up to 99% effectiveness in removing respirable dust at major dust generation points in the crushing circuit, including crushers, screeners, and conveyors. The chosen "hood and spoon" chute design effectively reduces particulate emissions at transfer points by consolidating material streams and minimizing dust escape, supporting primary dust control. Cyclone systems, effective at capturing coarse dust and requiring low maintenance, were deemed technically feasible but less efficient than fabric filter baghouses and are considered complementary for



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preliminary air cleaning. Dust curtains, intended to reduce air velocity and allow dust to settle, were considered supplementary controls. Though effective, they were ranked lower in control efficiency but may be used alongside other technologies as needed.

Wet scrubbers were reviewed but deemed infeasible due to high operational costs and freezing limitations, making them unsuitable for the facility's conditions. Electrostatic precipitators, while effective for small particles, were eliminated due to significant investment and space requirements, proving unsuitable for the facility's crushing operations. Water/fog suppression systems were practical only under certain weather conditions because of outdoor freezing temperatures, thus not selected for year-round dust control. Out of all control technologies reviewed, water/fog suppression systems are the most applicable to the South Ridge Project to control fugitive dust emissions.

In conclusion, the BACT Assessment [3] provides a thorough and extensive evaluation and selection of dust control technologies for the crushing circuit in the processing area of the AGS Mine. The chosen technologies, including fabric filter baghouses, covered head chutes, and "hood and spoon" chute designs, ensure effective control of dust emissions. This exhaustive review process, grounded in comprehensive literature reviews, equipment manufacturers' data, and design knowledge, confirms that these selected technologies meet environmental compliance and performance criteria, ensuring their continued relevance and effectiveness. Future facility modifications may necessitate updates to the BACT assessment [3] to maintain compliance and operational efficiency.

## 4.3 Review of Fugitive Dust Management Plan

The Fugitive Dust Management Plan (FDMP) [4] established by Canada Fluorspar (NL) Inc. for the St. Lawrence Fluorspar Project outlines Best Management Practices (BMPs) for controlling and mitigating fugitive dust emissions. Submitted in March 2017 as part of the original EA [2] to support the Air Emissions Inventory Report dated September 2015 [1], and the Environmental Protection Plan dated April 2016 [7] It aims to ensure compliance with environmental regulations [6] and minimize the impact of dust emissions. The FDMP was prepared according to Appendix E (Technical Bulletin - Review of Approaches to Manage Industrial Fugitive Dust Sources) of the Procedure for Preparing an Emission Summary and Dispersion Modelling Report [8].

The FDMP utilizes a Plan Do Check Act (PDCA) cycle in accordance with ISO guidelines [9], ensuring a systematic approach to managing fugitive dust emissions. Based on the number of sources, their emissions profiles, and ambient monitoring data (Section 4.4), this review confirms that potentially significant emissions of TSP, $PM_{10}$, and $PM_{2.5}$ are anticipated from site operations and evaluates the effectiveness of the control measures implemented.

The FDMP identifies key sources of fugitive dust emissions, such as unpaved roads, paved roads, material handling processes, drilling and blasting operations, material processing activities, truck loading, and stockpiles. Each source is addressed with specific strategies to mitigate emissions. Unpaved roads are managed through regular watering schedules, while paved roads undergo routine maintenance and inspections. Waste rock handling and other outdoor activities ensure appropriate load sizes and cleanliness, while indoor material transport occurs within fully enclosed structures.

Drilling and blasting operations use smaller blast areas and fewer holes, combined with water retention, to minimize particulate matter. Material processing incorporates dust collectors in crushing circuits, and truck loading is performed within enclosed facilities. Stockpiles are covered to prevent wind erosion.



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The plan demonstrates effectiveness through both preventative and reactive measures. Preventative procedures include regular road watering and the use of enclosures, while reactive measures address unexpected spikes in emissions. Optimized blast designs and dust collectors enhance the plan's robustness under varying conditions. Operationally, the plan identifies emission sources and specifies BMPs. Training programs ensure compliance with dust control measures. Regular inspections and documentation, such as dust control forms and activity logs, facilitate continuous monitoring and corrective actions. Recordkeeping, both electronic and hard copy, is maintained for at least five years, overseen by operations supervisors. Regular reviews and updates follow the PDCA cycle, occurring every five years or more frequently if significant changes or verified complaints arise. No changes have been deemed necessary, indicating that the existing control measures are effective and aligned with objectives.

Utilizing a PDCA cycle in line with ISO guidelines [9], the FDMP provides a robust framework for controlling emissions of TSP, $PM_{10}$, and $PM_{2.5}$. Preventative and reactive measures, operational procedures, regular inspections, and rigorous recordkeeping support effective dust management. Provisions for regular reviews and updates reflect a commitment to continuous improvement and environmental responsibility. Overall, the plan's systematic approach supports its efficacy in reducing dust emissions and maintaining compliance with environmental standards, protecting public health and the surrounding environment, and ensuring its continued relevance, effectiveness, and applicability to the project.

## 4.4 Review of Ambient Monitoring Data

The site operates an onsite ambient air monitoring station located 0.3 km northeast of the South Ridge Project (see Figure A1) that continuously monitors TSP, $PM_{2.5}$ and $NO_2$ [10]. As summarized in Table A3 below, the monitoring results from recent years (2022-2024) shows that ambient concentrations of TSP, $PM_{2.5}$ and $NO_2$ remain below the provincial air quality standards. This data shows that the facility's current BACT [3] and fugitive dust management practices [4] have been effective to minimize offsite air quality impacts and no adverse air quality impacts on the surrounding residential receptors have resulted from the current site operations.

**Table A3: Onsite Ambient Air Quality Monitoring Station Data (2022-2024)**

| Monitor Name and Year | TSP | | $PM_{10}$ | $PM_{2.5}$ | | $NO_2$ | | |
|---|---|---|---|---|---|---|---|---|
| | Max 24-hour | Annual | Max 24-hour | 98th Percentile 24-hour | Annual | Max 1-hour | Max 24-hour | Annual |
| | µg/m³ | µg/m³ | µg/m³ | µg/m³ | µg/m³ | ppb | ppb | ppb |
| CFI Station- 2022 AQ Data | 28.13 | 10.36 | N/A | 10.30 | 5.29 | 28.19 | 5.17 | 1.47 |
| CFI Station - 2023 AQ Data | 38.00 | 32.18 | N/A | 13.71 | 4.75 | 52.70 | 42.28 | 1.26 |
| CFI Station - 2024 AQ Data | 19.58 | 6.60 | N/A | 9.83 | 4.65 | 14.29 | 1.65 | 0.32 |
| Newfoundland and Labrador's Air Pollution Control Regulations, 2022 Schedule A [6] | 120 | 60 | 50 | 25 | 8.8 | 213 | 106 | 53 |



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# 5. Air Contaminant Emission Inventory for Operating Scenarios and Comparison to Baseline

An air contaminant emissions inventory was developed for the Project to quantify facility-wide emissions during Year 1 of the South Ridge Project when the highest annual emissions are expected. The assumptions including equipment throughputs, input parameters and operating schedule are presented in Attachment 2.

Emission estimate sheets for each source that was considered are provided in Attachment 3. The emissions estimate sheets provide the following information.

- a source identifier (Source ID);
- a description of the emission source;
- an explanation of the methods used to estimate emissions from the source, including references to any emission factor documents that have been used to develop the estimation technique;
- input parameters used in the calculation (see Attachment 2);
- sample calculations; and
- emission estimates in various units.

## 5.1 Metals Speciation

For activities where metals may be present in the dust generated, "Metals" was identified as a compound in Table A4. Two speciation profiles were applied to metals depending on which source was generating the dust. For sources that involved ore and waste rock, the maximum concentration of each metal of all ore and waste rock assay data provided by CFI was used to speciate the dust. For sources where only waste rock was involved, the maximum concentration of the waste rock assays was used for speciation. For road dust, metal speciation was completed for onsite road segments as a result of dust deposition from ore/waste rock handling and no metal emissions were estimated for the public road sections (i.e. between AGS mill and South Ridge, and between AGS mill and the marine terminal). This approach is consistent with the original AGS project EA. These profiles were applied to the PM emissions documented on the emissions estimation sheets provided in Attachment 3 according to the following table.



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**Table A4: Metal Speciation Profile**

| Speciation Profile | Max % in Ore and Waste Rock | | Max % in Waste Rock | |
|---|---|---|---|---|
| **Compound** | **Concentration in PM (%)** | **Emission Sources to which Speciation Profile has been Applied** | **Concentration in PM (%)** | **Emission Sources to which Speciation Profile has been Applied** |
| Antimony | 0.00046 | Construction Activity: C_WR, WR_BD<br><br>Operation Activity: PIT_DB, ORE_MH, OP_WR, ROM, DC, FINE | 0.00046 | Construction Activity: C_UPR<br><br>Operation Activity: Stockpile_Rock, Stockpile_Rock_2, UPR1, UPR2, UPR3*<br><br>*onsite roads only |
| Arsenic | 0.013 | | 0.013 | |
| Barium | 0.095 | | 0.095 | |
| Beryllium | 0.0018 | | 0.0018 | |
| Cadmium | 0.0025 | | 0.0025 | |
| Chromium | 0.011 | | 0.011 | |
| Cobalt | 0.002 | | 0.002 | |
| Lithium | 0.028 | | 0.028 | |
| Copper | 0.016 | | 0.016 | |
| Lead | 0.15 | | 0.023 | |
| Manganese | 0.14 | | 0.14 | |
| Mercury | 0.00005 | | 0.00005 | |
| Nickel | 0.0044 | | 0.0044 | |
| Selenium | 0.0001 | | 0.0001 | |
| Silver | 0.000069 | | 0.000069 | |
| Vanadium | 0.0097 | | 0.0097 | |
| Zinc | 0.5 | | 0.16 | |

Attachment 3 contains the metals emission estimates for all sources that generate dust that may contain metals.

## 5.2 Input Parameters

A table summarizing all calculation input parameters along with references for each parameter is provided in Attachment 2. Where possible, calculation input parameters have been selected based on design specifications provided by CFI; however, in the absence of known values, estimates derived from similar mining and milling operations were provided to CFI and confirmed to be reasonable estimates for the Project.

## 5.3 Emissions Estimate Summary

Using the operating conditions and input parameters described above, annual emission estimates have been prepared in the unit of kg/year. All compound emission estimates, along with each source's percentage contribution to the overall Project-wide emissions for each compound, are provided in Attachment 3.

As shown in Tables 3A3 (Baseline) in Attachment 3a the significant emission sources for the AGS operation phase baseline are:

- vehicle movement on unpaved roads for fugitive particulate; and
- diesel mining equipment and marine engines for $NO_x$, $SO_2$ and CO.

This remains the case for the Year 1 construction/operation phase of the South Ridge project as summarized in Table 3B3 (Assessment) in Attachment 3b.



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## 5.4 Emissions Estimate Conservatism

The following table outlines the areas where conservatism was assumed in the operating condition inventoried or emission estimates for each scenario, which result in estimates that are not likely to under-predict the actual emissions associated with the Project.

**Table A5: Areas of Conservatism in the Operating Conditions and Emissions Estimates for Year 1**

| Project Aspect | Conservative Assumption |
|---|---|
| Ore Crushing and Screening | The emission calculations are based on the maximum material throughput occurring every day of operation. |
| Blasting | Emission estimates are based on the largest blast possible occurring every day of operation. |
| Mobile Vehicle Exhaust | It is assumed that all off-road vehicles are operating at the same time, for 20 hours per day. This situation is not likely to occur. |
| Metals in Dusts/Particulate Matter | Relevant particulate matter emissions were scaled to estimate metal emission rates from all sources where metals emissions may be expected. The scaling assumed the maximum observed metal concentrations from assays of ore and waste rock. This is a conservative assumption as it is not likely that the metals would always be present at the maximum concentrations for all potentially emitted materials to which this assumption has been applied. |
| Fugitive Dust Emissions from Unpaved Roadways | The emission estimation methods applied were developed from measured emissions from public roadways and, as a result, will tend to over-estimate low speed vehicle traffic from construction or mine sites.<br><br>The assumed silt loading used to calculate emission rates is based on conservative default values. As the best management practices implemented at the site are revised through continuous improvements, silt loadings and consequent emissions from the on-site roadways are likely to decrease. |

## 5.5 Project Emission Comparison to Baseline

For contaminants with an applicable provincial and/or federal air quality criteria [6], total emissions from Year 1 of the Project are compared to those for the AGS operation baseline as summarized in Table A6. Changes in emissions for the significant contaminants are discussed below.

For Year 1 of the South Ridge Project, reduction in emissions is expected for fugitive particulates (TPM and $PM_{10}$) due to lower material extraction and processing rates relative to the AGS operations baseline. A slight increase in emissions is expected for combustion gases including $PM_{2.5}$,CO, $NO_x$, and $SO_2$ as a result of additional diesel fired mobile equipment planned for the South Ridge Project. With respect to trace metals, a reduction in emissions is expected for most with the exception of lead and zinc, which are dominated by waste rock handling activities that are expected to increase for the South Ridge project relative to the AGS operations baseline.



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**Table A6: Emission Comparison Summary: South Ridge Project Operation vs Original EA Operations Baseline**

| Contaminants | Baseline Operation Annual ER (kg/year) | Year 1 South Ridge (kg/year) | Change from Baseline Operation to Year 1 South Ridge (%) |
|---|---|---|---|
| **PM** | 793,556 | 700,184 | -11.77% |
| **$PM_{10}$** | 239,608 | 213,041 | -11.09% |
| **$PM_{2.5}$** | 37,878 | 42,085 | 11.11% |
| **CO** | 224,882 | 274,799 | 22.20% |
| **$NO_X$** | 310,184 | 375,866 | 21.18% |
| **SO2** | 9,879 | 9,849 | -0.30% |
| **Arsenic** | 23.5 | 23.3 | -0.93% |
| **Cadmium** | 4.52 | 4.48 | -0.93% |
| **Copper** | 28.9 | 28.7 | -0.93% |
| **Lead** | 60.9 | 88.8 | 45.83% |
| **Mercury** | 9.04E-02 | 8.96E-02 | -0.93% |
| **Nickel** | 8 | 8 | -0.93% |
| **Vanadium** | 18 | 17 | -0.93% |
| **Zinc** | 341 | 414 | 21.44% |



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# 6. Review of Local Meteorology

Meteorological data from the Environment Canada climate station at St. Lawrence has been reviewed and summarized with respect to winds and data availability. The pertinent physical details for this station are:

- Station Name: St. Lawrence
- EC Station ID: 8403619
- WMO Identifier: 71110
- Latitude: 46.92 N
- Longitude: 55.38 W
- Elevation: 48.5 metres above sea level (masl)
- Station Type: Hourly
- Data Availability: January 2006 to present

This station is located 2.8km northwest of the South Ridge Project location and 700m west of the Town of St Lawrence. Given the proximity of the station to the project site and the coherent nature of the terrain for this general area, the St Lawrence station is considered to be a representative meteorological station for this project.

Publicly available data (from the Environment Canada climate data website [11]) includes hourly temperature, dewpoint, relative humidity, wind direction, wind speed, station pressure and wind chill. Station reliability appears to be high, with better than 99% data availability for the 2019 to 2024 period (the most recent five full years of data).

Figure A2 and Figure A3 show the 5-year and the seasonal wind roses for this station, respectively. Winds are predominantly from the west/southwest quadrants overall. Seasonally, winds are predominantly from the south-west and west quadrants in spring, shifting to southwest and southwest and south-southwest quadrants in summer, and back to the west quadrant in autumn and winter. Winds are stronger during daytime than at night with an overall average wind speed of 5.59m/s.

Figure A1 illustrates the location of the Project site (South Ridge pit operations and new haul roads) relative to the surrounding residential receptors (i.e. R1 to R4 and Town of St Lawrence). Winds blowing toward the Town of St. Lawrence, 1.5km from the project site, occur throughout the seasons, but occur less than 25% of the time. Winds below towards the human receptors R1 and R2 (private residences) located within 1.5km of the project site, occur less than 10% of the time throughout the seasons, whereas R3 (private residence) and R4 (RV park) will be downwind of the Project for a small portion of the time (<5%). It is worth noting that the frequency of R4 (RV park) being downwind from the Project is the lowest (<2%) for the summer time when occupancy is expected to be the highest.



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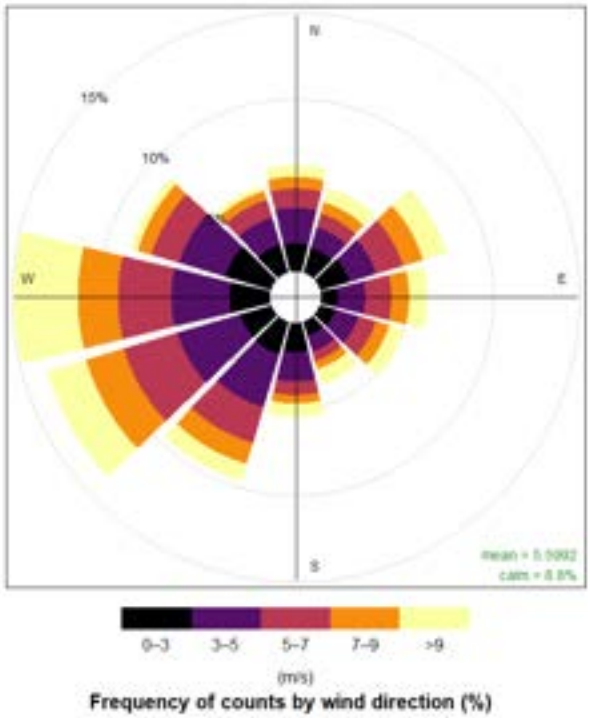


**Figure A2: 5-year wind rose from the Environment Canada St. Lawrence climate station**

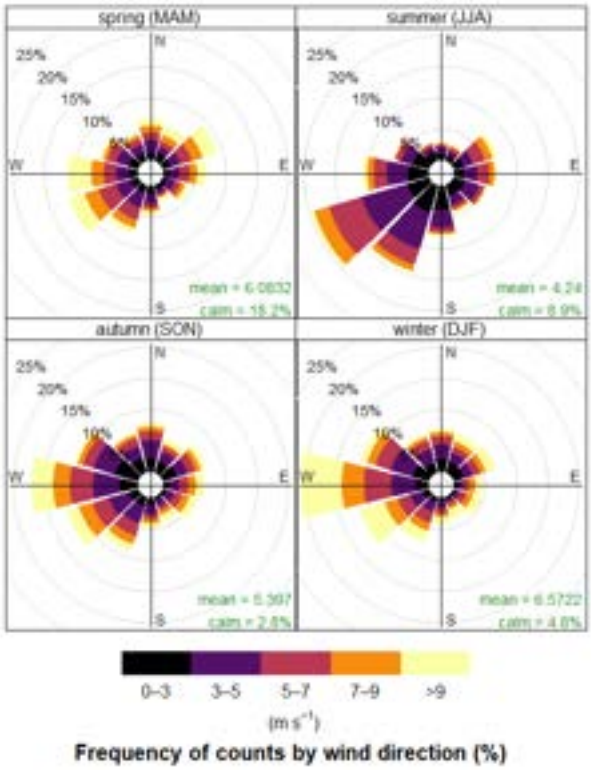


**Figure A3: Seasonal 5-year wind rose from the Environment Canada St. Lawrence climate station**



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# 7. Climate Change Assessment

Greenhouse gas emissions from the Project can be used to assess the potential adverse effect the Project may have on global climate change. In addition, the potential effects of climate change on the Project are considered to determine whether mitigation actions are required over the duration of the Project life.

## 7.1 GHG Emission Inventory Scenarios

The following baseline and assessment scenarios have been included for the GHG analysis:

Baseline GHG Emissions Scenario – Current Operation Phase (1 Year)
Project GHG Emissions Scenario – Year 1 Construction Phase + Operation Phase
Project GHG Emissions Scenario – Year 2: Operation Phase (1 Year)

Baseline Scenario
The operation of the AGS Mine site as currently authorized represents the GHG emissions baseline scenario. As a current operational emission report is not readily available, this GHG analysis applies a conservative estimation approach, whereby baseline operational emissions are assumed to be less than or equal to the operational emissions reported in the 2015 GHG emission inventory prepared in support of the AGS mine EA. The baseline emission inventory includes annual Scope 1 and Scope 2 GHG emissions associated with the operations phase and is used as the reference condition for comparison with South Ridge Project Year 1 and Year 2 emissions.

Assessment Scenarios
Project Year 1 is expected to include 6 months of Construction Phase and 6 months of Operations Phase. Recognizing that there will be a transition period that the same equipment will be used for either the construction or operation activities, the assessment scenario assumed that construction and operation phases will each last 6 months in Year 1. Project Year 2 consists of 12 months of Operations Activities only. Year 3 is Site Closure during which GHG emissions are expected to be significantly lower in comparison to the Construction Phase and is therefore not considered as part of this GHG emissions analysis. The potential annual GHG emissions from Year 1 and Year 2 of the Project have been estimated, compared to baseline year emissions, and then put in the context of the annual GHGs emitted provincially, nationally and globally.

### 7.1.1 Estimates of Fuel Consumption for the Project

Estimation of fuel consumption and GHG emissions for the South Ridge Project aligns with the AGS operations baseline scenario with the exception of the diesel powered process and mobile equipment. Diesel consumption projections for process and mobile equipment for Year 1 and Year 2 of the Project provided by CFI is used to estimate GHG emissions. (See Attachment 4, Table 1 – Project Emission Sources and Inputs).

### 7.1.2 Greenhouse Gas Emissions Overview

Annual GHG emissions were estimated for the scenarios described in Section 7.1. Emissions are expressed as total tonnes carbon dioxide equivalent ($tCO_2e$) and include contributions from both construction activities and ongoing operations, where applicable as shown in Attachment 4, Table 2 Baseline vs Projected Total Project Emission.

### 7.1.3 General Assumptions of Greenhouse Gas Releases for the Project

The emissions estimation methods used to quantify annual GHG releases follow generally accepted practices for conducting Environmental Assessments in Canada and, where applicable,



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the Government of Canada's GHG Emissions Reporting Program (the GHGPRP) guidance document.

The Greenhouse Gas Protocol (GHG Protocol) provided by the World Business Council for Sustainable Development/ World Resources Institute (WBCSD/WRI, 2004) outlines guidance for preparing corporate GHG emission inventories, and introduces the concept of direct and indirect emissions and scopes for the inventory under three broad categories, as follows:

Scope 1 – Direct GHG emissions (included in Project emissions)
Scope 2 – Indirect GHG emissions from purchased utilities (included in Project emissions)
Scope 3 – Other indirect value chain GHG emissions (excluded in Project emissions)

To maintain consistency with the baseline assessment, only Scope 1 and 2 emissions are included in Project emissions evaluation. Scope 3 emissions were not included in the baseline year and are therefore outside the scope of this assessment.

### 7.1.4 Project GHG Emissions and Comparison to Baseline Emissions

A comparison of the Project Year 1 and Project Year 2 emissions to the baseline emissions is presented in Table A7. The GHG emissions from each source category for each scenario are also presented in this table.

The baseline AGS operational GHG emissions of 28,774 $tCO_2e$, represent currently authorized existing conditions and serve as the reference point for assessing the magnitude and significance of South Ridge Project-related emissions.

**Table A7: Baseline vs Projected Total Project GHG Emissions**

| | Project Emissions ($tCO_2e$) | | | Scope 1 ($tCO_2e$) | | | Scope 2 ($tCO_2e$) |
|---|---|---|---|---|---|---|---|
| | **Total** | **Construction** | **Operation** | **Stationary** | **Mobile** | **Process** | **Purchased Electricity** |
| Baseline GHG Emission (1 Year) | 28,774 | - | 28,774 | 8,939 | 18,518 | 353 | 964 |
| Projected Year 1 Emission | 10,504 | 4,220 | 6,284 | 3,086 | 6,603 | 368 | 447 |
| Materiality Year 1 vs Baseline Year (5%) | -63% | | | | | | |
| Projected Year 2 Emission | 7,568 | - | 7,568 | 4,849 | 1,546 | 353 | 819 |
| Materiality Year 2 vs Baseline Year (5%) | -74% | | | | | | |

**Project Year 1 Emissions:**

In Project Year 1, total GHG emissions are estimated at 10,504 $tCO_2e$, reflecting emissions from construction and operational activities. This represents a decrease of approximately 63% in emissions relative to baseline AGS operation emissions, primarily due to decreased diesel usage for on-site equipment and elimination of stationary combustion for underground heating. When assessed against a 5% materiality threshold, the change is considered material in magnitude; the



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decrease in projected emission in year 1 does not represent a significant adverse effect on climate change.

**Project Year 2 Emissions:**
In Project Year 2, construction activities are no longer present, and total GHG emissions are limited to operational sources. Total emissions for Year 2 are estimated at 7,568 $tCO_2e$, which are approximately 74% lower than baseline annual operational emissions. When assessed against a 5% materiality threshold, this change represents a material reduction in total emissions and does not indicate a significant adverse effect on climate change.

**Comparison of Project GHG Emissions to Provincial, Canadian and Global GHG Emissions**

A comparison of the GHG emissions from the Project to the latest publicly available annual GHG emissions for Newfoundland-Labrador, Canada and globally is presented in Table A9. The contribution from the project GHG emissions to the provincial, Canada-wide and global GHG emissions are very minor.

**Table A8: Comparison of the Project GHG Emissions with Provincial, Canadian and Global Totals**

| Scope 1 and Scope 2 Emissions | Year 1 | | Year 2 | |
|---|---|---|---|---|
| | Total Emissions (kt CO2e) | Project Emissions as % of Listed Totals | Total Emissions (kt CO2e) | Project Emissions as % of Listed Totals |
| Project Total | 10.50 | - | 7.57 | - |
| Newfoundland Labrador (2022) | 8,600 | 0.12% | 8,600 | 0.09% |
| Canada (2022) | 708,000 | 0.0015% | 708,000 | 0.0011% |
| Global (2022) | 48,824,000 | 0.000022% | 48,824,000 | 0.000015% |

Data Sources: Newfoundland & Labrador emissions are obtained from ECCC Regional Indicators and GHGRP. Canada wide emissions are taken from the National Inventory Report submitted to the UNFCCC. Global emissions are taken from Climate Watch/World Resources Institute via ECCC.

### 7.1.5 Potential Project Effects on Climate Change
Based on the magnitude of change and the results of the materiality assessment, no significant climate change effects are anticipated, and additional GHG-specific mitigation measures are not required beyond standard best management practices.

### 7.1.6 Potential Effects of Climate Change on the Project
Based on the magnitude of the project change and duration of the project, the project expects no significant potential effects of climate change on project construction and operation. Adapting project design and operational practices to account for extreme weather may happen, but this should not impact overall estimated project emissions for year 1 and year 2.

### 7.1.7 Recommended Mitigation Measures
There are no proposed GHG mitigation measures proposed for this project, beyond the selection of energy efficient haulage equipment.



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# 8. Closure

We trust this report meets your present requirements. Please do not hesitate to contact the undersigned should you have any questions.

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**Reviewed by:**

**Francis Ries**, P.Eng.

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# 9. References

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[3] . Golder Associates, "Best Available Control Technologies Report," 2017.

[4] . Golder Associates, "Best Management Practices Plan for the Control of Fugitive Dust St. Lawrence Fluorspar Project," 2017.

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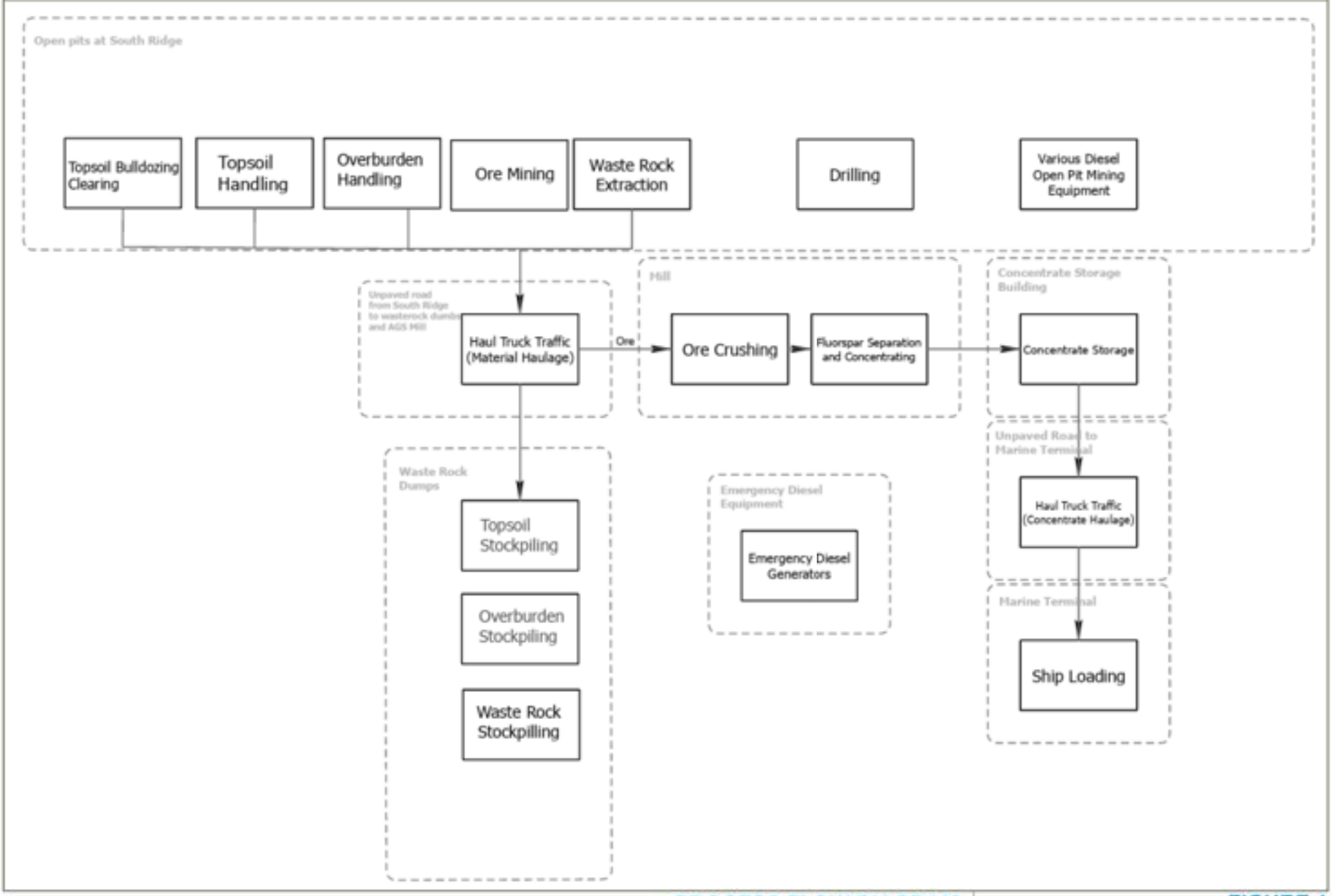
[9] International Organization for Standardization (ISO), "ISO 14001:2015," 2015. [Online]. Available: https://www.iso.org/standard/60857.html.

[10] Canada Fluorspar Inc, "Environmental Effects Monitoring Plan: Operations Phase," 2017.

[11] Government of Canada, "Historical Data," Government of Canada, 2026. [Online]. Available: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html.

Attachment 1
# Process Flow Diagrams




**PROCESS FLOW DIAGRAM**
**SOUTH RIDGE PROJECT**

**FIGURE 1**

Canada Fluorspar Inc
St. Lawrence,
Newfoundland and Labrador

RAMBOLL

Attachment 2

# Summary of Input Parameters (A: Baseline; B: South Ridge Project)

***Table 3A2: Source Inputs Summary Table - Baseline***

| Source ID | Description | Type | Amount of Material Moved (tonnes/yr) | Silt Content (%) | Moisture Content (%) | Operating Hour per Hour | Operating Hours per Day | Operating Days per Year | Number of Days per Year Without Snow Cover/Rain | Throughput (tonnes/hr) | Throughput (tonnes/day) | Throughput (tonnes/year) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ORE_MH | Above-Ground Ore Material Handling | Material Handling | - | - | 4 | 1 | 20 | 350 | 180 | 79 | 1900 | 693500 | EA Registration s.2.4.1.3., - stockpiles for ore blending between pit and UG. Utilized during year 1 of operation to achieve min head grade. Separate AG assumed based on PFS Study s.22.1 average tonnes per day mined from the AGS mine. Worley Parsons Mill design criteria s3.1. run of mine material moisture content |
| OP_WR | Waste Rock Material Handling | Material Handling | - | - | 5 | 1 | 24 | 350 | 180 | 298 | 7142 | 2606830 | EA Registration s.2.2.2 and Figure 2-11 - Estimated maximum waste rock generation from the GNP (2.5 million tonnes in 2023), assumed as the worst-case annual generation rate. Converted to tonnes per day based on 350 operating days,. The moisture content was assumed based on similar sites. |
| ROM | Runf-Of-Mine Ore Transfer to Stationary Grizzly | Material Handling | - | - | 4 | 1 | 24 | 350 | 350 | 89.1 | 2138 | 780370 | Process described in EA Registration s.2.4.1.3 and s.2.4.2; and Worley Parsons Mill design criteria s.3.4. Material rate assumed bassed on Worley Parsons Mill design criteria Table 3-6 Crushing Plant design criteria |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separator | Material Handling | - | - | 4 | 1 | 24 | 350 | 350 | 89.1 | 2138 | 780370 | Worley Parsons Mill design criteria section 3.6.1 DMS design feed rate Table 3-5 Production Rate and Plant Availability. Assuming this is not ducted through dust collector. |
| ONSPEC | On-spec Concentrate Stockpile Loading | Material Handling | - | - | 8 | 1 | 24 | 350 | 350 | 21.57 | 518 | 189070 | From mill design criteria App B stream total mass transfer is 28.76 tph<br>PFS s.17.5.3, p. 17-193, main stockpile will contain ~15,000 tonnes of on-spec material.<br>Off-spec stockpile ~5,000 tonnes.<br>Total 20,000 tonnes product: 75% on-spec |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | Material Handling | - | - | 8 | 1 | 24 | 350 | 350 | 7.19 | 173 | 63145 | From mill design criteria App B stream total mass transfer is 28.76 tph<br>PFS s.17.5.3, p. 17-193, main stockpile will contain ~15,000 tonnes of on-spec material.<br>Off-spec stockpile ~5,000 tonnes.<br>Total 20,000 tonnes product: 25% off-spec |
| PIT_DB | Open Pit Drilling and Blasting | Drilling and Blasting | - | - | - | - | 20 | 350 | 350 | - | - | | The operating schedule for pit mining equipment and personnel will consist of two 10-hour shifts per day (totaling 20 hours of operation within a 24-hour period) for 350 days per year. Both ore and waste rock material will be blasted. Contaminants will be released from the open pits. Source parameters, such as the number of blasts per day and holes drilled per day, are summarized below. To estimate a 1-hour averaged emission rate for drilling, it was assumed that holes will be drilled throughout the production day (i.e., 80 holes divided by 20 operating hours per day = 4 holes/hour). To estimate a 1-hour averaged emission rate for blasting, a rate of 1 blast per hour was conservatively assumed. |
| U_PH | Propane-fired Underground Mine Heating | Mine Heating | - | - | - | - | 20 | 350 | 350 | - | - | | 8.5 million BTU/hr is assumed based on similar sites. It is estimated that the heater will operate for 20 hours per day. |
| DC | Crushing Circuit Dust Collector | Dust Collector | - | - | - | - | 24 | 350 | 350 | - | - | | The entire crushing circuit will operate up to 24 hours per day, 350 days per year. |
| SULPH | Sink Product Sulphide Flotation | Flotation | - | - | - | - | 24 | 350 | - | - | - | | EA Registration s.2.4.2, p. 36; Worley Parsons Mill design criteria Table 3-28. Concentration (10% PAX) assumed based on July 7 conference call with CFI - chemicals are added as liquids to the process, between 5-10% concentrate assumed similar to water.<br>Assuming alkaline, based on information from CFI that the tailings will be alkaline at approximately pH 8.2. Worley Parsons Mill design criteria Table 3-34. It is assumed there are no emissions associated with MIBC usage (20 g per tonne flotation feed). Worley Parsons Mill design criteria App B - Mass Balance; calculated from slurry feed 150.78 $m^3$/hr and slurry specific gravity 1.27. Mass rate of flotation feed (191.5 tonnes/hr) ssumed based on Mill Design Criteria Table 3-5 Production Rate and Plant Availability. Operating hours per day is assumed based on Mill Design Criteria Table 3-5 Production Rate and Plant Availability |
| TAILS | Tailings Pond | | - | - | - | - | 24 | 350 | - | - | - | | The tailings leaving the mill will be alkaline, estimated at pH 8.2 from testwork.Provided by CFI.<br>Assuming there will be residual xanthate present in tailings from the flotation circuit. Assume ~1% of xanthates used in flotation will be discharged in tailings based on Australian NPI Emissions Estimation Technique Manual for Mining. Potassium amyl xanthate disharge rate is 0.01 kg/hr.<br>Assumed same as concentration of solution added to flotation process (10% PAX), which was assumed based on July 7 conference call with CFI - chemicals are added as liquids to the process, between 5-10% concentrate. |
| TL | Haul Truck Loading for Transport to Marine Terminal | Truck Loading | - | - | 8 | - | 20 | 365 | - | 500 | 10,000 | 3650000 | Road length from GIS and EA Registration figures. Assumed empty vehicle weight. Truck payload provided by CFI. EA Registration s.2.4.8, p. 41 - assumed concentrate transport rate is same as loading rate of ship feeder.<br>Based on info from CFI that 10,000 tpd would be loaded at a rate of 500 tph. Transport would then need to occur for 20 hours/day. Per CFI, there will only be 40 days out of the year where materials will be hauled and loaded onto ships. Calculated from truck capacity and 10,000 tonnes hauled per day. |
| UPR1 | Road-GNP In-Pit | | - | 8.3 | - | - | 20 | 365 | 180 | - | 1,900 | 693500 | The truck haulage schedule for in-pit activity is assumed to match the mining equipment operating schedule (20 hours per day). Emissions are assumed to occur on days without snow cover or rain, which averages 180 days per year. Fluorspar concentrate or aggregate will only be hauled to the marine terminal for a total of 40 days each year. On those days, transport will take place for 20 hours per day. It is conservatively assumed that there will be no snow cover or precipitation on any of the 40 days, thereby implying no natural mitigation of emissions. Silt content is from U.S. EPA AP-42 Table 13.2.2-1 for stone quarrying and processing haul road |
| UPR2 | GNP Haul Road to North Dump | | - | 8.3 | - | - | 20 | 365 | 180 | - | 7142 | 2606830 | |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | | - | 8.3 | - | - | 20 | 365 | 180 | - | 1900 | 693500 | |
| UPR4 | Haul Road from Mill Site to Marine Terminal | | - | 8.3 | - | - | 20 | 365 | 40 | - | 10000 | 3650000 | |
| MAR_TD | Transfer from trucks into Ship Feeder | | - | | 8 | - | 20 | 365 | - | 500 | 10,000 | 3650000 | EA Registration s.2.4.8., p. 41 - assumed truck loading is same as loading rate of ship feeder. Assumed truck weight and capacity based on similar operations. Truck payload provided by CFI. Based on info from CFI that 10,000 tonnes/day would be loaded at a rate of 500 tonnes/hour. Loading would then need to occur for 20 h/day |
| MAR_CONV | Loading onto Ship via Covered Conveyor | | - | | 8 | - | 20 | 365 | - | 500 | 10,000 | 3650000 | |

***Table 3B2: Source Inputs Summary Table (Year 1)***

| Source ID | Description | Type | Silt Content (%) | Moisture Content (%) | Number of Days per Year Without Snow Cover/Rain | Throughput (tonnes/yr) | Notes |
|---|---|---|---|---|---|---|---|
| OB_MH | Overburden Material Handling | Material Handling | 6.9 | 7.9 | 169 | 563,867 | Silt and moisture content were assumed based on AP-42 Table 11.9.3. Projected throughput value was provided by CFI. |
| C_WR | Waste Rock Material Handling | Material Handling | 6.9 | 5 | 169 | 3,459,338 | Moisture content was assumed based on similar sites. Projected throughput value was provided by CFI. |
| TP_MH | Topsoil Material Handling | Material Handling | 6.9 | 7.9 | 169 | 140,967 | Silt and moisture content were assumed based on AP-42 Table 11.9.3. Operating hours per day assumed based on similar sites. Projected throughput value was provided by CFI. |
| OB_BD | Overburden Dump Bulldozing | Bulldozing | 6.9 | 7.9 | 169 | - | Annual averaged emissions will experience some natural mitigation due to the presence of snow or rainy days throughout the year. According to Canadian Climate Normals data for the St. Lawrence station (covering the period 1991-2020), the region experiences an average of 169 days per year without snow cover or rain. As a result, the annual emissions of fugitive dust are calculated assuming these emissions occur on 169 days of the year.Silt and moisture content were assumed based on AP-42 Table 11.9.3 for overburden. |
| WR_BD | Waste Rock Dump Bulldozing | Bulldozing | 6.9 | 7.9 | 169 | - | |
| TP_BD | Topsoil Bulldozing | Bulldozing | 6.9 | 7.9 | 169 | - | |
| C_UPR | Traffic on Unpaved Roads | Unpaved Roads | 8.3 | - | 169 | - | Average weight of industrial vehicles, prorated average weight of all industrial vehicles, calculated from data provided by CFI.<br>Average weight of passenger vehicles, prorated average weight of all passenger vehicles, calculated from data provided by CFI .<br>Control factor (%): 75% control (Assumed Value), due to application of water or other dust suppressants (EA Registration Report s.7.2.1)<br>Silt content was assumed according to the Australian NPI Emissions Estimation Technique Manual for Mining.<br>Total distance travelled calculated based on truck load and throughput rate provided by CFI.<br>Length of road traveled estimated from the Project Site Plan.<br>Based on Canadian Climate Normals data for the St. Lawrence station (covering the period 1991-2020), the region experiences an average of 169 days per year without snow cover or rain. |
| PIT_DEV | Surface Drilling and Blasting (Open Pit Development) | Surface Drilling and Blasting | - | - | - | - | Number of holes drilled per day (80 holes drilled/day), Area blasted per day ( 100 $m^2$ per day), Amount of explosives used per blast (100 kg ANFO per blast), amount of emulsion per blast (0.7 mg ore and 4.3 mg waste), Number of blasts per day (2 blasts )are provided by CFI.<br>Control efficiency for drilling (%): 70% control was assumed. |
| SRP_DWP | Diesel Powered Dewatering Pump | South Ridge | - | - | - | - | It is assumed that a 150 hp diesel pump will be used for the pit dewatering process based on CFI's input. This equipment is expected to operate 24 hours per day, 183 days per year. |
| ORE_MH | Above-Ground Ore Material Handling | Material Handling | - | 4 | 169 | 681,889 | EA Registration s.2.4.1.3., - Worley Parsons Mill design criteria s3.1. run of mine material moisture content.<br>Projected throughput value was provided by CFI. |
| OP_WR | Waste Rock Material Handling | Material Handling | - | 5 | 169 | 3,459,338 | EA Registration s.2.2.2 and Figure 2-11 - Estimated maximum waste rock generation from the GNP (2.5 million tonnes in 2023), assumed as the worst-case annual generation rate. Converted to tonnes per day based on 365 operating days,. The moisture content was assumed based on similar sites. Projected throughput value was provided by CFI. Based on Canadian Climate Normals data for the St. Lawrence station (covering the period 1991-2020), the region experiences an average of 169 days per year without snow cover or rain. |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Material Handling | - | 4 | | 681,889 | Process described in EA Registration s.2.4.1.3 and s.2.4.2; and Worley Parsons Mill design criteria s.3.4. Material rate assumed bassed on Worley Parsons Mill design criteria Table 3-6 Crushing Plant design criteria. Projected throughput value was provided by CFI. |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separator | Material Handling | - | 4 | | 681,889 | Worley Parsons Mill design criteria section 3.6.1 DMS design feed rate Table 3-5 Production Rate and Plant Availability. Assuming this is not ducted through dust collector. Projected throughput value was provided by CFI. |
| ONSPEC | On-spec Concentrate Stockpile Loading | Material Handling | - | 8 | | 189,070 | EA Registration s.2.4.1.3., - Worley Parsons Mill design criteria s3.1. run of mine material moisture content. Projected throughput value was provided by CFI. |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | Material Handling | - | 8 | | 63,145 | EA Registration s.2.4.1.3., - Worley Parsons Mill design criteria s3.1. run of mine material moisture content. Projected throughput value was provided by CFI. |
| PIT_DB | Open Pit Drilling and Blasting | Drilling and Blasting | - | - | | - | The operating schedule for pit mining equipment and personnel will consist of two 10-hour shifts per day (totaling 20 hours of operation within a 24-hour period) for 350 days per year. Both ore and waste rock material will be blasted. Contaminants will be released from the open pits. Source parameters, such as the number of blasts per day and holes drilled per day, are summarized below. To estimate a 1-hour averaged emission rate for drilling, it was assumed that holes will be drilled throughout the production day (i.e., 80 holes divided by 20 operating hours per day = 4 holes/hour). To estimate a 1-hour averaged emission rate for blasting, a rate of 1 blast per hour was conservatively assumed. |
| DC | Crushing Circuit Dust Collector | Dust Collector | - | - | | - | The entire crushing circuit will operate up to 24 hours per day, 350 days per year. |
| SULPH | Sink Product Sulphide Flotation | Flotation | - | - | - | - | EA Registration s.2.4.2, p. 36; Worley Parsons Mill design criteria Table 3-28. Concentration (10% PAX) assumed based on July 7 conference call with CFI - chemicals are added as liquids to the process, between 5-10% concentrate assumed similar to water.<br>Assuming alkaline, based on information from CFI that the tailings will be alkaline at approximately pH 8.2. Worley Parsons Mill design criteria Table 3-34. It is assumed there are no emissions associated with MIBC usage (20 g per tonne flotation feed). Worley Parsons Mill design criteria App B - Mass Balance; calculated from slurry feed 150.78 $m^3$/hr and slurry specific gravity 1.27. Mass rate of flotation feed (191.5 tonnes/hr) ssumed based on Mill Design Criteria Table 3-5 Production Rate and Plant Availability. Operating hours per day is assumed based on Mill Design Criteria Table 3-5 Production Rate and Plant Availability |
| TAILS | Tailings Pond | | - | - | - | - | The tailings leaving the mill will be alkaline, estimated at pH 8.2 from testwork.Provided by CFI.<br>Assuming there will be residual xanthate present in tailings from the flotation circuit. Assume ~1% of xanthates used in flotation will be discharged in tailings based on Australian NPI Emissions Estimation Technique Manual for Mining. Potassium amyl xanthate disharge rate is 0.01 kg/hr.<br>Assumed same as concentration of solution added to flotation process (10% PAX), which was assumed based on July 7 conference call with CFI - chemicals are added as liquids to the process, between 5-10% concentrate. |
| TL | Haul Truck Loading for Transport to Marine Terminal | Truck Loading | - | 8 | - | 208,658 | Trucking route, truck type, truck load weight, projected shipping rate provided by CFI |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | | 8.3 | - | 169 | 681,889 | Silt content is from U.S. EPA AP-42 Table 13.2.2-1 for stone quarrying and processing haul road<br>Trucking route, truck type, truck load weight, projected shipping rate provided by CFI. Based on Canadian Climate Normals data for the St. Lawrence station (covering the period 1991-2020), the region experiences an average of 169 days per year without snow cover or rain. |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | | 8.3 | - | 169 | 704,834 | |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | | 8.3 | - | 169 | 3,459,338 | |
| UPR4 | Unpaved Road from AGS to Marine Terminal | | 8.3 | - | 169 | 208,658 | |
| MAR_TD | Transfer from trucks into Ship Feeder | | | 8 | - | 208,658 | EA Registration s.2.4.1.3., - Worley Parsons Mill design criteria s3.1. run of mine material moisture content. Projected throughput value was provided by CFI. |
| MAR_CONV | Loading onto Ship via Covered Conveyor | | | 8 | - | 208,658 | |

Attachment 3

# Air Emission Calculation Sheets (A: Baseline; B: South Ridge Project )

Attachment 3a

# Air Emission Calculation Sheets - Baseline

***Table 3A1: Sources and Contaminants Identification***

| Source ID | Description | Material | General Location | Expected Contaminants | Calculation Sheet |
|---|---|---|---|---|---|
| PIT_DB | Open Pit Drilling and Blasting | Waste Rock | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc, CO, NOX | EO2 |
| PIT_EQUIP | Open Pit Mining Equipment | - | | PM, PM10, PM2.5, CO, NOX, SO2 | EO3 |
| U_PH | Propane-fired Underground Mine | - | | PM, PM10, PM2.5, CO, NOX, SO2 | EO4 |
| U_EPG | Underground Mine Standby Diesel Generator | - | | PM, PM10, PM2.5, CO, NOX, SO2 | EO5 |
| MILL_EPG | Emergency Diesel Generator at Mill | - | | PM, DPM, PM10, PM2.5, CO, NOX, SO2 | EO5 |
| ORE_MH | Above-Ground Ore Material Handling | Ore | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| OP_WR | Waste Rock Material Handling | Waste Rock | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Ore | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Ore | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| ONSPEC | On-spec Concentrate Stockpile Loading | Concentrate | | PM, $PM_{10}$ $PM_{2.5}$ | EO1 |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | Concentrate | | PM, $PM_{10}$ $PM_{2.5}$ | EO1 |
| DC | Crushing Circuit Dust Collector | Ore | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO6 |
| SULPH | Sink Product Sulphide Flotation | Mill | Mill | Carbon Disulphide, Pentanol | EO7 |
| TL | Haul Truck Loading for Transport to Marine Terminal | Concentrate | | PM, $PM_{10}$ $PM_{2.5}$ | EO8 |
| MAR_TD | Transfer from Trucks into Ship Feeder | Concentrate | | PM, $PM_{10}$ $PM_{2.5}$ | EO10 |
| MAR_CONV | Loading onto Ship via Covered Conveyor | Concentrate | | PM, $PM_{10}$ $PM_{2.5}$ | EO10 |
| UPR1 | Road - GNP In-Pit | Road | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO9 |
| UPR2 | GNP Haul Road to North Dump | Road | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO9 |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Road | | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO9 |
| UPR4 | Haul Road from Mill Site to Marine Terminal | Road | | PM, $PM_{10}$ $PM_{2.5}$ | EO9 |
| TAILS | Tailings Pond | Tailings | | Carbon Disulphide, Pentanol | EO7 |
| SHIP_1 | Auxiliary Engine 1 | - | | CO, NOX, PM, DPM, PM10, PM2.5, SO2 | EO11 |
| SHIP_2 | Auxiliary Engine 2 | - | | CO, NOX, PM, DPM, PM10, PM2.5, SO2 | EO11 |
| SHIP_3 | Auxiliary Engine 3 | - | | CO, NOX, PM, DPM, PM10, PM2.5, SO2 | EO11 |
| Stockpile_OB | Overburden Stockpile (Blue) | Overburden | Overburden Dump | PM, $PM_{10}$ $PM_{2.5}$ | 3A5 |
| Stockpile_Topsoil | Topsoil Stockpile (Light Blue) | Topsoil | Topsoil Dump | PM, $PM_{10}$ $PM_{2.5}$ | 3A5 |
| Stockpile_Rock | Rock Stockpile (Pink) | Waste Rock | Waste Rock Dump | PM, $PM_{10}$ $PM_{2.5}$ | 3A5 |
| Stockpile_Rock_2 | Rock Stockpile 2 (Green) | Waste Rock | Waste Rock Dump | PM, $PM_{10}$ $PM_{2.5}$ | 3A5 |

***Table 3A3: Emission Summary Table***

| Source ID | Description | Compound | Annual | | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|---|
| | | | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario | |
| PIT_DB | Open Pit Drilling and Blasting | PM | 1.68E-01 | 5.30E+03 | 0.7% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{10}$ | 8.40E-02 | 2.65E+03 | 1.1% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{2.5}$ | 4.20E-02 | 1.32E+03 | 3.5% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | CO | 1.28E-01 | 4.03E+03 | 1.8% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | NOX | 1.11E-02 | 3.50E+02 | 0.1% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Antimony | 6.02E-07 | 1.90E-02 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Arsenic | 1.70E-05 | 5.37E-01 | 2.3% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Barium | 1.24E-04 | 3.92E+00 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Beryllium | 2.36E-06 | 7.43E-02 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Cadmium | 3.27E-06 | 1.03E-01 | 2.3% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Chromium | 1.45E-05 | 4.58E-01 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Cobalt | 2.62E-06 | 8.26E-02 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Lithium | 3.67E-05 | 1.16E+00 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Copper | 2.10E-05 | 6.61E-01 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Lead | 1.96E-04 | 6.20E+00 | 10.2% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Manganese | 1.83E-04 | 5.78E+00 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Mercury | 6.55E-08 | 2.07E-03 | 2.3% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Nickel | 5.76E-06 | 1.82E-01 | 2.3% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Selenium | 1.31E-07 | 4.13E-03 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Silver | 9.04E-08 | 2.85E-03 | 2.3% | No |
| PIT_DB | Open Pit Drilling and Blasting | Vanadium | 1.27E-05 | 4.01E-01 | 2.3% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Zinc | 6.55E-04 | 2.07E+01 | 6.1% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | PM | 3.97E-01 | 1.25E+04 | 1.6% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $PM_{10}$ | 3.97E-01 | 1.25E+04 | 5.2% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $PM_{2.5}$ | 3.85E-01 | 1.21E+04 | 32.1% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | CO | 6.85E+00 | 2.16E+05 | 96.0% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $NO_X$ | 8.66E+00 | 2.73E+05 | 88.0% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $SO_2$ | 6.22E-03 | 1.96E+02 | 2.0% | Yes |
| U_PH | Propane-fired Underground Mine Heating | PM | 6.55E-03 | 2.07E+02 | 0.0% | Yes |
| U_PH | Propane-fired Underground Mine Heating | $PM_{10}$ | 6.55E-03 | 2.07E+02 | 0.1% | Yes |
| U_PH | Propane-fired Underground Mine Heating | $PM_{2.5}$ | 6.55E-03 | 2.07E+02 | 0.5% | Yes |
| U_PH | Propane-fired Underground Mine Heating | CO | 7.02E-02 | 2.21E+03 | 1.0% | Yes |
| U_PH | Propane-fired Underground Mine Heating | NOX | 1.22E-01 | 3.84E+03 | 1.2% | Yes |
| U_PH | Propane-fired Underground Mine Heating | SO2 | 1.69E-04 | 5.31E+00 | 0.1% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | PM | 5.31E-04 | 1.67E+01 | 0.0% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | $PM_{10}$ | 5.31E-04 | 1.67E+01 | 0.0% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | $PM_{2.5}$ | 5.15E-04 | 1.62E+01 | 0.0% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | CO | 1.61E-03 | 5.08E+01 | 0.0% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | NOX | 7.48E-03 | 2.36E+02 | 0.1% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | SO2 | 1.14E-06 | 3.60E-02 | 0.0% | Yes |
| U_EPG | Underground Mine Standby Diesel Generator | PM | 6.76E-04 | 2.13E+01 | 0.0% | Yes |
| U_EPG | Underground Mine Standby Diesel Generator | $PM_{10}$ | 6.76E-04 | 2.13E+01 | 0.0% | Yes |
| U_EPG | Underground Mine Standby Diesel Generator | $PM_{2.5}$ | 6.55E-04 | 2.07E+01 | 0.1% | Yes |
| U_EPG | Underground Mine Standby Diesel Generator | CO | 5.31E-03 | 1.67E+02 | 0.1% | Yes |
| U_EPG | Underground Mine Standby Diesel Generator | NOX | 2.32E-02 | 7.31E+02 | 0.2% | Yes |
| U_EPG | Underground Mine Standby Diesel Generator | SO2 | 1.17E-05 | 3.69E-01 | 0.0% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | PM | 3.40E-02 | 1.07E+03 | 0.1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | $PM_{10}$ | 1.61E-02 | 5.08E+02 | 0.2% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | $PM_{2.5}$ | 2.44E-03 | 7.69E+01 | 0.2% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Antimony | 1.57E-07 | 4.94E-03 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Arsenic | 4.42E-06 | 1.40E-01 | 0.6% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Barium | 3.23E-05 | 1.02E+00 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Beryllium | 6.13E-07 | 1.93E-02 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Cadmium | 8.51E-07 | 2.68E-02 | 0.6% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Chromium | 3.78E-06 | 1.19E-01 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Cobalt | 6.81E-07 | 2.15E-02 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Lithium | 9.53E-06 | 3.01E-01 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Copper | 5.45E-06 | 1.72E-01 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Lead | 5.11E-05 | 1.61E+00 | 2.6% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Manganese | 4.77E-05 | 1.50E+00 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Mercury | 1.70E-08 | 5.37E-04 | 0.6% | Yes |

| Source ID | Description | Compound | Annual | | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|---|
| | | | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario | |
| ORE_MH | Above-Ground Ore Material Handling | Nickel | 1.50E-06 | 4.72E-02 | 0.6% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Selenium | 3.40E-08 | 1.07E-03 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Silver | 2.35E-08 | 7.41E-04 | 0.6% | No |
| ORE_MH | Above-Ground Ore Material Handling | Vanadium | 3.30E-06 | 1.04E-01 | 0.6% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Zinc | 1.70E-04 | 5.37E+00 | 1.6% | Yes |
| OP_WR | Waste Rock Material Handling | PM | 9.39E-02 | 2.96E+03 | 0.4% | Yes |
| OP_WR | Waste Rock Material Handling | $PM_{10}$ | 4.44E-02 | 1.40E+03 | 0.6% | Yes |
| OP_WR | Waste Rock Material Handling | $PM_{2.5}$ | 6.73E-03 | 2.12E+02 | 0.6% | Yes |
| OP_WR | Waste Rock Material Handling | Antimony | 4.32E-07 | 1.36E-02 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Arsenic | 1.22E-05 | 3.85E-01 | 1.6% | Yes |
| OP_WR | Waste Rock Material Handling | Barium | 8.92E-05 | 2.81E+00 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Beryllium | 1.69E-06 | 5.33E-02 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Cadmium | 2.35E-06 | 7.41E-02 | 1.6% | Yes |
| OP_WR | Waste Rock Material Handling | Chromium | 1.04E-05 | 3.29E-01 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Cobalt | 1.88E-06 | 5.93E-02 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Lithium | 2.63E-05 | 8.30E-01 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Copper | 1.50E-05 | 4.74E-01 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Lead | 1.41E-04 | 4.44E+00 | 7.3% | Yes |
| OP_WR | Waste Rock Material Handling | Manganese | 1.32E-04 | 4.15E+00 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Mercury | 4.70E-08 | 1.48E-03 | 1.6% | Yes |
| OP_WR | Waste Rock Material Handling | Nickel | 4.13E-06 | 1.30E-01 | 1.6% | Yes |
| OP_WR | Waste Rock Material Handling | Selenium | 9.39E-08 | 2.96E-03 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Silver | 6.48E-08 | 2.04E-03 | 1.6% | No |
| OP_WR | Waste Rock Material Handling | Vanadium | 9.11E-06 | 2.87E-01 | 1.6% | Yes |
| OP_WR | Waste Rock Material Handling | Zinc | 4.70E-04 | 1.48E+01 | 4.3% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | PM | 3.84E-02 | 1.21E+03 | 0.2% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | $PM_{10}$ | 1.82E-02 | 5.73E+02 | 0.2% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | $PM_{2.5}$ | 2.75E-03 | 8.67E+01 | 0.2% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Antimony | 1.77E-07 | 5.57E-03 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Arsenic | 4.99E-06 | 1.57E-01 | 0.7% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Barium | 3.65E-05 | 1.15E+00 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Beryllium | 6.91E-07 | 2.18E-02 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Cadmium | 9.60E-07 | 3.03E-02 | 0.7% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Chromium | 4.26E-06 | 1.34E-01 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Cobalt | 7.68E-07 | 2.42E-02 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Lithium | 1.07E-05 | 3.39E-01 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Copper | 6.14E-06 | 1.94E-01 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Lead | 5.76E-05 | 1.82E+00 | 3.0% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Manganese | 5.37E-05 | 1.69E+00 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Mercury | 1.92E-08 | 6.05E-04 | 0.7% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Nickel | 1.69E-06 | 5.33E-02 | 0.7% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Selenium | 3.84E-08 | 1.21E-03 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Silver | 2.65E-08 | 8.35E-04 | 0.7% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Vanadium | 3.72E-06 | 1.17E-01 | 0.7% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Zinc | 1.92E-04 | 6.05E+00 | 1.8% | Yes |
| DC | Crushing Circuit Dust Collector | PM | 1.47E-01 | 4.64E+03 | 0.6% | Yes |
| DC | Crushing Circuit Dust Collector | $PM_{10}$ | 7.35E-02 | 2.32E+03 | 1.0% | Yes |
| DC | Crushing Circuit Dust Collector | $PM_{2.5}$ | 3.68E-02 | 1.16E+03 | 3.1% | Yes |
| DC | Crushing Circuit Dust Collector | Antimony | 6.76E-07 | 2.13E-02 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Arsenic | 1.91E-05 | 6.03E-01 | 2.6% | Yes |
| DC | Crushing Circuit Dust Collector | Barium | 1.40E-04 | 4.40E+00 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Beryllium | 2.65E-06 | 8.35E-02 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Cadmium | 3.68E-06 | 1.16E-01 | 2.6% | Yes |
| DC | Crushing Circuit Dust Collector | Chromium | 1.63E-05 | 5.15E-01 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Cobalt | 2.94E-06 | 9.27E-02 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Lithium | 4.12E-05 | 1.30E+00 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Copper | 2.35E-05 | 7.42E-01 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Lead | 2.21E-04 | 6.96E+00 | 11.4% | Yes |
| DC | Crushing Circuit Dust Collector | Manganese | 2.06E-04 | 6.49E+00 | 2.6% | No |

| Source ID | Description | Compound | Annual | | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|---|
| | | | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario | |
| DC | Crushing Circuit Dust Collector | Mercury | 7.35E-08 | 2.32E-03 | 2.6% | Yes |
| DC | Crushing Circuit Dust Collector | Nickel | 6.47E-06 | 2.04E-01 | 2.6% | Yes |
| DC | Crushing Circuit Dust Collector | Selenium | 1.47E-07 | 4.64E-03 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Silver | 1.01E-07 | 3.20E-03 | 2.6% | No |
| DC | Crushing Circuit Dust Collector | Vanadium | 1.43E-05 | 4.50E-01 | 2.6% | Yes |
| DC | Crushing Circuit Dust Collector | Zinc | 7.35E-04 | 2.32E+01 | 6.8% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | PM | 3.84E-02 | 1.21E+03 | 0.2% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | $PM_{10}$ | 1.82E-02 | 5.73E+02 | 0.2% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | $PM_{2.5}$ | 2.75E-03 | 8.67E+01 | 0.2% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Antimony | 1.77E-07 | 5.57E-03 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Arsenic | 4.99E-06 | 1.57E-01 | 0.7% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Barium | 3.65E-05 | 1.15E+00 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Beryllium | 6.91E-07 | 2.18E-02 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Cadmium | 9.60E-07 | 3.03E-02 | 0.7% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Chromium | 4.26E-06 | 1.34E-01 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Cobalt | 7.68E-07 | 2.42E-02 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Lithium | 1.07E-05 | 3.39E-01 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Copper | 6.14E-06 | 1.94E-01 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Lead | 5.76E-05 | 1.82E+00 | 3.0% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Manganese | 5.37E-05 | 1.69E+00 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Mercury | 1.92E-08 | 6.05E-04 | 0.7% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Nickel | 1.69E-06 | 5.33E-02 | 0.7% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Selenium | 3.84E-08 | 1.21E-03 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Silver | 2.65E-08 | 8.35E-04 | 0.7% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Vanadium | 3.72E-06 | 1.17E-01 | 0.7% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Zinc | 1.92E-04 | 6.05E+00 | 1.8% | Yes |
| SULPH | Sink Product Sulphide Flotation | Carbon Disulphide | 4.79E-02 | 1.51E+03 | 99.0% | No |
| SULPH | Sink Product Sulphide Flotation | Pentanol | 5.56E-02 | 1.75E+03 | 99.0% | No |
| ONSPEC | On-spec Concentrate Stockpile Loading | PM | 3.52E-03 | 1.11E+02 | 0.0% | Yes |
| ONSPEC | On-spec Concentrate Stockpile Loading | $PM_{10}$ | 1.67E-03 | 5.25E+01 | 0.0% | Yes |

| Source ID | Description | Compound | Annual | | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|---|
| | | | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario | |
| ONSPEC | On-spec Concentrate Stockpile Loading | $PM_{2.5}$ | 2.52E-04 | 7.95E+00 | 0.0% | Yes |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | PM | 1.17E-03 | 3.70E+01 | 0.0% | Yes |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | $PM_{10}$ | 5.55E-04 | 1.75E+01 | 0.0% | Yes |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | $PM_{2.5}$ | 8.41E-05 | 2.65E+00 | 0.0% | Yes |
| TL | Haul Truck Loading for Transport to Marine Terminal | PM | 8.51E-02 | 2.68E+03 | 0.3% | Yes |
| TL | Haul Truck Loading for Transport to Marine Terminal | $PM_{10}$ | 4.03E-02 | 1.27E+03 | 0.5% | Yes |
| TL | Haul Truck Loading for Transport to Marine Terminal | $PM_{2.5}$ | 6.10E-03 | 1.92E+02 | 0.5% | Yes |
| MAR_TD | Transfer from Trucks into Ship Feeder | PM | 7.09E-02 | 2.24E+03 | 0.3% | Yes |
| MAR_TD | Transfer from Trucks into Ship Feeder | $PM_{10}$ | 3.36E-02 | 1.06E+03 | 0.4% | Yes |
| MAR_TD | Transfer from Trucks into Ship Feeder | $PM_{2.5}$ | 5.08E-03 | 1.60E+02 | 0.4% | Yes |
| MAR_CONV | Loading onto Ship via Covered Conveyor | PM | 8.10E-03 | 2.56E+02 | 0.0% | Yes |
| MAR_CONV | Loading onto Ship via Covered Conveyor | $PM_{10}$ | 4.05E-03 | 1.28E+02 | 0.1% | Yes |
| MAR_CONV | Loading onto Ships via Covered Conveyor | $PM_{2.5}$ | 2.03E-03 | 6.39E+01 | 0.2% | Yes |
| UPR1 | Road - GNP In-Pit | PM | 1.00E+00 | 3.16E+04 | 4.0% | Yes |
| UPR1 | Road - GNP In-Pit | $PM_{10}$ | 2.85E-01 | 8.97E+03 | 3.7% | Yes |
| UPR1 | Road - GNP In-Pit | $PM_{2.5}$ | 2.85E-02 | 8.97E+02 | 2.4% | Yes |
| UPR1 | Road - GNP In-Pit | Antimony | 4.60E-06 | 1.45E-01 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Arsenic | 1.30E-04 | 4.10E+00 | 17.5% | Yes |
| UPR1 | Road - GNP In-Pit | Barium | 9.51E-04 | 3.00E+01 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Beryllium | 1.80E-05 | 5.68E-01 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Cadmium | 2.50E-05 | 7.89E-01 | 17.5% | Yes |
| UPR1 | Road - GNP In-Pit | Chromium | 1.11E-04 | 3.50E+00 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Cobalt | 2.00E-05 | 6.31E-01 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Lithium | 2.80E-04 | 8.84E+00 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Copper | 1.60E-04 | 5.05E+00 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Lead | 2.30E-04 | 7.26E+00 | 11.9% | Yes |
| UPR1 | Road - GNP In-Pit | Manganese | 1.40E-03 | 4.42E+01 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Mercury | 5.00E-07 | 1.58E-02 | 17.5% | Yes |
| UPR1 | Road - GNP In-Pit | Nickel | 4.40E-05 | 1.39E+00 | 17.5% | Yes |
| UPR1 | Road - GNP In-Pit | Selenium | 1.00E-06 | 3.16E-02 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Silver | 6.90E-07 | 2.18E-02 | 17.5% | No |
| UPR1 | Road - GNP In-Pit | Vanadium | 9.71E-05 | 3.06E+00 | 17.5% | Yes |
| UPR1 | Road - GNP In-Pit | Zinc | 1.60E-03 | 5.05E+01 | 14.8% | Yes |
| UPR2 | GNP Haul Road to North Dump | PM | 2.63E+00 | 8.29E+04 | 10.4% | Yes |
| UPR2 | GNP Haul Road to North Dump | $PM_{10}$ | 7.47E-01 | 2.36E+04 | 9.8% | Yes |
| UPR2 | GNP Haul Road to North Dump | $PM_{2.5}$ | 7.47E-02 | 2.36E+03 | 6.2% | Yes |
| UPR2 | GNP Haul Road to North Dump | Antimony | 1.21E-05 | 3.81E-01 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Arsenic | 3.42E-04 | 1.08E+01 | 45.8% | Yes |
| UPR2 | GNP Haul Road to North Dump | Barium | 2.50E-03 | 7.87E+01 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Beryllium | 4.73E-05 | 1.49E+00 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Cadmium | 6.57E-05 | 2.07E+00 | 45.8% | Yes |
| UPR2 | GNP Haul Road to North Dump | Chromium | 2.92E-04 | 9.20E+00 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Cobalt | 5.26E-05 | 1.66E+00 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Lithium | 7.36E-04 | 2.32E+01 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Copper | 4.20E-04 | 1.33E+01 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Lead | 6.04E-04 | 1.91E+01 | 31.3% | Yes |
| UPR2 | GNP Haul Road to North Dump | Manganese | 3.68E-03 | 1.16E+02 | 45.8% | No |

| Source ID | Description | Compound | Annual | | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|---|
| | | | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario | |
| UPR2 | GNP Haul Road to North Dump | Mercury | 1.31E-06 | 4.14E-02 | 45.8% | Yes |
| UPR2 | GNP Haul Road to North Dump | Nickel | 1.16E-04 | 3.65E+00 | 45.8% | Yes |
| UPR2 | GNP Haul Road to North Dump | Selenium | 2.63E-06 | 8.29E-02 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Silver | 1.81E-06 | 5.72E-02 | 45.8% | No |
| UPR2 | GNP Haul Road to North Dump | Vanadium | 2.55E-04 | 8.04E+00 | 45.8% | Yes |
| UPR2 | GNP Haul Road to North Dump | Zinc | 4.20E-03 | 1.33E+02 | 38.9% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | PM | 1.62E+00 | 5.11E+04 | 6.4% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | $PM_{10}$ | 4.61E-01 | 1.45E+04 | 6.1% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | $PM_{2.5}$ | 4.61E-02 | 1.45E+03 | 3.8% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Antimony | 7.46E-06 | 2.35E-01 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Arsenic | 2.11E-04 | 6.65E+00 | 28.3% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Barium | 1.54E-03 | 4.86E+01 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Beryllium | 2.92E-05 | 9.20E-01 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Cadmium | 4.05E-05 | 1.28E+00 | 28.3% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Chromium | 1.80E-04 | 5.68E+00 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Cobalt | 3.24E-05 | 1.02E+00 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Lithium | 4.54E-04 | 1.43E+01 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Copper | 2.59E-04 | 8.18E+00 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Lead | 3.73E-04 | 1.18E+01 | 19.3% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Manganese | 2.27E-03 | 7.16E+01 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Mercury | 8.11E-07 | 2.56E-02 | 28.3% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Nickel | 7.13E-05 | 2.25E+00 | 28.3% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Selenium | 1.62E-06 | 5.11E-02 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Silver | 1.12E-06 | 3.53E-02 | 28.3% | No |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Vanadium | 1.57E-04 | 4.96E+00 | 28.3% | Yes |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Zinc | 2.59E-03 | 8.18E+01 | 24.0% | Yes |
| UPR4 | Haul Road from Mill Site to Marine Terminal | PM | 1.88E+01 | 5.93E+05 | 74.7% | Yes |
| UPR4 | Haul Road from Mill Site to Marine Terminal | $PM_{10}$ | 5.35E+00 | 1.69E+05 | 70.4% | Yes |
| UPR4 | Haul Road from Mill Site to Marine Terminal | $PM_{2.5}$ | 5.35E-01 | 1.69E+04 | 44.5% | Yes |
| TAILS | Tailings Pond | Carbon Disulphide | 4.79E-04 | 1.51E+01 | 1.0% | No |
| TAILS | Tailings Pond | Pentanol | 5.56E-04 | 1.75E+01 | 1.0% | No |
| SHIP_1 | Auxiliary Engine 1 | CO | 2.68E-02 | 8.45E+02 | 0.4% | Yes |
| SHIP_1 | Auxiliary Engine 1 | NOX | 3.39E-01 | 1.07E+04 | 3.4% | Yes |
| SHIP_1 | Auxiliary Engine 1 | PM | 6.58E-03 | 2.07E+02 | 0.0% | Yes |
| SHIP_1 | Auxiliary Engine 1 | $PM_{10}$ | 6.58E-03 | 2.07E+02 | 0.1% | Yes |
| SHIP_1 | Auxiliary Engine 1 | $PM_{2.5}$ | 5.84E-03 | 1.84E+02 | 0.5% | Yes |
| SHIP_1 | Auxiliary Engine 1 | SO2 | 1.02E-01 | 3.23E+03 | 32.7% | Yes |
| SHIP_2 | Auxiliary Engine 2 | CO | 2.68E-02 | 8.45E+02 | 0.4% | Yes |
| SHIP_2 | Auxiliary Engine 2 | NOX | 3.39E-01 | 1.07E+04 | 3.4% | Yes |
| SHIP_2 | Auxiliary Engine 2 | PM | 6.58E-03 | 2.07E+02 | 0.0% | Yes |
| SHIP_2 | Auxiliary Engine 2 | $PM_{10}$ | 6.58E-03 | 2.07E+02 | 0.1% | Yes |
| SHIP_2 | Auxiliary Engine 2 | $PM_{2.5}$ | 5.84E-03 | 1.84E+02 | 0.5% | Yes |
| SHIP_2 | Auxiliary Engine 2 | SO2 | 1.02E-01 | 3.23E+03 | 32.7% | Yes |
| SHIP_3 | Auxiliary Engine 3 | CO | 2.68E-02 | 8.45E+02 | 0.4% | Yes |
| SHIP_3 | Auxiliary Engine 3 | NOX | 3.39E-01 | 1.07E+04 | 3.4% | Yes |
| SHIP_3 | Auxiliary Engine 3 | PM | 6.58E-03 | 2.07E+02 | 0.0% | Yes |
| SHIP_3 | Auxiliary Engine 3 | $PM_{10}$ | 6.58E-03 | 2.07E+02 | 0.1% | Yes |
| SHIP_3 | Auxiliary Engine 3 | $PM_{2.5}$ | 5.84E-03 | 1.84E+02 | 0.5% | Yes |
| SHIP_3 | Auxiliary Engine 3 | SO2 | 1.02E-01 | 3.23E+03 | 32.7% | Yes |

**Table 3A4. Summary of Estimated Metals Emission Rates**

| Source ID | Description | Description | Compound | Metals Data | | 1 - hour | | 24 - hr | | | Annual | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM {%) | 1-hour ER (g/s) | % of Overall g/s Emissions for Scenario | 24-hour ER (g/s) | 24-hour ER (kg/day) | % of Overall kg/day Emissions for Scenario | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| PIT_DB | Open Pit Drilling and Blasting | Drilling and Blasting | PM | N/A | N/A | 1.12E+00 | 14% | 1.75E-01 | 1.51E+01 | 3.0% | 1.31E-01 | 4.13E+03 | 2.3% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 5.17E-06 | 14% | 8.06E-07 | 6.96E-05 | 3.0% | 6.02E-07 | 1.90E-02 | 2.3% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 1.46E-04 | 14% | 2.28E-05 | 1.97E-03 | 3.0% | 1.70E-05 | 5.37E-01 | 2.3% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.07E-03 | 14% | 1.66E-04 | 1.44E-02 | 3.0% | 1.24E-04 | 3.92E+00 | 2.3% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 2.02E-05 | 14% | 3.15E-06 | 2.72E-04 | 3.0% | 2.36E-06 | 7.43E-02 | 2.3% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 2.81E-05 | 14% | 4.38E-06 | 3.78E-04 | 3.0% | 3.27E-06 | 1.03E-01 | 2.3% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.25E-04 | 14% | 1.94E-05 | 1.68E-03 | 3.0% | 1.45E-05 | 4.58E-01 | 2.3% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 2.25E-05 | 14% | 3.50E-06 | 3.03E-04 | 3.0% | 2.62E-06 | 8.26E-02 | 2.3% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 3.15E-04 | 14% | 4.91E-05 | 4.24E-03 | 3.0% | 3.67E-05 | 1.16E+00 | 2.3% |
| | | | Copper | Max % in Ore & WR | 0.016% | 1.80E-04 | 14% | 2.80E-05 | 2.42E-03 | 3.0% | 2.10E-05 | 6.61E-01 | 2.3% |
| | | | Lead | Max % in Ore & WR | 0.150% | 1.68E-03 | 46% | 2.63E-04 | 2.27E-02 | 13.0% | 1.96E-04 | 6.20E+00 | 10.2% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 1.57E-03 | 14% | 2.45E-04 | 2.12E-02 | 3.0% | 1.83E-04 | 5.78E+00 | 2.3% |
| | | | Mercury | Max % in Ore & WR | 0.00005% | 5.62E-07 | 14% | 8.76E-08 | 7.57E-06 | 3.0% | 6.55E-08 | 2.07E-03 | 2.3% |
| | | | Nickel | Max % in Ore & WR | 0.0044% | 4.94E-05 | 14% | 7.71E-06 | 6.66E-04 | 3.0% | 5.76E-06 | 1.82E-01 | 2.3% |
| | | | Selenium | Max % in Ore & WR | 0.0001% | 1.12E-06 | 14% | 1.75E-07 | 1.51E-05 | 3.0% | 1.31E-07 | 4.13E-03 | 2.3% |
| | | | Silver | Max % in Ore & WR | 0.000069% | 7.75E-07 | 14% | 1.21E-07 | 1.04E-05 | 3.0% | 9.04E-08 | 2.85E-03 | 2.3% |
| | | | Vanadium | Max % in Ore & WR | 0.0097% | 1.09E-04 | 14% | 1.70E-05 | 1.47E-03 | 3.0% | 1.27E-05 | 4.01E-01 | 2.3% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 5.62E-03 | 32% | 8.76E-04 | 7.57E-02 | 7.9% | 6.55E-04 | 2.07E+01 | 6.1% |
| ORE_MH | Above-Ground Ore Material Handling | Material Handling | PM | N/A | N/A | 3.55E-02 | 0% | 0.04 | 3.07E+00 | 0.6% | 3.40E-02 | 1.07E+03 | 0.6% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.63E-07 | 0% | 1.63286E-07 | 1.41E-05 | 0.6% | 1.57E-07 | 4.94E-03 | 0.6% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 4.61E-06 | 0.5% | 4.61462E-06 | 3.99E-04 | 0.6% | 4.42E-06 | 1.40E-01 | 0.6% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.37E-05 | 0% | 3.37222E-05 | 2.91E-03 | 0.6% | 3.23E-05 | 1.02E+00 | 0.6% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 6.39E-07 | 0% | 6.38947E-07 | 5.52E-05 | 0.6% | 6.13E-07 | 1.93E-02 | 0.6% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 8.87E-07 | 0% | 8.87427E-07 | 7.67E-05 | 0.6% | 8.51E-07 | 2.68E-02 | 0.6% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 3.94E-06 | 0% | 3.94017E-06 | 3.40E-04 | 0.6% | 3.78E-06 | 1.19E-01 | 0.6% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 7.10E-07 | 0% | 7.09941E-07 | 6.13E-05 | 0.6% | 6.81E-07 | 2.15E-02 | 0.6% |

| Source ID | Description | Description | Compound | Metals Data | | 1 - hour | | 24 - hr | | | Annual | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM {%) | 1-hour ER (g/s) | % of Overall g/s Emissions for Scenario | 24-hour ER (g/s) | 24-hour ER (kg/day) | % of Overall kg/day Emissions for Scenario | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| | | | Lithium | Max % in Ore & WR | 0.028% | 9.94E-06 | 0% | 9.93918E-06 | 8.59E-04 | 0.6% | 9.53E-06 | 3.01E-01 | 0.6% |
| | | | Copper | Max % in Ore & WR | 0.016% | 5.68E-06 | 0% | 5.67953E-06 | 4.91E-04 | 0.6% | 5.45E-06 | 1.72E-01 | 0.6% |
| | | | Lead | Max % in Ore & WR | 0.150% | 5.32E-05 | 1% | 5.32456E-05 | 4.60E-03 | 2.6% | 5.11E-05 | 1.61E+00 | 2.6% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 4.97E-05 | 0% | 4.96959E-05 | 4.29E-03 | 0.6% | 4.77E-05 | 1.50E+00 | 0.6% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 1.77E-08 | 0% | 1.77485E-08 | 1.53E-06 | 0.6% | 1.70E-08 | 5.37E-04 | 0.6% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 1.56E-06 | 0% | 1.56187E-06 | 1.35E-04 | 0.6% | 1.50E-06 | 4.72E-02 | 0.6% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 3.55E-08 | 0% | 3.54971E-08 | 3.07E-06 | 0.6% | 3.40E-08 | 1.07E-03 | 0.6% |
| | | | Silver | Max % in Ore & WR | 0.000% | 2.45E-08 | 0% | 2.4493E-08 | 2.12E-06 | 0.6% | 2.35E-08 | 7.41E-04 | 0.6% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.44E-06 | 0% | 3.44322E-06 | 2.97E-04 | 0.6% | 3.30E-06 | 1.04E-01 | 0.6% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 1.77E-04 | 1% | 0.000177485 | 1.53E-02 | 1.6% | 1.70E-04 | 5.37E+00 | 1.6% |
| OP_WR | Waste Rock Material Handling | Material Handling | PM | N/A | N/A | 9.80E-02 | 1% | 0.10 | 8.46E+00 | 1.7% | 9.39E-02 | 2.96E+03 | 1.6% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 4.51E-07 | 1% | 4.51E-07 | 3.89E-05 | 1.7% | 4.32E-07 | 1.36E-02 | 1.6% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 1.27E-05 | 1% | 1.27E-05 | 1.10E-03 | 1.7% | 1.22E-05 | 3.85E-01 | 1.6% |
| | | | Barium | Max % in Ore & WR | 0.095% | 9.31E-05 | 1% | 9.31E-05 | 8.04E-03 | 1.7% | 8.92E-05 | 2.81E+00 | 1.6% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 1.76E-06 | 1% | 1.76E-06 | 1.52E-04 | 1.7% | 1.69E-06 | 5.33E-02 | 1.6% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 2.45E-06 | 1% | 2.45E-06 | 2.12E-04 | 1.7% | 2.35E-06 | 7.41E-02 | 1.6% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.09E-05 | 1% | 1.09E-05 | 9.40E-04 | 1.7% | 1.04E-05 | 3.29E-01 | 1.6% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 1.96E-06 | 1% | 1.96E-06 | 1.69E-04 | 1.7% | 1.88E-06 | 5.93E-02 | 1.6% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 2.74E-05 | 1% | 2.74E-05 | 2.37E-03 | 1.7% | 2.63E-05 | 8.30E-01 | 1.6% |
| | | | Copper | Max % in Ore & WR | 0.016% | 1.57E-05 | 1% | 1.57E-05 | 1.35E-03 | 1.7% | 1.50E-05 | 4.74E-01 | 1.6% |
| | | | Lead | Max % in Ore & WR | 0.150% | 1.47E-04 | 4% | 1.47E-04 | 1.27E-02 | 7.3% | 1.41E-04 | 4.44E+00 | 7.3% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 1.37E-04 | 1% | 1.37E-04 | 1.19E-02 | 1.7% | 1.32E-04 | 4.15E+00 | 1.6% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 4.90E-08 | 1% | 4.90E-08 | 4.23E-06 | 1.7% | 4.70E-08 | 1.48E-03 | 1.6% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 4.31E-06 | 1% | 4.31E-06 | 3.72E-04 | 1.7% | 4.13E-06 | 1.30E-01 | 1.6% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 9.80E-08 | 1% | 9.80E-08 | 8.46E-06 | 1.7% | 9.39E-08 | 2.96E-03 | 1.6% |
| | | | Silver | Max % in Ore & WR | 0.000% | 6.76E-08 | 1% | 6.76E-08 | 5.84E-06 | 1.7% | 6.48E-08 | 2.04E-03 | 1.6% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 9.50E-06 | 1% | 9.50E-06 | 8.21E-04 | 1.7% | 9.11E-06 | 2.87E-01 | 1.6% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 4.90E-04 | 3% | 4.90E-04 | 4.23E-02 | 4.4% | 4.70E-04 | 1.48E+01 | 4.3% |

| Source ID | Description | Description | Compound | Metals Data | | 1 - hour | | 24 - hr | | | Annual | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM {%) | 1-hour ER (g/s) | % of Overall g/s Emissions for Scenario | 24-hour ER (g/s) | 24-hour ER (kg/day) | % of Overall kg/day Emissions for Scenario | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Material Handling | PM | N/A | N/A | 4.00E-02 | 0.5% | 0.04 | 3.46E+00 | 0.7% | 3.84E-02 | 1.21E+03 | 0.7% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.84E-07 | 0.5% | 1.84E-07 | 1.59E-05 | 0.7% | 1.77E-07 | 5.57E-03 | 0.7% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 5.20E-06 | 0.5% | 5.20E-06 | 4.50E-04 | 0.7% | 4.99E-06 | 1.57E-01 | 0.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.80E-05 | 0.5% | 3.80E-05 | 3.29E-03 | 0.7% | 3.65E-05 | 1.15E+00 | 0.7% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 7.21E-07 | 0.5% | 7.21E-07 | 6.23E-05 | 0.7% | 6.91E-07 | 2.18E-02 | 0.7% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 1.00E-06 | 0.5% | 1.00E-06 | 8.65E-05 | 0.7% | 9.60E-07 | 3.03E-02 | 0.7% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 4.44E-06 | 0.5% | 4.44E-06 | 3.84E-04 | 0.7% | 4.26E-06 | 1.34E-01 | 0.7% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 8.01E-07 | 0.5% | 8.01E-07 | 6.92E-05 | 0.7% | 7.68E-07 | 2.42E-02 | 0.7% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 1.12E-05 | 0.5% | 1.12E-05 | 9.69E-04 | 0.7% | 1.07E-05 | 3.39E-01 | 0.7% |
| | | | Copper | Max % in Ore & WR | 0.016% | 6.41E-06 | 0.5% | 6.41E-06 | 5.53E-04 | 0.7% | 6.14E-06 | 1.94E-01 | 0.7% |
| | | | Lead | Max % in Ore & WR | 0.150% | 6.01E-05 | 1.6% | 6.01E-05 | 5.19E-03 | 3.0% | 5.76E-05 | 1.82E+00 | 3.0% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 5.60E-05 | 0.5% | 5.60E-05 | 4.84E-03 | 0.7% | 5.37E-05 | 1.69E+00 | 0.7% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 2.00E-08 | 0.5% | 2.00E-08 | 1.73E-06 | 0.7% | 1.92E-08 | 6.05E-04 | 0.7% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 1.76E-06 | 0.5% | 1.76E-06 | 1.52E-04 | 0.7% | 1.69E-06 | 5.33E-02 | 0.7% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 4.00E-08 | 0.5% | 4.00E-08 | 3.46E-06 | 0.7% | 3.84E-08 | 1.21E-03 | 0.7% |
| | | | Silver | Max % in Ore & WR | 0.000% | 2.76E-08 | 0.5% | 2.76E-08 | 2.39E-06 | 0.7% | 2.65E-08 | 8.35E-04 | 0.7% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.88E-06 | 0.5% | 3.88E-06 | 3.36E-04 | 0.7% | 3.72E-06 | 1.17E-01 | 0.7% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 2.00E-04 | 1% | 2.00E-04 | 1.73E-02 | 1.8% | 1.92E-04 | 6.05E+00 | 1.8% |
| DC | Crushing Circuit Dust Collector | Dust Collector | PM | N/A | N/A | 1.53E-01 | 2% | 0.15 | 1.32E+01 | 2.6% | 1.47E-01 | 4.64E+03 | 2.6% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 7.05E-07 | 2% | 7.05E-07 | 6.09E-05 | 2.6% | 6.76E-07 | 2.13E-02 | 2.6% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 1.99E-05 | 2% | 1.99E-05 | 1.72E-03 | 2.6% | 1.91E-05 | 6.03E-01 | 2.6% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.46E-04 | 2% | 1.46E-04 | 1.26E-02 | 2.6% | 1.40E-04 | 4.40E+00 | 2.6% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 2.76E-06 | 2% | 2.76E-06 | 2.38E-04 | 2.6% | 2.65E-06 | 8.35E-02 | 2.6% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 3.83E-06 | 2% | 3.83E-06 | 3.31E-04 | 2.6% | 3.68E-06 | 1.16E-01 | 2.6% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.70E-05 | 2% | 1.70E-05 | 1.47E-03 | 2.6% | 1.63E-05 | 5.15E-01 | 2.6% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 3.07E-06 | 2% | 3.07E-06 | 2.65E-04 | 2.6% | 2.94E-06 | 9.27E-02 | 2.6% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 4.29E-05 | 2% | 4.29E-05 | 3.71E-03 | 2.6% | 4.12E-05 | 1.30E+00 | 2.6% |
| | | | Copper | Max % in Ore & WR | 0.016% | 2.45E-05 | 2% | 2.45E-05 | 2.12E-03 | 2.6% | 2.35E-05 | 7.42E-01 | 2.6% |

| Source ID | Description | Description | Compound | Metals Data | | 1 - hour | | 24 - hr | | | Annual | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM {%) | 1-hour ER (g/s) | % of Overall g/s Emissions for Scenario | 24-hour ER (g/s) | 24-hour ER (kg/day) | % of Overall kg/day Emissions for Scenario | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| | | | Lead | Max % in Ore & WR | 0.150% | 2.30E-04 | 6% | 2.30E-04 | 1.99E-02 | 11.4% | 2.21E-04 | 6.96E+00 | 11.4% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 2.15E-04 | 2% | 2.15E-04 | 1.85E-02 | 2.6% | 2.06E-04 | 6.49E+00 | 2.6% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 7.67E-08 | 2% | 7.67E-08 | 6.62E-06 | 2.6% | 7.35E-08 | 2.32E-03 | 2.6% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 6.75E-06 | 2% | 6.75E-06 | 5.83E-04 | 2.6% | 6.47E-06 | 2.04E-01 | 2.6% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 1.53E-07 | 2% | 1.53E-07 | 1.32E-05 | 2.6% | 1.47E-07 | 4.64E-03 | 2.6% |
| | | | Silver | Max % in Ore & WR | 0.000% | 1.06E-07 | 2% | 1.06E-07 | 9.14E-06 | 2.6% | 1.01E-07 | 3.20E-03 | 2.6% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 1.49E-05 | 2% | 1.49E-05 | 1.29E-03 | 2.6% | 1.43E-05 | 4.50E-01 | 2.6% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 7.67E-04 | 4% | 7.67E-04 | 6.62E-02 | 6.9% | 7.35E-04 | 2.32E+01 | 6.8% |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Material Handling | PM | N/A | N/A | 4.00E-02 | 0.5% | 0.04 | 3.46E+00 | 0.7% | 3.84E-02 | 1.21E+03 | 0.7% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.84E-07 | 0.5% | 1.84E-07 | 1.59E-05 | 0.7% | 1.77E-07 | 5.57E-03 | 0.7% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 5.20E-06 | 0.5% | 5.20E-06 | 4.50E-04 | 0.7% | 4.99E-06 | 1.57E-01 | 0.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.80E-05 | 0.5% | 3.80E-05 | 3.29E-03 | 0.7% | 3.65E-05 | 1.15E+00 | 0.7% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 7.21E-07 | 0.5% | 7.21E-07 | 6.23E-05 | 0.7% | 6.91E-07 | 2.18E-02 | 0.7% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 1.00E-06 | 0.5% | 1.00E-06 | 8.65E-05 | 0.7% | 9.60E-07 | 3.03E-02 | 0.7% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 4.44E-06 | 0.5% | 4.44E-06 | 3.84E-04 | 0.7% | 4.26E-06 | 1.34E-01 | 0.7% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 8.01E-07 | 0.5% | 8.01E-07 | 6.92E-05 | 0.7% | 7.68E-07 | 2.42E-02 | 0.7% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 1.12E-05 | 0.5% | 1.12E-05 | 9.69E-04 | 0.7% | 1.07E-05 | 3.39E-01 | 0.7% |
| | | | Copper | Max % in Ore & WR | 0.016% | 6.41E-06 | 0.5% | 6.41E-06 | 5.53E-04 | 0.7% | 6.14E-06 | 1.94E-01 | 0.7% |
| | | | Lead | Max % in Ore & WR | 0.150% | 6.01E-05 | 1.6% | 6.01E-05 | 5.19E-03 | 3.0% | 5.76E-05 | 1.82E+00 | 3.0% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 5.60E-05 | 0.5% | 5.60E-05 | 4.84E-03 | 0.7% | 5.37E-05 | 1.69E+00 | 0.7% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 2.00E-08 | 0.5% | 2.00E-08 | 1.73E-06 | 0.7% | 1.92E-08 | 6.05E-04 | 0.7% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 1.76E-06 | 0.5% | 1.76E-06 | 1.52E-04 | 0.7% | 1.69E-06 | 5.33E-02 | 0.7% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 4.00E-08 | 0.5% | 4.00E-08 | 3.46E-06 | 0.7% | 3.84E-08 | 1.21E-03 | 0.7% |
| | | | Silver | Max % in Ore & WR | 0.000% | 2.76E-08 | 0.5% | 2.76E-08 | 2.39E-06 | 0.7% | 2.65E-08 | 8.35E-04 | 0.7% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.88E-06 | 0.5% | 3.88E-06 | 3.36E-04 | 0.7% | 3.72E-06 | 1.17E-01 | 0.7% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 2.00E-04 | 1.1% | 2.00E-04 | 1.73E-02 | 1.8% | 1.92E-04 | 6.05E+00 | 1.8% |
| UPR1 | Road - GNP In-Pit | Fugitive Dust Emissions from Roadways | PM | N/A | N/A | 1.20E+00 | 15% | 1.000702099 | 8.65E+01 | 17.3% | 1.00E+00 | 3.16E+04 | 17.5% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 5.52E-06 | 15% | 4.60E-06 | 3.98E-04 | 17.3% | 4.60E-06 | 1.45E-01 | 17.5% |

| Source ID | Description | Description | Compound | Metals Data | | 1 - hour | | 24 - hr | | | Annual | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM {%) | 1-hour ER (g/s) | % of Overall g/s Emissions for Scenario | 24-hour ER (g/s) | 24-hour ER (kg/day) | % of Overall kg/day Emissions for Scenario | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 1.56E-04 | 15% | 1.30E-04 | 1.12E-02 | 17.3% | 1.30E-04 | 4.10E+00 | 17.5% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.14E-03 | 15% | 9.51E-04 | 8.21E-02 | 17.3% | 9.51E-04 | 3.00E+01 | 17.5% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 2.16E-05 | 15% | 1.80E-05 | 1.56E-03 | 17.3% | 1.80E-05 | 5.68E-01 | 17.5% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 3.00E-05 | 15% | 2.50E-05 | 2.16E-03 | 17.3% | 2.50E-05 | 7.89E-01 | 17.5% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.33E-04 | 15% | 1.11E-04 | 9.60E-03 | 17.3% | 1.11E-04 | 3.50E+00 | 17.5% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 2.40E-05 | 15% | 2.00E-05 | 1.73E-03 | 17.3% | 2.00E-05 | 6.31E-01 | 17.5% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 3.36E-04 | 15% | 2.80E-04 | 2.42E-02 | 17.3% | 2.80E-04 | 8.84E+00 | 17.5% |
| | | | Copper | Max % in Ore & WR | 0.016% | 1.92E-04 | 15% | 1.60E-04 | 1.38E-02 | 17.3% | 1.60E-04 | 5.05E+00 | 17.5% |
| | | | Lead | Max % in Ore & WR | 0.023% | 2.76E-04 | 7% | 2.30E-04 | 1.99E-02 | 11.4% | 2.30E-04 | 7.26E+00 | 11.9% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 1.68E-03 | 15% | 1.40E-03 | 1.21E-01 | 17.3% | 1.40E-03 | 4.42E+01 | 17.5% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 6.00E-07 | 15% | 5.00E-07 | 4.32E-05 | 17.3% | 5.00E-07 | 1.58E-02 | 17.5% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 5.28E-05 | 15% | 4.40E-05 | 3.80E-03 | 17.3% | 4.40E-05 | 1.39E+00 | 17.5% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 1.20E-06 | 15% | 1.00E-06 | 8.65E-05 | 17.3% | 1.00E-06 | 3.16E-02 | 17.5% |
| | | | Silver | Max % in Ore & WR | 0.000% | 8.29E-07 | 15% | 6.90E-07 | 5.97E-05 | 17.3% | 6.90E-07 | 2.18E-02 | 17.5% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 1.16E-04 | 15% | 9.71E-05 | 8.39E-03 | 17.3% | 9.71E-05 | 3.06E+00 | 17.5% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 1.92E-03 | 11% | 1.60E-03 | 1.38E-01 | 14.4% | 1.60E-03 | 5.05E+01 | 14.8% |
| UPR2 | GNP Haul Road to North Dump | Fugitive Dust Emissions from Roadways | PM | N/A | N/A | 3.15E+00 | 40% | 2.628 | 2.27E+02 | 45.4% | 2.63E+00 | 8.29E+04 | 45.8% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.45E-05 | 40% | 1.21E-05 | 1.04E-03 | 45.4% | 1.21E-05 | 3.81E-01 | 45.8% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 4.10E-04 | 40% | 3.42E-04 | 2.95E-02 | 45.4% | 3.42E-04 | 1.08E+01 | 45.8% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.00E-03 | 40% | 2.50E-03 | 2.16E-01 | 45.4% | 2.50E-03 | 7.87E+01 | 45.8% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 5.68E-05 | 40% | 4.73E-05 | 4.09E-03 | 45.4% | 4.73E-05 | 1.49E+00 | 45.8% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 7.88E-05 | 40% | 6.57E-05 | 5.68E-03 | 45.4% | 6.57E-05 | 2.07E+00 | 45.8% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 3.50E-04 | 40% | 2.92E-04 | 2.52E-02 | 45.4% | 2.92E-04 | 9.20E+00 | 45.8% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 6.31E-05 | 40% | 5.26E-05 | 4.54E-03 | 45.4% | 5.26E-05 | 1.66E+00 | 45.8% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 8.83E-04 | 40% | 7.36E-04 | 6.36E-02 | 45.4% | 7.36E-04 | 2.32E+01 | 45.8% |
| | | | Copper | Max % in Ore & WR | 0.016% | 5.05E-04 | 40% | 4.20E-04 | 3.63E-02 | 45.4% | 4.20E-04 | 1.33E+01 | 45.8% |
| | | | Lead | Max % in Ore & WR | 0.023% | 7.25E-04 | 20% | 6.04E-04 | 5.22E-02 | 29.9% | 6.04E-04 | 1.91E+01 | 31.3% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 4.41E-03 | 40% | 3.68E-03 | 3.18E-01 | 45.4% | 3.68E-03 | 1.16E+02 | 45.8% |

| Source ID | Description | Description | Compound | Metals Data | | 1 - hour | | 24 - hr | | | Annual | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM {%) | 1-hour ER (g/s) | % of Overall g/s Emissions for Scenario | 24-hour ER (g/s) | 24-hour ER (kg/day) | % of Overall kg/day Emissions for Scenario | Annual ER (g/s) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| | | | Mercury | Max % in Ore & WR | 0.000% | 1.58E-06 | 40% | 1.31E-06 | 1.14E-04 | 45.4% | 1.31E-06 | 4.14E-02 | 45.8% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 1.39E-04 | 40% | 1.16E-04 | 9.99E-03 | 45.4% | 1.16E-04 | 3.65E+00 | 45.8% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 3.15E-06 | 40% | 2.63E-06 | 2.27E-04 | 45.4% | 2.63E-06 | 8.29E-02 | 45.8% |
| | | | Silver | Max % in Ore & WR | 0.000% | 2.18E-06 | 40% | 1.81E-06 | 1.57E-04 | 45.4% | 1.81E-06 | 5.72E-02 | 45.8% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.06E-04 | 40% | 2.55E-04 | 2.20E-02 | 45.4% | 2.55E-04 | 8.04E+00 | 45.8% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 5.05E-03 | 29% | 4.20E-03 | 3.63E-01 | 37.8% | 4.20E-03 | 1.33E+02 | 38.9% |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | Fugitive Dust Emissions from Roadways | PM | N/A | N/A | 1.95E+00 | 25% | 1.62 | 1.40E+02 | 28.0% | 1.62E+00 | 5.11E+04 | 28.3% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 8.95E-06 | 25% | 7.46E-06 | 6.44E-04 | 28.0% | 7.46E-06 | 2.35E-01 | 28.3% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 2.53E-04 | 25% | 2.11E-04 | 1.82E-02 | 28.0% | 2.11E-04 | 6.65E+00 | 28.3% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.85E-03 | 25% | 1.54E-03 | 1.33E-01 | 28.0% | 1.54E-03 | 4.86E+01 | 28.3% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 3.50E-05 | 25% | 2.92E-05 | 2.52E-03 | 28.0% | 2.92E-05 | 9.20E-01 | 28.3% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 4.86E-05 | 25% | 4.05E-05 | 3.50E-03 | 28.0% | 4.05E-05 | 1.28E+00 | 28.3% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 2.16E-04 | 25% | 1.80E-04 | 1.56E-02 | 28.0% | 1.80E-04 | 5.68E+00 | 28.3% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 3.89E-05 | 25% | 3.24E-05 | 2.80E-03 | 28.0% | 3.24E-05 | 1.02E+00 | 28.3% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 5.45E-04 | 25% | 4.54E-04 | 3.92E-02 | 28.0% | 4.54E-04 | 1.43E+01 | 28.3% |
| | | | Copper | Max % in Ore & WR | 0.016% | 3.11E-04 | 25% | 2.59E-04 | 2.24E-02 | 28.0% | 2.59E-04 | 8.18E+00 | 28.3% |
| | | | Lead | Max % in Ore & WR | 0.023% | 4.48E-04 | 12% | 3.73E-04 | 3.22E-02 | 18.5% | 3.73E-04 | 1.18E+01 | 19.3% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 2.72E-03 | 25% | 2.27E-03 | 1.96E-01 | 28.0% | 2.27E-03 | 7.16E+01 | 28.3% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 9.73E-07 | 25% | 8.11E-07 | 7.01E-05 | 28.0% | 8.11E-07 | 2.56E-02 | 28.3% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 8.56E-05 | 25% | 7.13E-05 | 6.16E-03 | 28.0% | 7.13E-05 | 2.25E+00 | 28.3% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 1.95E-06 | 25% | 1.62E-06 | 1.40E-04 | 28.0% | 1.62E-06 | 5.11E-02 | 28.3% |
| | | | Silver | Max % in Ore & WR | 0.000% | 1.34E-06 | 25% | 1.12E-06 | 9.67E-05 | 28.0% | 1.12E-06 | 3.53E-02 | 28.3% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 1.89E-04 | 25% | 1.57E-04 | 1.36E-02 | 28.0% | 1.57E-04 | 4.96E+00 | 28.3% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 3.11E-03 | 18% | 2.59E-03 | 2.24E-01 | 23.4% | 2.59E-03 | 8.18E+01 | 24.0% |

## ***EO1 - Operation Phase - Material Handling Emissions***

The material handling emissions associated with loading/unloading to stockpiles in the Overburden Dump, Waste Rock Dump and topsoil stroage areas were estimated using the emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

**Sample Emission Calculations - ORE_MH:**

**PM (24-hr) Sample Calculation using the Drop Equation**

$EF_{PM}$ = k x 0.0016 x (Mean Wind Speed m/s ÷2.2)$^{1.3}$ ÷ (Material Moisture Content % ÷ 2)$^{1.4}$ (kg/tonne)
Particle Size Multiplier

$EF_{PM}$ = 0.74 x 0.0016 x (5.9 m/s ÷2.2)^1.3 ÷ (4% ÷ 2)^1.4 (kg/tonne)

$EF_{PM}$ = 1.62E-03 kg/tonne

$ER_{PM\text{-}1hr}$ = Emission Factor (kg/tonne) x Loading Rate (tonne/day) x # of Transfers x 1000 g/kg ÷ 3600 s/hr

$ER_{PM\text{-}hr}$ = 0.0016 (kg/tonne) x 79 (tonne/hr) x 1000 g/kg ÷ 3600 s/hr

$ER_{PM\text{-}1hr}$ = 3.55E-02 g/s

ERPM-kg/y = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

| Contaminant | Aerodynamic Particle Size Multiplier (k) |
|---|---|
| PM | 0.74 |
| $PM_{10}$ | 0.35 |
| $PM_{2.5}$ | 0.053 |

**Reference:** Emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

| | |
|---|---|
| **Overall average wind speed (m/s)** | 5.9 |

**Reference**: Average of maximum hourly wind speeds from January to December from Canadian Climate Normals data for St.Lawrence, Nfld. Station, 1971-2000 Climate Normals and Averages.

**Emission Summary:**

| Source ID | Description | Contaminant | Emission Factor (kg/ tonne) | Emission Rates (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| ORE_MH | Above-Ground Ore Material Handling | PM | 1.62E-03 | 3.55E-02 | 3.55E-02 | 3.40E-02 | 1.07E+03 |
| | | $PM_{10}$ | 7.65E-04 | 1.68E-02 | 1.68E-02 | 1.61E-02 | 5.08E+02 |
| | | $PM_{2.5}$ | 1.16E-04 | 2.54E-03 | 2.54E-03 | 2.44E-03 | 7.69E+01 |
| OP_WR | Waste Rock Material Handling | PM | 1.18E-03 | 9.80E-02 | 9.80E-02 | 9.39E-02 | 2.96E+03 |
| | | $PM_{10}$ | 5.60E-04 | 4.63E-02 | 4.63E-02 | 4.44E-02 | 1.40E+03 |
| | | $PM_{2.5}$ | 8.48E-05 | 7.02E-03 | 7.02E-03 | 6.73E-03 | 2.12E+02 |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | PM | 1.62E-03 | 4.00E-02 | 4.00E-02 | 3.84E-02 | 1.21E+03 |
| | | $PM_{10}$ | 7.65E-04 | 1.89E-02 | 1.89E-02 | 1.82E-02 | 5.73E+02 |
| | | $PM_{2.5}$ | 1.16E-04 | 2.87E-03 | 2.87E-03 | 2.75E-03 | 8.67E+01 |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | PM | 1.62E-03 | 4.00E-02 | 4.00E-02 | 3.84E-02 | 1.21E+03 |
| | | $PM_{10}$ | 7.65E-04 | 1.89E-02 | 1.89E-02 | 1.82E-02 | 5.73E+02 |
| | | $PM_{2.5}$ | 1.16E-04 | 2.87E-03 | 2.87E-03 | 2.75E-03 | 8.67E+01 |
| ONSPEC | On-spec Concentrate Stockpile Loading | PM | 6.13E-04 | 3.67E-03 | 3.67E-03 | 3.52E-03 | 1.11E+02 |
| | | $PM_{10}$ | 2.90E-04 | 1.74E-03 | 1.74E-03 | 1.67E-03 | 5.25E+01 |
| | | $PM_{2.5}$ | 4.39E-05 | 2.63E-04 | 2.63E-04 | 2.52E-04 | 7.95E+00 |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | PM | 6.13E-04 | 1.22E-03 | 1.22E-03 | 1.17E-03 | 3.70E+01 |
| | | $PM_{10}$ | 2.90E-04 | 5.79E-04 | 5.79E-04 | 5.55E-04 | 1.75E+01 |
| | | $PM_{2.5}$ | 4.39E-05 | 8.77E-05 | 8.77E-05 | 8.41E-05 | 2.65E+00 |

## ***EO2 - Operation Phase - Blasting and Drilling Emissions***

Particulate matter (PM) emissions are estimated using the blasting emission factor for blasting in AP-42 Chapter 11.9 Western Coal Mining, Table 11.9-2, as shown in the formula below.

Drilling and blasting activities will be conducted within the open pits and the underground mine during the operation phase of the Project to facilitate ore mining activities and mine development. The calculation for drilling and blasting emissions assumes the worst-case emissions scenario, occurring when 100% of ore is mined from the open pits (note that underground mining will commence only in the third year of operation). Source parameters were derived based on the Grebes Nest Pit, which has the highest anticipated mining rate among the four pits.

The operating schedule for pit mining equipment and personnel will consist of two 10-hour shifts per day (totaling 20 hours of operation within a 24-hour period) for 350 days per year. Both ore and waste rock material will be blasted. Contaminants will be released from the open pits. Source parameters, such as the number of blasts per day and holes drilled per day, are summarized below. To estimate a 1-hour averaged emission rate for drilling, it was assumed that holes will be drilled throughout the production day (i.e., 80 holes divided by 20 operating hours per day = 4 holes/hour). To estimate a 1-hour averaged emission rate for blasting, a rate of 1 blast per hour was conservatively assumed.

**Emission Data:**

| **Ore Blasting** | **1-hr** | **24-hr** | **Annual** |
|---|---|---|---|
| **Number of Blasts:** | 1 | 1 | - |
| **Bulk Emulsion: Usage per Blast (mg)** | - | 0.7 | - |
| **Operating Hours per Day** | 20 | | |
| **Operating Days per Year** | 350 | | |
| **Blasting Face Area/Blast ($m^2$/blast):** | 60.0 | | |
| **CO emis factor (kg/mg)** | 2.3 | | |
| **NOX emis factor (kg/mg)** | 0.2 | | |

| **Waste Rock Blasting** | | | |
|---|---|---|---|
| **Number of Blasts:** | 1 | 1 | - |
| **Bulk Emulsion: Usage per Blast (mg)** | - | 4.3 | - |
| **Operating Hours per Day** | 20 | | |
| **Operating Days per Year** | 350 | | |
| **Blasting Face Area/Blast ($m^2$/blast):** | 600.0 | | |

| **Drilling** | |
|---|---|
| **Number of Holles Drilled Per Day** | 80 |
| **Number of Holles Drilled Per Hour** | 4 |
| **Drilling control** | 0.7 |
| **Operating Hours per Day** | 20 |
| **Operating Days per Year** | 350 |

**Sample Emission Calculations - PIT_DB:**

**PM (24-hr) Sample Calculation for PIT_DB**

$EF_{PM}$ = 0.00022 x (Area per Blast)$^{1.5}$

$ER_{PM}$ = 0.00022 x (Area per Blast)$^{1.5}$ (m2/blast) x 1000 g/kg x Number of Blasts per day x Particulate Size Scaling Ratio ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM-24hr}$ = 0.0022 x 60^1.5 (m2) x 1000 g/kg x 1 blasts/day x 1 ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM-24hr}$ = 1.18E-02 g/s

ERPM-kg/y = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary:**

**Blasting**

| Source ID | Description | Contaminant | Emission Factor (g/s) | Emission Rates (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| **Ore Blasting** | | | | | | | |
| PIT_DB | Open Pit Drilling and Blasting | PM | 1.02E-01 | 2.84E-02 | 1.18E-03 | 1.13E-03 | 3.58E+01 |
| PIT_DB | Open Pit Drilling and Blasting | CO | - | 4.47E-01 | 1.86E-02 | 1.79E-02 | 5.64E+02 |
| PIT_DB | Open Pit Drilling and Blasting | $NO_X$ | - | 3.89E-02 | 1.62E-03 | 1.55E-03 | 4.90E+01 |
| **Waste Rock Blasting** | | | | | | | |
| PIT_DB | Open Pit Drilling and Blasting | PM | 3.23E+00 | 8.98E-01 | 3.74E-02 | 3.59E-02 | 1.13E+03 |
| PIT_DB | Open Pit Drilling and Blasting | CO | - | 2.75E+00 | 1.14E-01 | 1.10E-01 | 3.46E+03 |
| PIT_DB | Open Pit Drilling and Blasting | $NO_X$ | - | 2.39E-01 | 9.95E-03 | 9.54E-03 | 3.01E+02 |

**References:**

1) PM Blasting Emission Factors and Scaling Ratios: AP-42 Chapter 11.9 Western Surface Coal Mining, Table 11.9-2, 1998.

**Drilling**

| Source ID | Description | Contaminant | Emission Factor (kg/ hole) | Emission Rates (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| PIT_DB | Open Pit Drilling and | PM | 0.59 | 0.20 | 1.37E-01 | 1.31E-01 | 4.13E+03 |

**Total Emissions by Source**

| Source ID | Description | Contaminant | CAS | Emission Rates (g/s) | | | Emission Rate |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| PIT_DB | Open Pit Drilling and Blasting | PM | N/A | 1.12E+00 | 1.75E-01 | 1.68E-01 | 5.30E+03 |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{10}$ * | N/A | 5.62E-01 | 8.76E-02 | 8.40E-02 | 2.65E+03 |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{2.5}$ * | N/A | 2.81E-01 | 4.38E-02 | 4.20E-02 | 1.32E+03 |
| PIT_DB | Open Pit Drilling and Blasting | CO | 630-08-0 | 3.19E+00 | 1.33E-01 | 1.28E-01 | 4.03E+03 |
| PIT_DB | Open Pit Drilling and Blasting | NOX | 10102-44-0 | 2.78E-01 | 1.16E-02 | 1.11E-02 | 3.50E+02 |

**Notes:**

* There are no Efs for PM10 and PM2.5 from drilling and blasting, therefore PM10 was assumed to be 50% of PM and PM2.5 was assumed to be 50% of PM10.

***EO3 - Operation Phase - Open Pit Mining Equipment***

The calculation for emissions from diesel-fired mining equipment assumes the worst-case scenario, where 100% of mining occurs in open pits (underground mining will not commence until the third year of operation). Equipment counts, engine sizes, and fuel usage were determined based on the projected open pit mining fleet.

Crankcase emission standards from the U.S. EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition NR-009d (July 2010) (EPA Report NR-009d) were used to calculate exhaust emissions from the diesel-fired equipment that will operate during open pit mining. It was assumed that all on-site vehicles conform to at least Tier 3 emission standards.

| | |
|---|---|
| **Molar Mass SO2 (g/mol)** | 64 |
| **Molar Mass of Sulphur** | 32 |
| **S Content in Diesel Fuel (mg/kg)** | 15 |
| **Diesel Fuel Density (kg/L)** | 0.8430 |
| **EF SO2=** | 0.0253 |

**Summary of Construction Phase Vehicles**

| Equipment | Number of Units | Fuel per Vehicle (L/hr) | Engine Rating [hp] | Engine Rating [kW] | U.S. EPA Emission Standard | Daily Operating Hours per Unit | Days of Operation in a Year | Load Factor | Brake-Specific Fuel Consumption | CO [g/kW-hr] | NOx [g/kW-hr] | PM [g/kW-hr] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hydraulic Excavator ore/waste CAT 390FL | 1 | 56 | 524 | 390 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Hydraulic Excavator ovb/ore CAT 374FL | 1 | 62 | 472 | 352 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Rigid Haul Truck ore/waste CAT 773G | 3 | 57 | 775 | 578 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 6.4 | 0.2 |
| Articulated Haul Truck ovb/ore CAT 740B | 1 | 46 | 489 | 365 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Drill rig ore AC DTH | 1 | 22 | 225 | 168 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Drill rig waste AC DTH | 1 | 65 | 563 | 420 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Wheel Loader CAT 980K | 1 | 25 | 406 | 302 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Wheel Dozer CAT 844H | 1 | 56 | 628 | 468 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Track Dozer CAT D9 | 1 | 46 | 436 | 325 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Motor Grader CAT 14M | 1 | 18 | 259 | 193 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Water/Sander Truck (oil highway truck) | 1 | 57 | 361 | 269 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Hydraulic Excavator CAT 320E L | 1 | 18 | 153 | 114 | Tier_3 | 20 | 350 | 1 | 0.367 | 5 | 4 | 0.3 |
| Tow Truck CAT | 1 | 56 | 489 | 365 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Tow Low Boy LPM (120-48-20) | 1 | 57 | 489 | 365 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Fuel/Lube Truck CT660 | 1 | 28.2 | 201 | 150 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Service Truck Kalmar DCD200-12lb | 1 | 50 | 361 | 269 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Bulk ANFO Explosives Truck | 1 | 28.2 | 489 | 365 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Mini Bus Ford E Series | 1 | 10 | 489 | 365 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Pick Up Truck 4x4 crew cab Chevrolet | 1 | 6 | 489 | 365 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Light Tower | 3 | 2 | 94 | 70 | Tier_3 | 20 | 350 | 1 | 0.408 | 5 | 4.7 | 0.4 |
| Dwatering Pump | 3 | 75 | 500 | 373 | Tier_3 | 20 | 350 | 1 | 0.367 | 3.5 | 4 | 0.2 |

**Notes:**
Table 10 of the U.S. EPA's Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling - Report No. NR-005d was used to assign engine cycle load factors to the diesel mine equipment based on the type of equipment operated. Emission factors for CO, NOx, and PM were obtained from Table A4: Zero-Hour Steady State Emission Factors for Nonroad CI Engines, which are based on the horsepower and EPA emission standard tier rating of each diesel engine. The emission factor data quality has been assigned a rating of "C", or "Average," as these factors are based on test data (where available), EPA certification data, or factors used in EPA's Nonroad Engine and Vehicle Emission Study (November 1991).

The operating time for pit mining equipment and personnel will be two 10-hour shifts per day (20 hours per day) for 350 days per year.

| Equipment Type | Representative Cycle (2) | Load Factor Assignment | Cycle Load Factor | Notes |
|---|---|---|---|---|
| Hydraulic Excavator ore/waste CAT 390FL | Excavator | Hi LF | 1 | — |
| Hydraulic Excavator ovb/ore CAT 374FL | Excavator | Hi LF | 1 | — |
| Rigid Haul Truck ore/waste CAT 773G | Crawler | Hi LF | 1 | -3 |
| Articulated Haul Truck ovb/ore CAT 740B | Crawler | Hi LF | 1 | -3 |
| Drill rig ore AC DTH | None | Avg 7-cycle | 1 | — |
| Drill rig waste AC DTH | None | Avg 7-cycle | 1 | — |
| Wheel Loader CAT 980K | Rubber Tired Loade | Hi LF | 1 | — |
| Wheel Dozer CAT 844H | Crawler | Hi LF | 1 | — |
| Track Dozer CAT D9 | Crawler | Hi LF | 1 | — |
| Motor Grader CAT 14M | Crawler | Hi LF | 1 | — |
| Water/Sander Truck (oil highway truck) | Crawler | LoLF | 1 | — |
| Hydraulic Excavator CAT 320E L | Excavator | Hi LF | 1 | — |
| Tow Truck CAT | Crawler | Hi LF | 1 | — |
| Tow Low Boy LPM (120-48-20) | None | Avg 7-cycle | 1 | — |
| Fuel/Lube Truck CT660 | Crawler | Hi LF | 1 | — |
| Service Truck Kalmar DCD200-12lb | Crawler | Hi LF | 1 | -3 |
| Bulk ANFO Explosives Truck | Crawler | Hi LF | 1 | — |
| Mini Bus Ford E Series | None | Avg 7-cycle | 1 | — |
| Pick Up Truck 4x4 crew cab Chevrolet | None | Avg 7-cycle | 1 | — |
| Light Tower | None | Avg 7-cycle | 1 | -3 |
| Dwatering Pump | None | Avg 7-cycle | 1 | -3 |

**Sample Emission Calculations - PIT  EQUIP:**

**CO (1-hr) Sample Calculation for Hydraulic Excavator ore/waste CAT 390FL:**

$ER_{CO}$ = Number of Units x Engine Rating (hp) x Load Factor x Emission Factor (g/hp-hr) ÷ 3600 s/hr

$ER_{CO\text{-}1hr}$ = 1 x 524 hp x 1 x 3.5 ÷ 3600 s/hr

$ER_{CO\text{-}1hr}$ = 5.09E-01 g/s

ERCO-kg/y = ERCO-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary:**

| Equipment Type | 1 hr Emission Rate (g/s) | | | |
|---|---|---|---|---|
| | CO | NOX | PM | SO2 |
| Hydraulic Excavator ore/waste CAT 390FL | 3.79E-01 | 4.33E-01 | 2.17E-02 | 3.93E-04 |
| Hydraulic Excavator ovb/ore CAT 374FL | 3.42E-01 | 3.91E-01 | 1.96E-02 | 4.36E-04 |
| Rigid Haul Truck ore/waste CAT 773G | 1.69E+00 | 3.08E+00 | 9.63E-02 | 1.20E-03 |
| Articulated Haul Truck ovb/ore CAT 740B | 3.55E-01 | 4.06E-01 | 2.03E-02 | 3.23E-04 |
| Drill rig ore AC DTH | 1.63E-01 | 1.87E-01 | 9.33E-03 | 1.55E-04 |
| Drill rig waste AC DTH | 4.08E-01 | 4.67E-01 | 2.33E-02 | 4.57E-04 |
| Wheel Loader CAT 980K | 2.94E-01 | 3.36E-01 | 1.68E-02 | 1.76E-04 |
| Wheel Dozer CAT 844H | 4.55E-01 | 5.20E-01 | 2.60E-02 | 3.93E-04 |
| Track Dozer CAT D9 | 3.16E-01 | 3.61E-01 | 1.81E-02 | 3.23E-04 |
| Motor Grader CAT 14M | 1.88E-01 | 2.14E-01 | 1.07E-02 | 1.26E-04 |
| Water/Sander Truck (oil highway truck) | 2.62E-01 | 2.99E-01 | 1.49E-02 | 4.00E-04 |
| Hydraulic Excavator CAT 320E L | 1.58E-01 | 1.27E-01 | 9.50E-03 | 1.26E-04 |
| Tow Truck CAT | 3.55E-01 | 4.06E-01 | 2.03E-02 | 3.93E-04 |
| Tow Low Boy LPM (120-48-20) | 3.55E-01 | 4.06E-01 | 2.03E-02 | 4.00E-04 |
| Fuel/Lube Truck CT660 | 1.46E-01 | 1.67E-01 | 8.33E-03 | 1.98E-04 |
| Service Truck Kalmar DCD200-12lb | 2.62E-01 | 2.99E-01 | 1.49E-02 | 3.51E-04 |
| Bulk ANFO Explosives Truck | 3.55E-01 | 4.06E-01 | 2.03E-02 | 1.98E-04 |
| Mini Bus Ford E Series | 3.55E-01 | 4.06E-01 | 2.03E-02 | 7.03E-05 |
| Pick Up Truck 4x4 crew cab Chevrolet | 3.55E-01 | 4.06E-01 | 2.03E-02 | 4.22E-05 |
| Light Tower | 2.92E-01 | 2.74E-01 | 2.33E-02 | 4.22E-05 |
| Dwatering Pump | 1.09E+00 | 1.24E+00 | 6.22E-02 | 1.58E-03 |

| Source ID | Description | Contaminant | CAS | Emission Rate (g/s) | | | Emission Rate |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| PIT_EQUIP | Open Pit Mining Equipment | PM | N/A | 4.97E-01 | 4.14E-01 | 3.97E-01 | 1.25E+04 |
| | | $PM_{10}$ | N/A | 4.97E-01 | 4.14E-01 | 3.97E-01 | 1.25E+04 |
| | | $PM_{2.5}$ | N/A | 4.82E-01 | 4.01E-01 | 3.85E-01 | 1.21E+04 |
| | | CO | 630-08-0 | 8.57E+00 | 7.14E+00 | 6.85E+00 | 2.16E+05 |
| | | $NO_X$ | 10102-44-0 | 1.08E+01 | 9.03E+00 | 8.66E+00 | 2.73E+05 |
| | | $SO_2$ | 7746-09-55 | 7.79E-03 | 6.49E-03 | 6.22E-03 | 1.96E+02 |

**Notes:**

[1]Emission standards were not provided for PM10 and PM2.5; therefore, it was assumed that all PM emissions consist of PM10, and PM2.5 emissions are 97% of PM10 emissions.

***EO4 - Propane-fire Underground Mine Heating***

A propane-fired heater will be utilized for underground air heating during mine production. Emission rates have been calculated using emission factors from the U.S. EPA AP-42 Section 1.5 "Liquefied Petroleum Gas Combustion," updated 7/08, based on the maximum heat input rating for the heater and an assumed sulfur content in propane of 0.18 gr/100ft3, as per Footnote (e) of Table 1.5-1 in Section 1.5.

A total heat output of 8.5 MMBTU/hr has been assumed based on comfort heating requirements at similar sites. It is estimated that the heater will operate for 20 hours per day.

| **Heat Content of Propane (MMBtu/gal)** | 0.0915 |
|---|---|

**Reference:** Table 1.5-1 of AP-42 EF Document

**Sample Emission Calculations for NOx (1-hr) from a propane fired heater (U_PH):**

$ER_{NOx}$ = Number of Units x Max Heat Input Rating (MMBTU/hr) x 264.1721 (gal/$m^3$) x Emission Factor (lb/1000 gal) x 453.59 g/lb ÷ 3600 s/hr

$ER_{NOx}$ = 1 x 8.5 MMBTU/hr x 0.0915 (MMBTU/gal) x 0.0007 (lb/gal) x 453.59 g/lb ÷ 3600 s/hr

$ER_{NOx}$ = 8.20E-03 g/s

ERNOx-kg/y = ERNOx-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary Propane:**

| Source ID | Description | Quantity of Units | Btu Heat Rating (MMBTU/hr) | Compound | Emission Factor Value (lb/gal) | Emission Rate (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 hr | 24 hr | Annual | |
| U_PH | Propane-fired Underground Mine Heating | 1.00 | 8.50 | PM | 7.00E-04 | 8.20E-03 | 6.83E-03 | 6.55E-03 | 2.07E+02 |
| | | | 8.50 | $PM_{10}$ | 7.00E-04 | 8.20E-03 | 6.83E-03 | 6.55E-03 | 2.07E+02 |
| | | | 8.50 | $PM_{2.5}$ | 7.00E-04 | 8.20E-03 | 6.83E-03 | 6.55E-03 | 2.07E+02 |
| | | | 8.50 | CO | 7.50E-03 | 8.79E-02 | 7.32E-02 | 7.02E-02 | 2.21E+03 |
| | | | 8.50 | $NO_X$ | 1.30E-02 | 1.52E-01 | 1.27E-01 | 1.22E-01 | 3.84E+03 |
| | | | 8.50 | $SO_2$ | 1.80E-05 | 2.11E-04 | 1.76E-04 | 1.69E-04 | 5.31E+00 |

***EQ5 - Operation Phase - Individual Diesel Generator***

Emission factors used were take from US EPA AP-42, Section 3.4, Table 3.4-1 for engines over 600 HP; Section 3.2, Table 3.2-1 for engines below 600 HP; and US EPA Emission Standards.

Emission factors were derived from the U.S. EPA AP-42 Chapter 3.4 "Large Stationary Diesel and All Stationary Dual-Fuel Engines," Table 3.4-1, section dated 10/96. An assumed sulfur content of 15 ppm, which is the maximum allowable sulfur content in diesel per the

| Equipment | Number of Units | Power Rating (kW) | Engine Power Rating per Unit [hp] | U.S. EPA Emission Standard | Daily Operating Hours per Day | Operating Days per Year | Representative Cycle (1) | Load Factor Assignment (3) | Load Factor (3) | Brake-Specific Fuel Consumption | CO | $NO_X$ | PM | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr |
| MILL_EPG | 1 | 250.00 | 335 | Tier_3 | 1 | 50 | None (2) | Avg 7-cycle | 0.43 | 0.367 | 0.00668 | 0.031 | 2.20E-03 | 2.20E-03 | 2.13E-03 | 5.57E-05 |
| U_EPG | 1 | 100.00 | 1341 | Tier_3 | 1 | 50 | None (2) | Avg 7-cycle | 0.43 | 0.367 | 0.00550 | 0.024 | 0.0007 | 0.0007 | 0.000679 | 1.21E-05 |

**Notes:**

1) Reference: NR-005d, Table 10: Page 15, Table 10. Compression-Ignition (CI) Load Factor Assignments by Equipment Type

2) Note: Load Factor of None = steady state

3) Reference: NR-005d, Table 9: Page 14, Table 9. Compression-Ignition Load Factors

| | |
|---|---|
| **Molar Mass SO2 (g/mol)** | 64 |
| **Molar Mass of Sulphur** | 32 |
| **S Content in Diesel Fuel (mg/kg)** | 15 |
| **Diesel Fuel Density (kg/L)** | 0.843 |
| **Fuel Consumption (MILL_EPG) L/hr** | 2.85E+01 |

**Reference**: 3(1)(e) Sulphur in Diesel Fuel Regulations (justice.gc.ca) (conservatively used a large diesel engine's limits)

**Sample Emission Calculations for NOx (1-hr) from the Diesel-fired engine (MILL_EPG):**

$ER_{NOx}$ = Number of Units x Max Input Rating (hp) x Emission Factor (g/kW-hr) x 0.7457 kW/hp ÷ 3600 s/hr

$ER_{NOx}$ = 1 x 335 hp x 14.074 g/hp-hr ÷ 3600 s/hr

$ER_{NOx}$ = 1.31E+00 g/s

ERNOx-kg/y = ERNOx-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary:**

| Source ID | Description | Contaminant | CAS | Emission Factor Value | Emission Factor Units | Emission Rate (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 hr | 24 hr | Annual | |
| MILL_EPG | Emergency Diesel Generator at Mill | PM | N/A | 1.00 | g/hp-hr | 9.29E-02 | 3.87E-03 | 5.31E-04 | 1.67E+01 |
| | | $PM_{10}$ | N/A | 1.00 | g/hp-hr | 9.29E-02 | 3.87E-03 | 5.31E-04 | 1.67E+01 |
| | | $PM_{2.5}$ | N/A | 0.97 | g/hp-hr | 9.02E-02 | 3.76E-03 | 5.15E-04 | 1.62E+01 |
| | | CO | 630-08-0 | 3.03 | g/hp-hr | 2.82E-01 | 1.18E-02 | 1.61E-03 | 5.08E+01 |
| | | $NO_X$ | 10102-44-0 | 14.07 | g/hp-hr | 1.31E+00 | 5.46E-02 | 7.48E-03 | 2.36E+02 |
| | | $SO_2$ | 7746-09-5 | 2.53E-02 | g/hp-hr | 2.00E-04 | 8.33E-06 | 1.14E-06 | 3.60E-02 |
| U_EPG | Underground Mine Standby Diesel Generator | PM | N/A | 0.32 | g/hp-hr | 1.18E-01 | 4.93E-03 | 6.76E-04 | 2.13E+01 |
| | | $PM_{10}$ | N/A | 0.32 | g/hp-hr | 1.18E-01 | 4.93E-03 | 6.76E-04 | 2.13E+01 |
| | | $PM_{2.5}$ | N/A | 0.31 | g/hp-hr | 1.15E-01 | 4.78E-03 | 6.55E-04 | 2.07E+01 |
| | | CO | 630-08-0 | 2.50 | g/hp-hr | 9.30E-01 | 3.88E-02 | 5.31E-03 | 1.67E+02 |
| | | $NO_X$ | 10102-44-0 | 10.90 | g/hp-hr | 4.06E+00 | 1.69E-01 | 2.32E-02 | 7.31E+02 |
| | | $SO_2$ | 7746-09-5 | 5.51E-03 | g/hp-hr | 2.05E-03 | 8.55E-05 | 1.17E-05 | 3.69E-01 |

**Notes:**

1- All particulate matter (PM) is assumed to be PM10. PM2.5 is estimated to constitute 97% of PM10. based on the U.S. EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition NR-009d (July 2010) (EPA Report NR-009d).

2- "Sulphur in Diesel Fuel Regulations SOR/2002-254," dated June 2012 and promulgated under CEPA (CEPA 1999). The data is of "A-Average" quality for NOx, PM, and SO2, and "Average" quality for CO. The emission factor for oxides of sulfur was assumed to be the emission factor for sulfur dioxide.

## ***EO6 - Operation Phase - Crushing Circuit Dust Collector***

A baghouse dust collection system will serve the crushing circuit and collect dust from: the primary, secondary and tertiary crushers; screening; transfer points; and ore bin loading. The emission factor for PM was obtained from the Air and Waste Management Association's "Air Pollution Engineering Manual, 2nd ed.", Chapter 3: Control of Particulate Matter, section on fabric filters (baghouses). It is a conservative factor of "Above Average" quality.

**Sample Emission Calculations - DC:**

**PM (1-hr) Sample Calculation using the Drop Equation**

$ER_{PM\text{-}1hr}$ = Exhaust Flow Rate (m3/hr) x Emission Factor (mg/m3) ÷ 1000 mg/g ÷ 3600 s/hr

$ER_{PM\text{-}hr}$ = 24000 x (23 mg/m3 ÷ 1000 (mg/g) ÷ 3600 s/hr

$ER_{PM\text{-}hr}$ = 1.53E-01 g/s

ERPM-kg/y = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

| **Exhaust Flow Rate ($m^3$/hr)** | 24,000 |
|---|---|

**Emission Summary:**

| **Source ID** | **Description** | **Contaminant** | **Emission Factor ($mg/m^3$)** | **Emission Rate(g/s)** | | | **Emission Rate (kg/y)** |
|---|---|---|---|---|---|---|---|
| | | | | **1 hr** | **24 hr** | **Annual** | |
| DC | Crushing Circuit Dust Collector | PM | 2.30E+01 | 1.53E-01 | 1.53E-01 | 1.47E-01 | 4.64E+03 |
| | | $PM_{10}$ | 1.15E+01 | 7.67E-02 | 7.67E-02 | 7.35E-02 | 2.32E+03 |
| | | $PM_{2.5}$ | 5.75E+00 | 3.83E-02 | 3.83E-02 | 3.68E-02 | 1.16E+03 |

**Notes:**

It was assumed that PM10 is 50% of PM and PM2.5 is 50% of PM10.

***EO7 - Sink Production Sulphide Flotation and Tailings Pond***

After the ore is crushed in the crushing circuit, it will be screened and washed, with undersize particles being fed to a dense media separator. Hydrocyclones will de-slime and further separate materials by particle size, with oversize particles undergoing additional grinding in a ball mill. The ball mill hydrocyclones will separate the re-ground products, with undersize material proceeding to the sulphides/slimes flotation circuit to remove sulphides from the ore before fluorspar concentration. Material will flow through a series of flotation cells, utilizing a 10% potassium amyl xanthate solution as the flotation collector. Tailings pulp from this sulphides/slimes flotation circuit will be pumped to a thickening tank to increase slurry density before entering the conditioning circuit, where fluorspar will be concentrated.

Potassium amyl xanthate decomposes into carbon disulphide and pentanol in air at ambient temperatures. The following method was referenced from the Australian National Pollutant Inventory "Emission Estimation Technique Manual for Nickel Concentrating, Smelting and Refining," dated June 1999.

The pH level in the floatation cells is maintained above 7 to prevent the formation of HCN. The tailings leaving the mill will be alkaline, estimated at pH 8.2 from testwork.

| Equipment | PAX Solution Usage Rate | Total flotation slurry feed rate | Slurry density | Mass feed rate of slurry to flotation | PAX Solution Usage Rate | PAX Usage Rate* |
|---|---|---|---|---|---|---|
| | g/tonne | m3/hr | kg/m3 | tonnes/hr | g/hr | g/hr |
| SULPH | 50 | 150.78 | 1270 | 191.49 | 9574.53 | 957.45 |

*Solution is 10% PAX

| | | |
|---|---|---|
| **Molecular Weight of Potassium Amyl Xanthhate (MWPAX)** | 202.4 | g/mol |
| **Molecular Weight of Carbon Disulphide (MWCS2)** | 76 | g/mol |
| **Molecular Weight of Pentanol** | 88.2 | g/mol |
| **Amount of CS2 produced per mole of PAX** | 0.5 | alkali conditions |
| **Amount of Pentanol produced per mole of PAX** | 0.5 | alkali conditions |

**Sample Calculation under Alkali conditions (>7) for SULPH:**

$ER_{CS2}$ = 0.5 x PAX Solution Usage Rate (g/tonnes) x Mass feed rate of slurry to flotation (tonnes/hr)
x MWCS2 (g/mol)/MWxanthate (g/mol) ÷ 3600 s/hr

$ER_{CS2-1hr}$ = 0.5 x 957.453 g x 76 g/mol /202.4 g/mol ÷ 3600 s/hr

$ER_{CS2-1hr}$ = 4.99E-02 g/s

ERCS2-kg/y = ERCS2-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary:**

| Source ID | Description | Contaminant | CAS Number | Emission Rate (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| SULPH | Sink Product Sulphide Flotation | Carbon Disulphide | 75-15-0 | 4.99E-02 | 4.99E-02 | 4.79E-02 | 1.51E+03 |
| | | Pentanol | 71-41-0 | 5.79E-02 | 5.79E-02 | 5.56E-02 | 1.75E+03 |
| TAILS | Tailings Pond | Carbon Disulphide | 75-15-0 | 4.99E-04 | 4.99E-04 | 4.79E-04 | 1.51E+01 |
| | | Pentanol | 71-41-0 | 5.79E-04 | 5.79E-04 | 5.56E-04 | 1.75E+01 |

**Notes:**

Emissions of carbon disukphide and pentanol from xanthale decompisition in the tailings pond were estimated as 1% of the rates of emissions frfom the flotation process, under the assumption from Australian NPI that the discharge flowrate of xanthates to tailings will be 1% of the xanthate usage rate in flotation

## ***EO8 - Operation Phase - Fluorspar Concentrate or Aggregate from DMS Float Process Haul Truck Loading***

Fluorspar will be concentrated using a froth flotation process. The concentrate will undergo thickening and filtration to remove water, producing a solid cake that will be conveyed to a heated building where on-spec and off-spec concentrates will be stored in stockpiles before being transported off-site. The building will have the capacity to store approximately 15,000 tonnes of on-spec concentrate and 5,000 tonnes of off-spec concentrate. Concentrate will be loaded from the stockpiles onto haul trucks for transport to the marine terminal, from where the product will be shipped to market. Trucks will be loaded with concentrate for only 20 days per year. Aggregate generated from the DMS float process will also be loaded into haul trucks for transport to the marine terminal for an additional 20 days per year.

Emissions from material loading onto haul trucks were estimated using the emission factors from Section 13.2.4 "Aggregate Handling and Storage Piles" of the AP 42 document (revised November 2006) using the emission factor (EF) equation as shown below.

**Sample Emission Calculations - TL:**

**PM Sample Calculation using the Drop Equation**

$EF_{PM}$ = k x 0.0016 x (Mean Wind Speed m/s ÷2.2)$^{1.3}$ ÷ (Material Moisture Content % ÷ 2)$^{1.4}$ (kg/tonne)

Particle Size Multiplier

$EF_{PM}$ = 0.74 x 0.0016 x (5.9 m/s ÷2.2)^1.3 ÷ (8 % ÷ 2)^1.4 (kg/tonne)

$EF_{PM}$ = 6.13E-04 kg/tonne

$ER_{PM\text{-}1hr}$ = Emission Factor (kg/tonne) x Loading Rate (tonne/day) x # of Transfers x 1000 g/kg ÷ 3600 s/hr

$ER_{PM\text{-}hr}$ = 0.0006 (kg/tonne) x 500 (Mg/hr) x 1000 g/kg ÷ 3600 s/hr

$ER_{PM\text{-}1hr}$ = 8.51E-02 g/s

ERPM-kg/y = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

| Contaminant | Aerodynamic Particle Size Multiplier (k) |
|---|---|
| PM | 0.74 |
| $PM_{10}$ | 0.35 |
| $PM_{2.5}$ | 0.053 |

**Reference**: Emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

| | |
|---|---|
| **Overall average wind speed (m/s) =** | 5.9 |

**Reference:** Average of maximum hourly wind speeds from January to December from Canadian Climate Normals data for St.Lawrence, Nfld. Station, 1971-2000 Climate Normals and Averages.

**Emission Summary:**

| Source ID | Description | Contaminant | Emission Factor ($mg/m^3$) | Emission Rate (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| TL | Haul Truck Loading for Transport to Marine Terminal | PM | 6.13E-04 | 8.51E-02 | 7.09E-02 | 8.51E-02 | 2.68E+03 |
| | | $PM_{10}$ | 2.90E-04 | 4.03E-02 | 3.36E-02 | 4.03E-02 | 1.27E+03 |
| | | $PM_{2.5}$ | 4.39E-05 | 6.10E-03 | 5.08E-03 | 6.10E-03 | 1.92E+02 |

***EO9 - Operation Phase - Fugitive Dust Emissions from Roadways***

During the operation phase of the Project, fugitive dust emissions will result from haulage on on-site unpaved roadways as ore is transported from the pits to the mill, waste rock and overburden are hauled from the mines to the dumps, and fluorspar concentrate and aggregate from DMS flotation are transported from the mill site to the marine terminal. These emissions are influenced by the parameters listed in the table below. The lengths of the haul routes were estimated based on the site layout, and the number of truck trips per day for each route was based on ore production rates or product transport rates, along with the carrying capacities of the trucks.

Annual averaged emissions would experience some natural mitigation due to the occurrence of snowy or rainy days throughout the year. Based on Canadian Climate Normals data for the St. Lawrence station (covering the period from 1971-2000), the region experiences an average of 180 days per year without snow cover or rain. Therefore, the calculation of annual emissions of fugitive dust from UPR1, UPR2, and UPR3 assumes these emissions will occur over 180 days annually.

Natural mitigation was not accounted for in emissions from UPR4, as activity on this roadway occurs infrequently throughout the year (with the concentrate being transported for only 20 days per year and the aggregate for another 20 days per year). Hence, it was conservatively assumed that there will be no snow cover or precipitation on any of the 40 total days when concentrate and aggregate are hauled on UPR4.

| Contaminant | k (lb/VMT) | a | b |
|---|---|---|---|
| PM | 4.9 | 0.7 | 0.45 |
| $PM_{10}$ | 1.5 | 0.9 | 0.45 |
| $PM_{2.5}$ | 0.15 | 0.9 | 0.45 |

**Reference:** Emissions from vehicles travelling on unpaved roads were calculated using emission factors in US EPA AP-42, Section 13.2.2, Unpaved Roads (November 2006). Emission factors for vehicles travelling on unpaved roads, are calculated using equation 1a in Section 13.2.2, where k, a, and b are empirical constants obtained from Table 13.2.2-2.

**Sample Emission Calculations - UPR1:**

**PM (24-hr) Sample Calculation for UPR1**

$EF_{PM}$ = k (lb/VMT) x (s (%)/12)$^a$ x (W (ton)/3)$^b$ x 281.9 (g/VKT)/(lb/VMT)

s - silt content (%)

W - Average truck weight (ton)

$EF_{PM}$ = 4.9 lb/VMT x (8.3%/12)^0.7 x (1.3 ton/3)^0.45 x 281.9 (g/VKT)/(lb/VMT)

$EF_{PM}$ = 11.8 g/VKT

Daily VKT = Total # of trips on segment per day x One way distance (km) x 2 (for roundtrip)

Daily VKT = 50 trips per day x 1.25 km x 2

Daily VKT = 125.0 VKT/day

$ER_{PM}$ = Daily VKT (VKT/day) x Emission Factor (g/VKT) x (100% - Control Efficiency (%)) ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM}$ = 125 VKT/day x 3320.09 g/VKT x (100% - 75) ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM}$ = 1.20E+00 g/s

ERPM-kg/y = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary:**

| Source ID | Description | Contaminant | Daily Tonnage | Empty Industrial Vehicle | Capacity of One Truck | Full Industrial Vehicle | Daily Full Haul Trucks | Daily Empty Haul Trucks | Prorated Mean Vehicle Weight | Length | Control | EF (lb/VMT) | EF (g/VKT) | Controlled Emission Rates (g/s) | | | Emission Rate (kg/y) | Uncontrolled Emission Rates (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 1 hr | 24 hr | Annual | | 1 hr | 24 hr | Annual | |
| | | | tonnes/day | tonnes | tonnes/truck | tonnes | Passes/24 hrs | Passes/24 hrs | tons | km | % | | | | | | | | | | |
| UPR1 | Road - GNP In-Pit | PM | 1900 | 15 | 37.8 | 52.8 | 50 | 50 | 37.37 | 1.25 | 75 | 1.18E+01 | 3.32E+03 | 1.20E+00 | 1.00E+00 | 1.00E+00 | 3.16E+04 | 4.80E+00 | 4.00E+00 | 4.00E+00 | 1.26E+05 |
| UPR1 | Road - GNP In-Pit | $PM_{10}$ | 1900 | 15 | 37.8 | 52.8 | 50 | 50 | 37.37 | 1.25 | 75 | 3.35E+00 | 9.44E+02 | 3.41E-01 | 2.85E-01 | 2.85E-01 | 8.97E+03 | 1.35E+01 | 1.12E+01 | 1.12E+01 | 3.54E+05 |
| UPR1 | Road - GNP In-Pit | $PM_{2.5}$ | 1900 | 15 | 37.8 | 52.8 | 50 | 50 | 37.37 | 1.25 | 75 | 3.35E-01 | 9.44E+01 | 3.41E-02 | 2.85E-02 | 2.85E-02 | 8.97E+02 | 1.08E+00 | 9.03E-01 | 9.03E-01 | 2.85E+04 |
| UPR2 | GNP Haul Road to North Dump | PM | 7142 | 15 | 57.5 | 72.5 | 124 | 124 | 48.23 | 1.18 | 75 | 1.32E+01 | 3.72E+03 | 3.15E+00 | 2.63E+00 | 2.63E+00 | 8.29E+04 | 1.26E+01 | 1.05E+01 | 1.05E+01 | 3.31E+05 |
| UPR2 | GNP Haul Road to North Dump | $PM_{10}$ | 7142 | 15 | 57.5 | 72.5 | 124 | 124 | 48.23 | 1.18 | 75 | 3.76E+00 | 1.06E+03 | 8.97E-01 | 7.47E-01 | 7.47E-01 | 2.36E+04 | 3.59E+00 | 2.99E+00 | 2.99E+00 | 9.43E+04 |
| UPR2 | GNP Haul Road to North Dump | $PM_{2.5}$ | 7142 | 15 | 57.5 | 72.5 | 124 | 124 | 48.23 | 1.18 | 75 | 3.76E-01 | 1.06E+02 | 8.97E-02 | 7.47E-02 | 7.47E-02 | 2.36E+03 | 3.59E-01 | 2.99E-01 | 2.99E-01 | 9.43E+03 |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | PM | 1900 | 15 | 49.3 | 64.3 | 39 | 39 | 43.71 | 2.42 | 75 | 1.26E+01 | 3.56E+03 | 1.95E+00 | 1.62E+00 | 1.62E+00 | 5.11E+04 | 7.78E+00 | 6.49E+00 | 6.49E+00 | 2.05E+05 |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | $PM_{10}$ | 1900 | 15 | 49.3 | 64.3 | 39 | 39 | 43.71 | 2.42 | 75 | 3.59E+00 | 1.01E+03 | 5.53E-01 | 4.61E-01 | 4.61E-01 | 1.45E+04 | 2.21E+00 | 1.84E+00 | 1.84E+00 | 5.82E+04 |
| UPR3 | Surface Haul Road - GNP Pit Exit to Mill | $PM_{2.5}$ | 1900 | 15 | 49.3 | 64.3 | 39 | 39 | 43.71 | 2.42 | 75 | 3.59E-01 | 1.01E+02 | 5.53E-02 | 4.61E-02 | 4.61E-02 | 1.45E+03 | 2.21E-01 | 1.84E-01 | 1.84E-01 | 5.82E+03 |
| UPR4 | Haul Road from Mill Site to Marine Terminal | PM | 10000 | 15 | 50 | 65 | 200 | 200 | 44.09 | 5.45 | 75 | 1.27E+01 | 3.58E+03 | 2.26E+01 | 1.88E+01 | 1.88E+01 | 5.93E+05 | 9.02E+01 | 7.52E+01 | 7.52E+01 | 2.37E+06 |
| UPR4 | Haul Road from Mill Site to Marine Terminal | $PM_{10}$ | 10000 | 15 | 50 | 65 | 200 | 200 | 44.09 | 5.45 | 75 | 3.61E+00 | 1.02E+03 | 6.42E+00 | 5.35E+00 | 5.35E+00 | 1.69E+05 | 2.57E+01 | 2.14E+01 | 2.14E+01 | 6.74E+05 |
| UPR4 | Haul Road from Mill Site to Marine Terminal | $PM_{2.5}$ | 10000 | 15 | 50 | 65 | 200 | 200 | 44.09 | 5.45 | 75 | 3.61E-01 | 1.02E+02 | 6.42E-01 | 5.35E-01 | 5.35E-01 | 1.69E+04 | 2.57E+00 | 2.14E+00 | 2.14E+00 | 6.74E+04 |

***E010 - Operation Phase - Loading at Marine Terminal***

At the marine terminal, fluorspar concentrate or aggregate from the DMS float process will be transported from the storage facilities at the Mill Site to the feeder system via direct dumping from trucks. Loading of marine transport ships will occur through a covered conveyor, at the maximum loading rate indicated below. A feeder will supply the mobile ship loader continuously, eliminating the need for an intermediate storage area. Concentrate will be loaded for 20 days per year, while aggregate will be loaded for an additional 20 days per year.

Natural mitigation was not considered for emissions from loading at the marine terminal, as this activity occurs infrequently throughout the year.

Emissions from concentrate dumping from haul trucks into the ship feeder system were calculated using the emission factors from Section 13.2.4 "Aggregate Handling and Storage Piles" of the AP 42 document (revised November 2006), utilizing the emission factor (EF) equation as given below.

| Contaminant | Aerodynamic Particle Size Multiplier |
|---|---|
| PM | 0.74 |
| $PM_{10}$ | 0.35 |
| $PM_{2.5}$ | 0.053 |

**Reference:** Emission factors from Section 13.2.4 "Aggregate Handling and Storage Piles" of the AP 42 document (revised November 2006)

| Overall average wind speed (m/s) | 5.9 |
|---|---|

**Reference**: Average of maximum hourly wind speeds from January to December from Canadian Climate Normals data for St.Lawrence, Nfld. Station, 1971-2000 Climate Normals and Averages.

**Sample Emission Calculations - MAR_TD:**

**PM (1-hr) Sample Calculation**

$EF_{PM}$ = k x 0.0016 x (Mean Wind Speed m/s ÷2.2)$^{1.3}$ ÷ (Material Moisture Content % ÷ 2)$^{1.4}$ (kg/Mg)

Particle Size Multiplier

$EF_{PM}$ = 0.74 x 0.0016 x (5.9 m/s ÷2.2)^1.3 ÷ (8 % ÷ 2)^1.4 (kg/tonne)

$EF_{PM}$ = 6.13E-04 kg/tonnes

$ER_{PM}$ = Emission Factor (kg/tonnes) x Throughput tonnes/hr x 1000 g/kg ÷ 3600 s/hr

$ER_{PM}$ = 0.00061 kg/Mg x 500 tonnes/hr x 1 Mg/1 tonnes x 1000 g/kg ÷ 3600 s/hr

$ER_{PM}$ = 8.51E-02 g/s

ERPM-kg/y = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary:**

| Source ID | Description | Contaminant | EF (kg/Mg) | Emission Rates (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| MAR_TD | Transfer from Trucks into Ship Feeder | PM | 6.13E-04 | 8.51E-02 | 7.09E-02 | 7.09E-02 | 2.24E+03 |
| | | $PM_{10}$ | 2.90E-04 | 4.03E-02 | 3.36E-02 | 3.36E-02 | 1.06E+03 |
| | | $PM_{2.5}$ | 4.39E-05 | 6.10E-03 | 5.08E-03 | 5.08E-03 | 1.60E+02 |
| MAR_CONV [1] | Loading onto Ship via Covered Conveyor | PM[2] | 7.00E-05 | 9.72E-03 | 8.10E-03 | 8.10E-03 | 2.56E+02 |
| | | $PM_{10}$ | 3.50E-05 | 4.86E-03 | 4.05E-03 | 4.05E-03 | 1.28E+02 |
| | | $PM_{2.5}$ | 1.75E-05 | 2.43E-03 | 2.03E-03 | 2.03E-03 | 6.39E+01 |

**Notes:**

[1]Emission factors for conveyor transfer (MAR_CONV) were sourced from the U.S. EPA AP-42 Section 11.19.2: "Crushed Stone Processing and Pulverized Mineral Processing," Table 11.9.2-1, section dated 08/04.

[2]It was assumed that PM10 is 50% of PM and PM2.5 is 50% of PM10 for MAR_CONV.
Emission factors for MAR_CONV is from AP-42 Section 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing

***EO11 - Operation Phase - Marine Vessel Emissions***

Emissions from marine vessels (ships) were estimated based on an operating scenario where a ship is docked at the port with auxiliary engines running for the entire duration of the docking period. Estimates of auxiliary engine number and size, docking time, and number of trips were provided by CFI. Emission factors for Marine Gas Oil (MGO) combustion in ship auxiliary engines were sourced from the British Columbia Chamber of Shipping document titled "2005-2006 BC Ocean-Going Vessel Emissions Inventory" (dated January 25, 2007), Table 18. For conservatism, emission factors for the "medium" engine type have been assumed in this assessment.

| Source ID | Number of Units | Power Rating (kW) | Time Ship Spends Docked Per Trip | Ship Trips Per Year |
|---|---|---|---|---|
| | | kW | hours | |
| SHIP_1 | 1 | 800 | 24 | 40 |
| SHIP_2 | 1 | 800 | 24 | 40 |
| SHIP_3 | 1 | 800 | 24 | 40 |

**NOx (1-hr) Sample Emission Calculations - SHIP_1:**

$ER_{NOx}$ = Number of Units x Max Input Rating (hp) x Emission Factor (g/kW-hr) x 0.7457 kW/hp ÷ 3600 s/hr

$ER_{NOx}$ = 1 x 800 kW x 13.9 g/kW-hr ÷ 3600 s/hr

$ER_{NOx}$ = 3.09E+00 g/s

ERNOx-kg/y = ERNOx-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

**Emission Summary:**

| Source ID | Description | Contaminant | CAS | Emission Factor Value | Emission Factor Units | Emission Rate (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 hr | 24 hr | Annual | |
| SHIP_1 | Auxiliary Engine 1 | CO | 630-08-0 | 1.10 | g/kW-hr | 2.44E-01 | 2.44E-01 | 2.68E-02 | 8.45E+02 |
| SHIP_1 | Auxiliary Engine 1 | $NO_X$ | 10102-44-0 | 13.90 | g/kW-hr | 3.09E+00 | 3.09E+00 | 3.39E-01 | 1.07E+04 |
| SHIP_1 | Auxiliary Engine 1 | PM | N/A | 0.27 | g/kW-hr | 6.00E-02 | 6.00E-02 | 6.58E-03 | 2.07E+02 |
| SHIP_1 | Auxiliary Engine 1 | $PM_{10}$ | N/A | 0.27 | g/kW-hr | 6.00E-02 | 6.00E-02 | 6.58E-03 | 2.07E+02 |
| SHIP_1 | Auxiliary Engine 1 | $PM_{2.5}$ | N/A | 0.24 | g/kW-hr | 5.33E-02 | 5.33E-02 | 5.84E-03 | 1.84E+02 |
| SHIP_1 | Auxiliary Engine 1 | $SO_2$ | 7446-09-05 | 4.20 | g/kW-hr | 9.33E-01 | 9.33E-01 | 1.02E-01 | 3.23E+03 |
| SHIP_2 | Auxiliary Engine 2 | CO | 630-08-0 | 1.10 | g/kW-hr | 2.44E-01 | 2.44E-01 | 2.68E-02 | 8.45E+02 |
| SHIP_2 | Auxiliary Engine 2 | $NO_X$ | 10102-44-0 | 13.90 | g/kW-hr | 3.09E+00 | 3.09E+00 | 3.39E-01 | 1.07E+04 |
| SHIP_2 | Auxiliary Engine 2 | PM | N/A | 0.27 | g/kW-hr | 6.00E-02 | 6.00E-02 | 6.58E-03 | 2.07E+02 |
| SHIP_2 | Auxiliary Engine 2 | $PM_{10}$ | N/A | 0.27 | g/kW-hr | 6.00E-02 | 6.00E-02 | 6.58E-03 | 2.07E+02 |
| SHIP_2 | Auxiliary Engine 2 | $PM_{2.5}$ | N/A | 0.24 | g/kW-hr | 5.33E-02 | 5.33E-02 | 5.84E-03 | 1.84E+02 |
| SHIP_2 | Auxiliary Engine 2 | $SO_2$ | 7446-09-05 | 4.20 | g/kW-hr | 9.33E-01 | 9.33E-01 | 1.02E-01 | 3.23E+03 |
| SHIP_3 | Auxiliary Engine 3 | CO | 630-08-0 | 1.10 | g/kW-hr | 2.44E-01 | 2.44E-01 | 2.68E-02 | 8.45E+02 |
| SHIP_3 | Auxiliary Engine 3 | $NO_X$ | 10102-44-0 | 13.90 | g/kW-hr | 3.09E+00 | 3.09E+00 | 3.39E-01 | 1.07E+04 |
| SHIP_3 | Auxiliary Engine 3 | PM | N/A | 0.27 | g/kW-hr | 6.00E-02 | 6.00E-02 | 6.58E-03 | 2.07E+02 |
| SHIP_3 | Auxiliary Engine 3 | $PM_{10}$ | N/A | 0.27 | g/kW-hr | 6.00E-02 | 6.00E-02 | 6.58E-03 | 2.07E+02 |
| SHIP_3 | Auxiliary Engine 3 | $PM_{2.5}$ | N/A | 0.24 | g/kW-hr | 5.33E-02 | 5.33E-02 | 5.84E-03 | 1.84E+02 |
| SHIP_3 | Auxiliary Engine 3 | $SO_2$ | 7446-09-05 | 4.20 | g/kW-hr | 9.33E-01 | 9.33E-01 | 1.02E-01 | 3.23E+03 |

**Notes:**

Emission factors for Marine Gas Oil (MGO) combustion in ship auxiliary engines were sourced from the British Columbia Chamber of Shipping document titled "2005-2006 BC Ocean-Going Vessel Emissions Inventory" (dated January 25, 2007), Table 18. For conservatism, emission factors for the "medium" engine type have been assumed in this assessment.

All PM is assumed to be PM10. SO2 emission factor conservatively assumes that all SOX is SO2 and also that sulphur content in MGO is 1%

Attachment 3b

# Air Emission Calculation Sheets - South Ridge Project

***Table 3B1: Sources and Contaminants Identification (Year 1)***

| Source ID | Description | Material | Expected Contaminants | Calculation Sheet |
|---|---|---|---|---|
| OB_MH | Overburden Material Handling | Overburden | PM, $PM_{10,}$ $PM_{2.5}$ | EC2 |
| OB_BD | Overburden Bulldozing | Overburden | PM, $PM_{10}$ $PM_{2.5}$ | EC1 |
| C_WR | Waste Rock Material Handling | Waste Rock | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EC2 |
| WR_BD | Waste Rock Bulldozing | Waste Rock | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EC1 |
| TP_BD | Topsoil Bulldozing | Topsoil | PM, $PM_{10}$ $PM_{2.5}$ | EC1 |
| TP_MH | Topsoil Material Handling | Topsoil | PM, $PM_{10}$ $PM_{2.5}$ | EC2 |
| Stockpile_OB | Wind Erosion from Overburden Stockpile | Overburden | PM, $PM_{10}$ $PM_{2.5}$ | EC8 |
| Stockpile_Topsoil | Wind Erosion from Topsoil Stockpile | Topsoil | PM, $PM_{10}$ $PM_{2.5}$ | EC8 |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Waste Rock | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EC8 |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Waste Rock | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EC8 |
| SRP_DWP | Diesel Powered Dewatering Pump | - | PM, DPM, PM10, PM2.5, CO, NOx, SO2 | EC7 |
| PIT_DB | Open Pit Drilling and Blasting | Waste Rock | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc, CO, NOX | EO2 |
| PIT_EQUIP | Open Pit Mining Equipment | - | PM, PM10, PM2.5, CO, NOX, SO2 | EO3 |
| MILL_EPG | Emergency Diesel Generator at Mill | - | PM, DPM, PM10, PM2.5, CO, NOX, SO2 | EO4 |
| ORE_MH | Above-Ground Ore Material Handling | Ore | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| OP_WR | Waste Rock Material Handling | Waste Rock | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Ore | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Ore | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO1 |
| ONSPEC | On-spec Concentrate Stockpile Loading | Concentrate | PM, $PM_{10}$ $PM_{2.5}$ | EO1 |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | Concentrate | PM, $PM_{10}$ $PM_{2.5}$ | EO1 |

***Table 3B1: Sources and Contaminants Identification (Year 1)***

| Source ID | Description | Material | Expected Contaminants | Calculation Sheet |
|---|---|---|---|---|
| DC | Ore Crushing Circuit Dust Collector | Ore | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO5 |
| SULPH | Sink Product Sulphide Flotation | Mill | Carbon Disulphide, Pentanol | EO6 |
| TL | Haul Truck Loading for Transport to Marine Terminal | Concentrate | PM, $PM_{10}$ $PM_{2.5}$ | EO7 |
| MAR_TD | Transfer from Trucks into Ship Feeder | Concentrate | PM, $PM_{10}$ $PM_{2.5}$ | EO9 |
| MAR_CONV | Loading onto Ship via Covered Conveyor | Concentrate | PM, $PM_{10}$ $PM_{2.5}$ | EO9 |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Road | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO8 |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Road | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO8 |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Road | PM, PM10, PM2.5, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lithium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc | EO8 |
| UPR4 | Unpaved Road from AGS to Marine Terminal | Road | PM, PM10, PM2.5 | EO8 |
| TAILS | Tailings Pond | Tailings | Carbon Disulphide, Pentanol | EO6 |
| SHIP_1 | Auxiliary Engine 1 | - | CO, NOX, PM, DPM, PM10, PM2.5, SO2 | EO10 |
| SHIP_2 | Auxiliary Engine 2 | - | CO, NOX, PM, DPM, PM10, PM2.5, SO2 | EO10 |
| SHIP_3 | Auxiliary Engine 3 | - | CO, NOX, PM, DPM, PM10, PM2.5, SO2 | EO10 |

***Table 3B3: Emission Summary Table (Year 1)***

| Source ID | Description | Compound | Annual | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|
| | | | Emisisons (kg/year) | % of Overall Emissions for Scenario | |
| OB_MH | Overburden Material Handling | PM | 372.40 | <1% | Yes |
| OB_MH | Overburden Material Handling | $PM_{10}$ | 176.14 | <1% | Yes |
| OB_MH | Overburden Material Handling | $PM_{2.5}$ | 26.67 | <1% | Yes |
| OB_BD | Overburden Bulldozing | PM | 15746.40 | 2.2% | Yes |
| OB_BD | Overburden Bulldozing | $PM_{10}$ | 2967.38 | 1.4% | Yes |
| OB_BD | Overburden Bulldozing | $PM_{2.5}$ | 1653.37 | 3.9% | Yes |
| C_WR | Waste Rock Material Handling | PM | 4334.60 | <1% | Yes |
| C_WR | Waste Rock Material Handling | $PM_{10}$ | 2050.15 | <1% | Yes |
| C_WR | Waste Rock Material Handling | $PM_{2.5}$ | 310.45 | <1% | Yes |
| C_WR | Waste Rock Material Handling | Antimony | 0.02 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Arsenic | 0.56 | 2.4% | Yes |
| C_WR | Waste Rock Material Handling | Barium | 4.12 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Beryllium | 0.08 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Cadmium | 0.11 | 2.4% | Yes |
| C_WR | Waste Rock Material Handling | Chromium | 0.48 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Cobalt | 0.09 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Lithium | 1.21 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Copper | 0.69 | 2.4% | Yes |
| C_WR | Waste Rock Material Handling | Lead | 6.50 | 7.3% | Yes |
| C_WR | Waste Rock Material Handling | Manganese | 6.07 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Mercury | 0.0022 | 2.4% | Yes |
| C_WR | Waste Rock Material Handling | Nickel | 0.19 | 2.4% | Yes |
| C_WR | Waste Rock Material Handling | Selenium | 0.00 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Silver | 0.00 | 2.4% | No |
| C_WR | Waste Rock Material Handling | Vanadium | 0.42 | 2.4% | Yes |
| C_WR | Waste Rock Material Handling | Zinc | 21.67 | 5.2% | Yes |
| SRP_DWP | Diesel Powered Dewatering Pump | PM | 0.18 | <1% | Yes |
| SRP_DWP | Diesel Powered Dewatering Pump | $PM_{10}$ | 0.18 | <1% | Yes |
| SRP_DWP | Diesel Powered Dewatering Pump | $PM_{2.5}$ | 0.18 | <1% | Yes |
| SRP_DWP | Diesel Powered Dewatering Pump | $NO_X$ | 2.58 | <1% | Yes |
| SRP_DWP | Diesel Powered Dewatering Pump | CO | 0.55 | <1% | Yes |
| SRP_DWP | Diesel Powered Dewatering Pump | $SO_2$ | 3.29 | <1% | Yes |
| WR_BD | Waste Rock Bulldozing | PM | 15746.40 | 2.2% | Yes |
| WR_BD | Waste Rock Bulldozing | $PM_{10}$ | 2967.38 | 1.4% | Yes |
| WR_BD | Waste Rock Bulldozing | $PM_{2.5}$ | 1653.37 | 3.9% | Yes |
| WR_BD | Waste Rock Bulldozing | Antimony | 0.07 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Arsenic | 2.05 | 8.8% | Yes |
| WR_BD | Waste Rock Bulldozing | Barium | 14.96 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Beryllium | 0.28 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Cadmium | 0.39 | 8.8% | Yes |
| WR_BD | Waste Rock Bulldozing | Chromium | 1.75 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Cobalt | 0.31 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Lithium | 4.41 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Copper | 2.52 | 8.8% | Yes |
| WR_BD | Waste Rock Bulldozing | Lead | 23.62 | 26.6% | Yes |
| WR_BD | Waste Rock Bulldozing | Manganese | 22.04 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Mercury | 0.0079 | 8.8% | Yes |
| WR_BD | Waste Rock Bulldozing | Nickel | 0.69 | 8.8% | Yes |
| WR_BD | Waste Rock Bulldozing | Selenium | 0.02 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Silver | 0.01 | 8.8% | No |
| WR_BD | Waste Rock Bulldozing | Vanadium | 1.53 | 8.8% | Yes |
| WR_BD | Waste Rock Bulldozing | Zinc | 78.73 | 19.0% | Yes |
| TP_BD | Topsoil Bulldozing | PM | 15746.40 | 2.2% | Yes |
| TP_BD | Topsoil Bulldozing | $PM_{10}$ | 2967.38 | 1.4% | Yes |
| TP_BD | Topsoil Bulldozing | $PM_{2.5}$ | 1653.37 | 3.9% | Yes |
| TP_MH | Topsoil Material Handling | PM | 93.10 | <1% | Yes |
| TP_MH | Topsoil Material Handling | $PM_{10}$ | 44.03 | <1% | Yes |
| TP_MH | Topsoil Material Handling | $PM_{2.5}$ | 6.67 | <1% | Yes |
| Stockpile_OB | Wind Erosion from Overburden Stockpile | PM | 2.64E+03 | <1% | Yes |
| Stockpile_OB | Wind Erosion from Overburden Stockpile | $PM_{10}$ | 1.32E+03 | <1% | Yes |
| Stockpile_OB | Wind Erosion from Overburden Stockpile | $PM_{2.5}$ | 1.98E+02 | <1% | Yes |
| Stockpile_Topsoil | Wind Erosion from Topsoil Stockpile | PM | 2.20E+03 | <1% | Yes |
| Stockpile_Topsoil | Wind Erosion from Topsoil Stockpile | $PM_{10}$ | 1.10E+03 | <1% | Yes |
| Stockpile_Topsoil | Wind Erosion from Topsoil Stockpile | $PM_{2.5}$ | 1.65E+02 | <1% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | PM | 2.64E+03 | <1% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | $PM_{10}$ | 1.32E+03 | <1% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | $PM_{2.5}$ | 1.98E+02 | <1% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Antimony | 1.58E-01 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Arsenic | 4.48E+00 | 19.2% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Barium | 3.27E+01 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Beryllium | 6.20E-01 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Cadmium | 8.61E-01 | 19.2% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Chromium | 3.82E+00 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Cobalt | 6.89E-01 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Lithium | 9.64E+00 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Copper | 5.51E+00 | 19.2% | Yes |

***Table 3B3: Emission Summary Table (Year 1)***

| Source ID | Description | Compound | Annual | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|
| | | | Emisisons (kg/year) | % of Overall Emissions for Scenario | |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Lead | 7.92E+00 | 8.9% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Manganese | 4.82E+01 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Mercury | 1.72E-02 | 19.2% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Nickel | 1.52E+00 | 19.2% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Selenium | 3.44E-02 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Silver | 2.38E-02 | 19.2% | No |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Vanadium | 3.34E+00 | 19.2% | Yes |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Zinc | 5.51E+01 | 13.3% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | PM | 2.38E+03 | <1% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | $PM_{10}$ | 1.19E+03 | <1% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | $PM_{2.5}$ | 1.78E+02 | <1% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Antimony | 1.58E-01 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Arsenic | 4.48E+00 | 19.2% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Barium | 3.27E+01 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Beryllium | 6.20E-01 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Cadmium | 8.61E-01 | 19.2% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Chromium | 3.82E+00 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Cobalt | 6.89E-01 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Lithium | 9.64E+00 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Copper | 5.51E+00 | 19.2% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Lead | 7.92E+00 | 8.9% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Manganese | 4.82E+01 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Mercury | 1.72E-02 | 19.2% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Nickel | 1.52E+00 | 19.2% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Selenium | 3.44E-02 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Silver | 2.38E-02 | 19.2% | No |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Vanadium | 3.34E+00 | 19.2% | Yes |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Zinc | 5.51E+01 | 13.3% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | PM | 6.12E+03 | <1% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{10}$ | 3.06E+03 | 1.4% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{2.5}$ | 1.53E+03 | 3.6% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | CO | 4.03E+03 | 1.5% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | NOX | 3.50E+02 | <1% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Antimony | 2.28E-02 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Arsenic | 6.44E-01 | 2.8% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Barium | 4.71E+00 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Beryllium | 8.92E-02 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Cadmium | 1.24E-01 | 2.8% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Chromium | 5.50E-01 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Cobalt | 9.91E-02 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Lithium | 1.39E+00 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Copper | 7.93E-01 | 2.8% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Lead | 7.43E+00 | 8.4% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Manganese | 6.94E+00 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Mercury | 0.0025 | 2.8% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Nickel | 2.18E-01 | 2.8% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Selenium | 4.96E-03 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Silver | 3.42E-03 | 2.8% | No |
| PIT_DB | Open Pit Drilling and Blasting | Vanadium | 4.81E-01 | 2.8% | Yes |
| PIT_DB | Open Pit Drilling and Blasting | Zinc | 2.48E+01 | 6.0% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | PM | 1.55E+04 | 2.2% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $PM_{10}$ | 1.55E+04 | 7.3% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $PM_{2.5}$ | 1.50E+04 | 35.7% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | CO | 2.68E+05 | 97.6% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $NO_X$ | 3.43E+05 | 91.3% | Yes |
| PIT_EQUIP | Open Pit Mining Equipment | $SO_2$ | 1.69E+02 | 1.7% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | PM | 1.67E+01 | <1% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | $PM_{10}$ | 1.67E+01 | <1% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | $PM_{2.5}$ | 1.62E+01 | <1% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | CO | 5.08E+01 | <1% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | NOX | 2.36E+02 | <1% | Yes |
| MILL_EPG | Emergency Diesel Generator at Mill | SO2 | 3.60E-02 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | PM | 1.17E+03 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | $PM_{10}$ | 5.52E+02 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | PM2.5 | 8.36E+01 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Antimony | 5.37E-03 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Arsenic | 1.52E-01 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Barium | 1.11E+00 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Beryllium | 2.10E-02 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Cadmium | 2.92E-02 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Chromium | 1.30E-01 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Cobalt | 2.34E-02 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Lithium | 3.27E-01 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Copper | 1.87E-01 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Lead | 1.75E+00 | 2.0% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Manganese | 1.63E+00 | <1% | No |

***Table 3B3: Emission Summary Table (Year 1)***

| Source ID | Description | Compound | Annual | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|
| | | | Emisisons (kg/year) | % of Overall Emissions for Scenario | |
| ORE_MH | Above-Ground Ore Material Handling | Mercury | 0.0006 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Nickel | 5.14E-02 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Selenium | 1.17E-03 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Silver | 8.06E-04 | <1% | No |
| ORE_MH | Above-Ground Ore Material Handling | Vanadium | 1.13E-01 | <1% | Yes |
| ORE_MH | Above-Ground Ore Material Handling | Zinc | 5.84E+00 | 1.4% | Yes |
| OP_WR | Waste Rock Material Handling | PM | 4.33E+03 | <1% | Yes |
| OP_WR | Waste Rock Material Handling | $PM_{10}$ | 2.05E+03 | <1% | Yes |
| OP_WR | Waste Rock Material Handling | PM2.5 | 3.10E+02 | <1% | Yes |
| OP_WR | Waste Rock Material Handling | Antimony | 1.99E-02 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Arsenic | 5.63E-01 | 2.4% | Yes |
| OP_WR | Waste Rock Material Handling | Barium | 4.12E+00 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Beryllium | 7.80E-02 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Cadmium | 1.08E-01 | 2.4% | Yes |
| OP_WR | Waste Rock Material Handling | Chromium | 4.81E-01 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Cobalt | 8.67E-02 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Lithium | 1.21E+00 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Copper | 6.94E-01 | 2.4% | Yes |
| OP_WR | Waste Rock Material Handling | Lead | 6.50E+00 | 7.3% | Yes |
| OP_WR | Waste Rock Material Handling | Manganese | 6.07E+00 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Mercury | 0.0022 | 2.4% | Yes |
| OP_WR | Waste Rock Material Handling | Nickel | 1.91E-01 | 2.4% | Yes |
| OP_WR | Waste Rock Material Handling | Selenium | 4.33E-03 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Silver | 2.99E-03 | 2.4% | No |
| OP_WR | Waste Rock Material Handling | Vanadium | 4.20E-01 | 2.4% | Yes |
| OP_WR | Waste Rock Material Handling | Zinc | 2.17E+01 | 5.2% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | PM | 1.17E+03 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | $PM_{10}$ | 5.52E+02 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | PM2.5 | 8.36E+01 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Antimony | 5.37E-03 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Arsenic | 1.52E-01 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Barium | 1.11E+00 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Beryllium | 2.10E-02 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Cadmium | 2.92E-02 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Chromium | 1.30E-01 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Cobalt | 2.34E-02 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Lithium | 3.27E-01 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Copper | 1.87E-01 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Lead | 1.75E+00 | 2.0% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Manganese | 1.63E+00 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Mercury | 0.0006 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Nickel | 5.14E-02 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Selenium | 1.17E-03 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Silver | 8.06E-04 | <1% | No |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Vanadium | 1.13E-01 | <1% | Yes |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Zinc | 5.84E+00 | 1.4% | Yes |
| DC | Ore Crushing Circuit Dust Collector | PM | 4.64E+03 | <1% | Yes |
| DC | Ore Crushing Circuit Dust Collector | $PM_{10}$ | 2.32E+03 | 1.1% | Yes |
| DC | Ore Crushing Circuit Dust Collector | PM2.5 | 1.16E+03 | 2.8% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Antimony | 2.13E-02 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Arsenic | 6.03E-01 | 2.6% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Barium | 4.40E+00 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Beryllium | 8.35E-02 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Cadmium | 1.16E-01 | 2.6% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Chromium | 5.15E-01 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Cobalt | 9.27E-02 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Lithium | 1.30E+00 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Copper | 7.42E-01 | 2.6% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Lead | 6.96E+00 | 7.8% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Manganese | 6.49E+00 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Mercury | 0.0023 | 2.6% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Nickel | 2.04E-01 | 2.6% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Selenium | 4.64E-03 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Silver | 3.20E-03 | 2.6% | No |
| DC | Ore Crushing Circuit Dust Collector | Vanadium | 4.50E-01 | 2.6% | Yes |
| DC | Ore Crushing Circuit Dust Collector | Zinc | 2.32E+01 | 5.6% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | PM | 1.17E+03 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | $PM_{10}$ | 5.52E+02 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | PM2.5 | 8.36E+01 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Antimony | 5.37E-03 | <1% | No |

***Table 3B3: Emission Summary Table (Year 1)***

| Source ID | Description | Compound | Annual | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|
| | | | Emisisons (kg/year) | % of Overall Emissions for Scenario | |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Arsenic | 1.52E-01 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Barium | 1.11E+00 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Beryllium | 2.10E-02 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Cadmium | 2.92E-02 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Chromium | 1.30E-01 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Cobalt | 2.34E-02 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Lithium | 3.27E-01 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Copper | 1.87E-01 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Lead | 1.75E+00 | 2.0% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Manganese | 1.63E+00 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Mercury | 0.0006 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Nickel | 5.14E-02 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Selenium | 1.17E-03 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Silver | 8.06E-04 | <1% | No |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Vanadium | 1.13E-01 | <1% | Yes |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Zinc | 5.84E+00 | 1.4% | Yes |
| SULPH | Sink Product Sulphide Flotation | Carbon Disulphide | 1.51E+03 | 99.0% | No |
| SULPH | Sink Product Sulphide Flotation | Pentanol | 1.75E+03 | 99.0% | No |
| ONSPEC | On-spec Concentrate Stockpile Loading | PM | 1.23E+02 | <1% | Yes |
| ONSPEC | On-spec Concentrate Stockpile Loading | $PM_{10}$ | 5.80E+01 | <1% | Yes |
| ONSPEC | On-spec Concentrate Stockpile Loading | $PM_{2.5}$ | 8.79E+00 | <1% | Yes |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | PM | 4.10E+01 | <1% | Yes |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | $PM_{10}$ | 1.94E+01 | <1% | Yes |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | $PM_{2.5}$ | 2.93E+00 | <1% | Yes |
| TL | Haul Truck Loading for Transport to Marine Terminal | PM | 1.35E+02 | <1% | Yes |
| TL | Haul Truck Loading for Transport to Marine Terminal | $PM_{10}$ | 6.40E+01 | <1% | Yes |
| TL | Haul Truck Loading for Transport to Marine Terminal | $PM_{2.5}$ | 9.70E+00 | <1% | Yes |
| MAR_TD | Transfer from Trucks into Ship Feeder | PM | 1.35E+02 | <1% | Yes |
| MAR_TD | Transfer from Trucks into Ship Feeder | $PM_{10}$ | 6.40E+01 | <1% | Yes |
| MAR_TD | Transfer from Trucks into Ship Feeder | $PM_{2.5}$ | 9.70E+00 | <1% | Yes |
| MAR_CONV | Loading onto Ship via Covered Conveyor | PM | 1.46E+01 | <1% | Yes |
| MAR_CONV | Loading onto Ship via Covered Conveyor | $PM_{10}$ | 7.30E+00 | <1% | Yes |
| MAR_CONV | Loading onto Ship via Covered Conveyor | $PM_{2.5}$ | 3.65E+00 | <1% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | PM | 1.32E+05 | 18.8% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | $PM_{10}$ | 3.75E+04 | 17.6% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | $PM_{2.5}$ | 3.75E+03 | 8.9% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Antimony | 1.51E-01 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Arsenic | 4.28E+00 | 18.4% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Barium | 3.13E+01 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Beryllium | 5.93E-01 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Cadmium | 8.23E-01 | 18.4% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Chromium | 3.65E+00 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Cobalt | 6.58E-01 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Lithium | 9.22E+00 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Copper | 5.27E+00 | 18.4% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Lead | 7.57E+00 | 8.5% | Yes |

***Table 3B3: Emission Summary Table (Year 1)***

| Source ID | Description | Compound | Annual | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|
| | | | Emisisons (kg/year) | % of Overall Emissions for Scenario | |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Manganese | 4.61E+01 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Mercury | 0.0165 | 18.4% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Nickel | 1.45E+00 | 18.4% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Selenium | 3.29E-02 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Silver | 2.27E-02 | 18.4% | No |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Vanadium | 3.19E+00 | 18.4% | Yes |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Zinc | 5.27E+01 | 12.7% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | PM | 5.38E+03 | <1% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | $PM_{10}$ | 1.53E+03 | <1% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | $PM_{2.5}$ | 1.53E+02 | <1% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Antimony | 2.47E-02 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Arsenic | 6.99E-01 | 3.0% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Barium | 5.11E+00 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Beryllium | 9.68E-02 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Cadmium | 1.34E-01 | 3.0% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Chromium | 5.97E-01 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Cobalt | 1.08E-01 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Lithium | 1.51E+00 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Copper | 8.60E-01 | 3.0% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Lead | 1.24E+00 | 1.4% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Manganese | 7.53E+00 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Mercury | 0.0027 | 3.0% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Nickel | 2.37E-01 | 3.0% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Selenium | 5.38E-03 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Silver | 3.71E-03 | 3.0% | No |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Vanadium | 5.21E-01 | 3.0% | Yes |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Zinc | 8.60E+00 | 2.1% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | PM | 3.44E+04 | 4.9% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | $PM_{10}$ | 9.79E+03 | 4.6% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | $PM_{2.5}$ | 9.79E+02 | 2.3% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Antimony | 1.58E-01 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Arsenic | 4.48E+00 | 19.2% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Barium | 3.27E+01 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Beryllium | 6.20E-01 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Cadmium | 8.61E-01 | 19.2% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Chromium | 3.82E+00 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Cobalt | 6.89E-01 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Lithium | 9.64E+00 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Copper | 5.51E+00 | 19.2% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Lead | 7.92E+00 | 8.9% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Manganese | 4.82E+01 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Mercury | 0.0172 | 19.2% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Nickel | 1.52E+00 | 19.2% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Selenium | 3.44E-02 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Silver | 2.38E-02 | 19.2% | No |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Vanadium | 3.34E+00 | 19.2% | Yes |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Zinc | 5.51E+01 | 13.3% | Yes |
| UPR4 | Unpaved Road from AGS to Marine Terminal | PM | 4.32E+05 | 61.6% | Yes |
| UPR4 | Unpaved Road from AGS to Marine Terminal | $PM_{10}$ | 1.23E+05 | 57.6% | Yes |
| UPR4 | Unpaved Road from AGS to Marine Terminal | $PM_{2.5}$ | 1.23E+04 | 29.2% | Yes |
| TAILS | Tailings Pond | Carbon Disulphide | 1.51E+01 | <1% | No |
| TAILS | Tailings Pond | Pentanol | 1.75E+01 | <1% | No |
| SHIP_1 | Auxiliary Engine 1 | CO | 8.45E+02 | <1% | Yes |
| SHIP_1 | Auxiliary Engine 1 | NOX | 1.07E+04 | 2.8% | Yes |
| SHIP_1 | Auxiliary Engine 1 | PM | 2.07E+02 | <1% | Yes |
| SHIP_1 | Auxiliary Engine 1 | $PM_{10}$ | 2.07E+02 | <1% | Yes |

***Table 3B3: Emission Summary Table (Year 1)***

| Source ID | Description | Compound | Annual | | NLR 11/22 - Air Pollution Control Regulated? |
|---|---|---|---|---|---|
| | | | Emisisons (kg/year) | % of Overall Emissions for Scenario | |
| SHIP_1 | Auxiliary Engine 1 | $PM_{2.5}$ | 1.84E+02 | <1% | Yes |
| SHIP_1 | Auxiliary Engine 1 | SO2 | 3.23E+03 | 32.7% | Yes |
| SHIP_2 | Auxiliary Engine 2 | CO | 8.45E+02 | <1% | Yes |
| SHIP_2 | Auxiliary Engine 2 | NOX | 1.07E+04 | 2.8% | Yes |
| SHIP_2 | Auxiliary Engine 2 | PM | 2.07E+02 | <1% | Yes |
| SHIP_2 | Auxiliary Engine 2 | $PM_{10}$ | 2.07E+02 | <1% | Yes |
| SHIP_2 | Auxiliary Engine 2 | $PM_{2.5}$ | 1.84E+02 | <1% | Yes |
| SHIP_2 | Auxiliary Engine 2 | SO2 | 3.23E+03 | 32.7% | Yes |
| SHIP_3 | Auxiliary Engine 3 | CO | 8.45E+02 | <1% | Yes |
| SHIP_3 | Auxiliary Engine 3 | NOX | 1.07E+04 | 2.8% | Yes |
| SHIP_3 | Auxiliary Engine 3 | PM | 2.07E+02 | <1% | Yes |
| SHIP_3 | Auxiliary Engine 3 | $PM_{10}$ | 2.07E+02 | <1% | Yes |
| SHIP_3 | Auxiliary Engine 3 | $PM_{2.5}$ | 1.84E+02 | <1% | Yes |
| SHIP_3 | Auxiliary Engine 3 | SO2 | 3.23E+03 | 32.7% | Yes |

**Table 3B4. Summary of Estimated Metals Emission Rates (Year 1)**

| Source ID | Description | Description | Compound | Metals Data | | Annual | |
|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM (%) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| C_WR | Waste Rock Material Handling | Material Handling | PM | N/A | N/A | 4.33E+03 | 2.0% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.99E-02 | 2.4% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 5.63E-01 | 21.6% |
| | | | Barium | Max % in Ore & WR | 0.095% | 4.12E+00 | 2.4% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 7.80E-02 | 2.4% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 1.08E-01 | 2.4% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 4.81E-01 | 2.4% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 8.67E-02 | 2.4% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 1.21E+00 | 2.4% |
| | | | Copper | Max % in Ore & WR | 0.016% | 6.94E-01 | 2.4% |
| | | | Lead | Max % in Ore & WR | 0.150% | 6.50E+00 | 7.3% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 6.07E+00 | 2.4% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 2.17E-03 | 2.4% |
| | | | Nickel | Max % in Ore & WR | 0.0044% | 1.91E-01 | 2.4% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 4.33E-03 | 2.4% |
| | | | Silver | Max % in Ore & WR | 0.000% | 2.99E-03 | 2.4% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 4.20E-01 | 2.4% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 2.17E+01 | 5.2% |
| WR_BD | Waste Rock Bulldozing | Bulldozing | PM | N/A | N/A | 1.57E+04 | 7.4% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 7.24E-02 | 8.8% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 2.05E+00 | 78.4% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.50E+01 | 8.8% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 2.83E-01 | 8.8% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 3.94E-01 | 8.8% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.75E+00 | 8.8% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 3.15E-01 | 8.8% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 4.41E+00 | 8.8% |
| | | | Copper | Max % in Ore & WR | 0.016% | 2.52E+00 | 8.8% |
| | | | Lead | Max % in Ore & WR | 0.150% | 2.36E+01 | 26.6% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 2.20E+01 | 8.8% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 7.87E-03 | 8.8% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 6.93E-01 | 8.8% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 1.57E-02 | 8.8% |
| | | | Silver | Max % in Ore & WR | 0.000% | 1.09E-02 | 8.8% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 1.53E+00 | 8.8% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 7.87E+01 | 19.0% |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | Wind Erosion | PM | N/A | N/A | 2.64E+03 | 1.2% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.58E-01 | 19.2% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 4.48E+00 | 21.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.27E+01 | 19.2% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 6.20E-01 | 19.2% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 8.61E-01 | 19.2% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 3.82E+00 | 19.2% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 6.89E-01 | 19.2% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 9.64E+00 | 19.2% |
| | | | Copper | Max % in Ore & WR | 0.016% | 5.51E+00 | 19.2% |
| | | | Lead | Max % in Ore & WR | 0.023% | 7.92E+00 | 8.9% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 4.82E+01 | 19.2% |
| | | | Mercury | Max % in Ore & WR | 0.00005% | 1.72E-02 | 19.2% |
| | | | Nickel | Max % in Ore & WR | 0.0044% | 1.52E+00 | 19.2% |
| | | | Selenium | Max % in Ore & WR | 0.00010% | 3.44E-02 | 19.2% |
| | | | Silver | Max % in Ore & WR | 0.000069% | 2.38E-02 | 19.2% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.34E+00 | 19.2% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 5.51E+01 | 13.3% |
| | | | PM | N/A | N/A | 2.38E+03 | 1.1% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.58E-01 | 19.2% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 4.48E+00 | 21.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.27E+01 | 19.2% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 6.20E-01 | 19.2% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 8.61E-01 | 19.2% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 3.82E+00 | 19.2% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 6.89E-01 | 19.2% |

**Table 3B4. Summary of Estimated Metals Emission Rates (Year 1)**

| Source ID | Description | Description | Compound | Metals Data | | Annual | |
|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM (%) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | Wind Erosion | Lithium | Max % in Ore & WR | 0.028% | 9.64E+00 | 19.2% |
| | | | Copper | Max % in Ore & WR | 0.016% | 5.51E+00 | 19.2% |
| | | | Lead | Max % in Ore & WR | 0.023% | 7.92E+00 | 8.9% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 4.82E+01 | 19.2% |
| | | | Mercury | Max % in Ore & WR | 0.00005% | 1.72E-02 | 19.2% |
| | | | Nickel | Max % in Ore & WR | 0.0044% | 1.52E+00 | 19.2% |
| | | | Selenium | Max % in Ore & WR | 0.00010% | 3.44E-02 | 19.2% |
| | | | Silver | Max % in Ore & WR | 0.000069% | 2.38E-02 | 19.2% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.34E+00 | 19.2% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 5.51E+01 | 13.3% |
| PIT_DB | Open Pit Drilling and Blasting | Drilling and Blasting | PM | N/A | N/A | 4.96E+03 | 2.3% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 2.28E-02 | 2.8% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 6.44E-01 | 3.1% |
| | | | Barium | Max % in Ore & WR | 0.095% | 4.71E+00 | 2.8% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 8.92E-02 | 2.8% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 1.24E-01 | 2.8% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 5.50E-01 | 2.8% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 9.91E-02 | 2.8% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 1.39E+00 | 2.8% |
| | | | Copper | Max % in Ore & WR | 0.016% | 7.93E-01 | 2.8% |
| | | | Lead | Max % in Ore & WR | 0.150% | 7.43E+00 | 8.4% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 6.94E+00 | 2.8% |
| | | | Mercury | Max % in Ore & WR | 0.00005% | 2.48E-03 | 2.8% |
| | | | Nickel | Max % in Ore & WR | 0.0044% | 2.18E-01 | 2.8% |
| | | | Selenium | Max % in Ore & WR | 0.0001% | 4.96E-03 | 2.8% |
| | | | Silver | Max % in Ore & WR | 0.000069% | 3.42E-03 | 2.8% |
| | | | Vanadium | Max % in Ore & WR | 0.0097% | 4.81E-01 | 2.8% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 2.48E+01 | 6.0% |
| ORE_MH | Above-Ground Ore Material Handling | Material Handling | PM | N/A | N/A | 1.17E+03 | 0.5% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 5.37E-03 | 0.7% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 1.52E-01 | 0.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.11E+00 | 0.7% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 2.10E-02 | 0.7% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 2.92E-02 | 0.7% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.30E-01 | 0.7% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 2.34E-02 | 0.7% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 3.27E-01 | 0.7% |
| | | | Copper | Max % in Ore & WR | 0.016% | 1.87E-01 | 0.7% |
| | | | Lead | Max % in Ore & WR | 0.150% | 1.75E+00 | 2.0% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 1.63E+00 | 0.7% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 5.84E-04 | 0.7% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 5.14E-02 | 0.7% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 1.17E-03 | 0.7% |
| | | | Silver | Max % in Ore & WR | 0.000% | 8.06E-04 | 0.7% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 1.13E-01 | 0.7% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 5.84E+00 | 1.4% |
| OP_WR | Waste Rock Material Handling | Material Handling | PM | N/A | N/A | 4.33E+03 | 2.0% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.99E-02 | 2.4% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 5.63E-01 | 2.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 4.12E+00 | 2.4% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 7.80E-02 | 2.4% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 1.08E-01 | 2.4% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 4.81E-01 | 2.4% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 8.67E-02 | 2.4% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 1.21E+00 | 2.4% |
| | | | Copper | Max % in Ore & WR | 0.016% | 6.94E-01 | 2.4% |
| | | | Lead | Max % in Ore & WR | 0.150% | 6.50E+00 | 7.3% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 6.07E+00 | 2.4% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 2.17E-03 | 2.4% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 1.91E-01 | 2.4% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 4.33E-03 | 2.4% |
| | | | Silver | Max % in Ore & WR | 0.000% | 2.99E-03 | 2.4% |

**Table 3B4. Summary of Estimated Metals Emission Rates (Year 1)**

| Source ID | Description | Description | Compound | Metals Data | | Annual | |
|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM (%) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 4.20E-01 | 2.4% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 2.17E+01 | 5.2% |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | Material Handling | PM | N/A | N/A | 1.17E+03 | 0.5% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 5.37E-03 | 0.7% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 1.52E-01 | 0.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.11E+00 | 0.7% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 2.10E-02 | 0.7% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 2.92E-02 | 0.7% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.30E-01 | 0.7% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 2.34E-02 | 0.7% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 3.27E-01 | 0.7% |
| | | | Copper | Max % in Ore & WR | 0.016% | 1.87E-01 | 0.7% |
| | | | Lead | Max % in Ore & WR | 0.150% | 1.75E+00 | 2.0% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 1.63E+00 | 0.7% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 5.84E-04 | 0.7% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 5.14E-02 | 0.7% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 1.17E-03 | 0.7% |
| | | | Silver | Max % in Ore & WR | 0.000% | 8.06E-04 | 0.7% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 1.13E-01 | 0.7% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 5.84E+00 | 1.4% |
| DC | Ore Crushing Circuit Dust Collector | Dust Collector | PM | N/A | N/A | 4.64E+03 | 2.2% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 2.13E-02 | 2.6% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 6.03E-01 | 2.9% |
| | | | Barium | Max % in Ore & WR | 0.095% | 4.40E+00 | 2.6% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 8.35E-02 | 2.6% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 1.16E-01 | 2.6% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 5.15E-01 | 2.6% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 9.27E-02 | 2.6% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 1.30E+00 | 2.6% |
| | | | Copper | Max % in Ore & WR | 0.016% | 7.42E-01 | 2.6% |
| | | | Lead | Max % in Ore & WR | 0.150% | 6.96E+00 | 7.8% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 6.49E+00 | 2.6% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 2.32E-03 | 2.6% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 2.04E-01 | 2.6% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 4.64E-03 | 2.6% |
| | | | Silver | Max % in Ore & WR | 0.000% | 3.20E-03 | 2.6% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 4.50E-01 | 2.6% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 2.32E+01 | 5.6% |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | Material Handling | PM | N/A | N/A | 1.17E+03 | 0.5% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 5.37E-03 | 0.7% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 1.52E-01 | 0.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 1.11E+00 | 0.7% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 2.10E-02 | 0.7% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 2.92E-02 | 0.7% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 1.30E-01 | 0.7% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 2.34E-02 | 0.7% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 3.27E-01 | 0.7% |
| | | | Copper | Max % in Ore & WR | 0.016% | 1.87E-01 | 0.7% |
| | | | Lead | Max % in Ore & WR | 0.150% | 1.75E+00 | 2.0% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 1.63E+00 | 0.7% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 5.84E-04 | 0.7% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 5.14E-02 | 0.7% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 1.17E-03 | 0.7% |
| | | | Silver | Max % in Ore & WR | 0.000% | 8.06E-04 | 0.7% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 1.13E-01 | 0.7% |
| | | | Zinc | Max % in Ore & WR | 0.500% | 5.84E+00 | 1.4% |
| | | | PM | N/A | N/A | 1.32E+05 | 61.5% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.51E-01 | 18.4% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 4.28E+00 | 20.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.13E+01 | 18.4% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 5.93E-01 | 18.4% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 8.23E-01 | 18.4% |

**Table 3B4. Summary of Estimated Metals Emission Rates (Year 1)**

| Source ID | Description | Description | Compound | Metals Data | | Annual | |
|---|---|---|---|---|---|---|---|
| | | | | Assumed PM Speciation Profile | Assumed Concentration in of PM (%) | Annual ER (kg/year) | % of Overall kg/year Emissions for Scenario |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | Fugitive Dust Emissions from Roadways | Chromium | Max % in Ore & WR | 0.011% | 3.65E+00 | 18.4% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 6.58E-01 | 18.4% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 9.22E+00 | 18.4% |
| | | | Copper | Max % in Ore & WR | 0.016% | 5.27E+00 | 18.4% |
| | | | Lead | Max % in Ore & WR | 0.023% | 7.57E+00 | 8.5% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 4.61E+01 | 18.4% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 1.65E-02 | 18.4% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 1.45E+00 | 18.4% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 3.29E-02 | 18.4% |
| | | | Silver | Max % in Ore & WR | 0.000% | 2.27E-02 | 18.4% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.19E+00 | 18.4% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 5.27E+01 | 12.7% |
| UPR2 | Unpaved Road from South Ridge to Overburden/Topsoil | Fugitive Dust Emissions from Roadways | PM | N/A | N/A | 5.38E+03 | 2.5% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 2.47E-02 | 3.0% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 6.99E-01 | 3.4% |
| | | | Barium | Max % in Ore & WR | 0.095% | 5.11E+00 | 3.0% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 9.68E-02 | 3.0% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 1.34E-01 | 3.0% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 5.97E-01 | 3.0% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 1.08E-01 | 3.0% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 1.51E+00 | 3.0% |
| | | | Copper | Max % in Ore & WR | 0.016% | 8.60E-01 | 3.0% |
| | | | Lead | Max % in Ore & WR | 0.023% | 1.24E+00 | 1.4% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 7.53E+00 | 3.0% |
| | | | Mercury | Max % in Ore & WR | 0.000% | 2.69E-03 | 3.0% |
| | | | Nickel | Max % in Ore & WR | 0.004% | 2.37E-01 | 3.0% |
| | | | Selenium | Max % in Ore & WR | 0.000% | 5.38E-03 | 3.0% |
| | | | Silver | Max % in Ore & WR | 0.000% | 3.71E-03 | 3.0% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 5.21E-01 | 3.0% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 8.60E+00 | 2.1% |
| UPR3 | Unpaved Road from South Ridge to Waste Rock Stockpile | Fugitive Dust Emissions from Roadways | PM | N/A | N/A | 3.44E+04 | 16.1% |
| | | | Antimony | Max % in Ore & WR | 0.00046% | 1.58E-01 | 19.2% |
| | | | Arsenic | Max % in Ore & WR | 0.013% | 4.48E+00 | 21.7% |
| | | | Barium | Max % in Ore & WR | 0.095% | 3.27E+01 | 19.2% |
| | | | Beryllium | Max % in Ore & WR | 0.002% | 6.20E-01 | 19.2% |
| | | | Cadmium | Max % in Ore & WR | 0.003% | 8.61E-01 | 19.2% |
| | | | Chromium | Max % in Ore & WR | 0.011% | 3.82E+00 | 19.2% |
| | | | Cobalt | Max % in Ore & WR | 0.002% | 6.89E-01 | 19.2% |
| | | | Lithium | Max % in Ore & WR | 0.028% | 9.64E+00 | 19.2% |
| | | | Copper | Max % in Ore & WR | 0.016% | 5.51E+00 | 19.2% |
| | | | Lead | Max % in Ore & WR | 0.023% | 7.92E+00 | 8.9% |
| | | | Manganese | Max % in Ore & WR | 0.140% | 4.82E+01 | 19.2% |
| | | | Mercury | Max % in Ore & WR | 0.00005% | 1.72E-02 | 19.2% |
| | | | Nickel | Max % in Ore & WR | 0.0044% | 1.52E+00 | 19.2% |
| | | | Selenium | Max % in Ore & WR | 0.00010% | 3.44E-02 | 19.2% |
| | | | Silver | Max % in Ore & WR | 0.000069% | 2.38E-02 | 19.2% |
| | | | Vanadium | Max % in Ore & WR | 0.010% | 3.34E+00 | 19.2% |
| | | | Zinc | Max % in Ore & WR | 0.160% | 5.51E+01 | 13.3% |

**Notes:**

PM speciation profiles were developed to estimate metals emissions based on Particulate Matter (PM) emission estimates from sources that emit PM potentially containing metals. For sources associated with handling ore or waste rock, PM emission estimates were speciated into metal emission rate estimates by conservatively assuming that the metal concentration in the emitted PM is equal to the maximum concentration taken from ore and waste rock assay data provided by CFI. For PM from roads used for hauling material that may contain metals, it has been conservatively assumed that the metal concentration is equal to the maximum concentration taken from waste rock assay data provided by CFI.

Metal emissions are estimated for the onsite unpaved road segments only (i.e. 1.2 km of total 4.8 km for UPR3, 4.4 km of total 5.6 km for UPR4). For public road segments, only particulate emissions were estimated which is consistent with the previous EA air quality assessment.

***EC1 - Construction Activity - Bulldozing Dust Emissions***

During the construction phase of the Project, fugitive dust emissions may be generated from bulldozing and handling (loading, unloading, transfers) of non-metallic mineral materials. Bulldozing activities will take place in the Overburden Dump, Waste Rock Dump, and topsoil storage areas to prepare the sites for material storage. Material will be loaded into the overburden, waste rock, and topsoil stockpiles as areas are cleared for infrastructure construction and as portal and pit development occurs.

Particulate matter (PM) emissions are estimated using the emission factors in U.S. EPA AP-42 11.9 Western Surface Coal Mining (7/98), for overburden as shown in the formula below.

**PM (Annual) Sample Calculation**

$ER_{PM}$ = Emission Factor (kg/hr) x 24 hr/day x 365 days/yr

$ER_{PM\text{-}annual}$ = 1.8 (kg/hr) x 24 hr/day ÷ 365 days/yr

$ER_{PM\text{-}annual}$ = 1.57E+04 kg/yr

| Compound | EF Equation | EF [kg/hr] |
|---|---|---|
| PM | 2.6 x s^1.2 / M^1.3 | 1.80 |
| PM10 | EF_PM1.5 x 0.75 | 0.34 |
| PM2.5 | EF_PM x 0.105 | 0.19 |

Reference: U.S. EPA AP-42 11.9, Table 11.9-2 Western Surface Coal Mining (7/98), for overburden

**Emission Summary:**

**Bulldozing**

| Source ID | Description | Contaminant | Emission Factor (kg/hr) | Emission Rate (kg/y) |
|---|---|---|---|---|
| OB_BD | Bulldozing | PM | 1.80E+00 | 1.57E+04 |
| | | $PM_{10}$ | 3.39E-01 | 2.97E+03 |
| | | $PM_{2.5}$ | 1.89E-01 | 1.65E+03 |
| WR_BD | Bulldozing | PM | 1.80E+00 | 1.57E+04 |
| | | $PM_{10}$ | 3.39E-01 | 2.97E+03 |
| | | $PM_{2.5}$ | 1.89E-01 | 1.65E+03 |
| TP_BD | Bulldozing | PM | 1.80E+00 | 1.57E+04 |
| | | $PM_{10}$ | 3.39E-01 | 2.97E+03 |
| | | $PM_{2.5}$ | 1.89E-01 | 1.65E+03 |

## ***EC2 - Construction Activity - Material Drops Emissions***

The material handling emissions associated with loading/unloading to stockpiles in the Overburden Dump, Waste Rock Dump and topsoil stroage areas were estimated using the emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

**Sample Emission Calculations - OB_MH:**

**PM (Annual) Sample Calculation using the Drop Equation**

$EF_{PM}$ = k x 0.0016 x (Mean Wind Speed m/s ÷2.2)$^{1.3}$ ÷ (Material Moisture Content % ÷ 2)$^{1.4}$ (kg/tonne)

Particle Size Multiplier

$EF_{PM}$ = 0.74 x 0.0016 x (6.16 m/s ÷2.2)^1.3 ÷ (7.9 % ÷ 2)^1.4 (kg/tonne)

$EF_{PM}$ = 6.60E-04 kg/tonne

$ER_{PM}$ = Emission Factor (kg/tonne) x Throughput (tonne/yr)

$ER_{PM}$ = 0.0007 (kg/tonne) x 563867 (tonne/year)

$ER_{PM\text{-}kg/yr}$ = 3.72E+02 g/s

| Contaminant | Aerodynamic Particle Size Multiplier (k) |
|---|---|
| PM | 0.74 |
| $PM_{10}$ | 0.35 |
| $PM_{2.5}$ | 0.053 |

**Reference**: Emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

| Overall average wind speed (m/s) | 6.16 |
|---|---|

**Reference:** Average of maximum hourly wind speeds from January to December from Canadian Climate Normals data for St.Lawrence, Nfld. Station, 1991-2020 Climate Normals and Averages.

**Emission Summary:**

| Source ID | Description | Contaminant | Emission Factor (kg/ tonne) | Emission Rate (kg/y) |
|---|---|---|---|---|
| OB_MH | Overburden Material Handling | PM | 6.60E-04 | 3.72E+02 |
| | | $PM_{10}$ | 3.12E-04 | 1.76E+02 |
| | | $PM_{2.5}$ | 4.73E-05 | 2.67E+01 |
| C_WR | Waste Rock Material Handling | PM | 1.25E-03 | 4.33E+03 |
| | | $PM_{10}$ | 5.93E-04 | 2.05E+03 |
| | | $PM_{2.5}$ | 8.97E-05 | 3.10E+02 |
| TP_MH | Topsoil Material Handling | PM | 6.60E-04 | 9.31E+01 |
| | | $PM_{10}$ | 3.12E-04 | 4.40E+01 |
| | | $PM_{2.5}$ | 4.73E-05 | 6.67E+00 |

***EC4- Construction Activity - Diesel Powered Dewatering Pump***

South Ridge will be dewatered to facilitate the excavation of a portion of South Ridge Pit during construction. It is assumed that a 150 hp diesel pump will be used for the pit dewatering process based on CFI's input. This equipment is expected to operate 24 hours per day, 183 days per year.

Emission factors from the US EPA AP-42 Table 3.3-1, section dated 10/96, were used to calculate the emission rates of nitrogen oxides, carbon monoxide, and particulate matter from diesel combustion.

| Equipment | Number of Units | Power Output (kW) | Power Output (HP) | Daily Operating Hours per Unit | Operating Days per Year | Representative Cycle (1) | Load Factor Assignment (3) | Load Factor (3) | Brake-Specific Fuel Consumption | CO | NOX | PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | (lb/hp-hr) | (lb/hp-hr) | (lb/hp-hr) | (lb/hp-hr) |
| SRP_DWP | 1 | 112.00 | 150 | 24 | 183 | None (2) | Avg 7-cycle | 1 | 0.367 | 0.00668 | 0.031 | 0.0022 |

Notes:

1) Reference: NR-005d, Table 10: Page 15, Table 10. Compression-Ignition (CI) Load Factor Assignments by Equipment Type

2) Note: Load Factor of None = steady state

3) Reference: NR-005d, Table 9: Page 14, Table 9. Compression-Ignition Load Factors

| | |
|---|---|
| **Molar Mass SO2 (g/mol)** | 64 |
| **Molar Mass of Sulphur (g/mol)** | 32 |
| **S Content in Diesel Fuel (mg/kg)** | 15 |
| **Diesel Fuel Density (kg/L)** | 0.843 |
| **Fuel Consumption (L/hr)** | 2.96E+01 |

**Reference**: 3(1)(e) Sulphur in Diesel Fuel Regulations (justice.gc.ca) (conservatively used a large diesel engine's limits)

**Sample Emission Calculations for NOx from the Diesel-fired engine (SRP_DWP):**

$ER_{NOx}$ = Number of Units x Max Input Rating (hp) x Emission Factor (g/kW-hr) x 0.7457 kW/hp ÷ 3600 s/hr

$ER_{NOx}$ = 1 x 150 hp x 0.00391 g/hp-hr

$ER_{NOx\text{-}Annual}$ = 5.86E-01 g/s

$ER_{NOx\text{-}kg/yr}$ = $ER_{NOx\text{-}annual}$ (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

$ER_{NOx\text{-}kg/yr}$ = 1.85E+04 kg/yr

**Emission Summary (3 units total)**

| Source ID | Description | Contaminant | CAS | Emission Factor Value | Emission Factor Units | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|
| SRP_DWP | Diesel Powered Dewatering Pump | PM | N/A | 2.77E-04 | g/hp-hr | 1.83E-01 |
| | | $PM_{10}$ | N/A | - | - | 1.83E-01 |
| | | $PM_{2.5}$ | N/A | - | - | 1.77E-01 |
| | | $NO_X$ | 10102-44-0 | 3.91E-03 | g/hp-hr | 2.58E+00 |
| | | CO | 630-08-0 | 8.42E-04 | g/hp-hr | 5.55E-01 |
| | | $SO_2$ | 7746-09-5 | 2.53E-02 | g/L | 3.29E+00 |

**Notes:**

The emission factor for PM10 was assigned as the emission factor for particulate matter (PM), based on the conservative assumption that all particulate generated by diesel combustion will be nominally less than 10 µm in aerodynamic diameter. Additionally, it was assumed that 97% of the PM10 will be nominally less than PM2.5.

***EC5 - Wind Erosion***

Particulate emissions from wind erosion of stockpiles were calculated using the emission factor equation from the Government of Canada, Stockpiles and exposed area wind erosion calculator: guide to reporting, Method A.

Silt cotents were taken from US EPA AP-42, Table 13.2.4-1, Aggregate Handling and Storage Piles, November 2006.

The exposed area for a conical stockpile is estimated using:

$A = \pi \times R \sqrt{(R^2 + H^2)}$

R = radius of the stockpile (m)
H = height of the stockpile (m)
A = exposed surface area of stockpile ($m^2$)

70% control efficiency was assumed for the routine watering as per the plant's best management practices plan for fugitive dust (BMPP).

| | $PM_{10}$ | $PM_{2.5}$ | |
|---|---|---|---|
| Particulate aerodynamic factor (J) | 0.5 | 0.075 | (Method A) |

| | | |
|---|---|---|
| Days with Precipitation >= 0.2 mm | 195.8 | (1991 to 2020 Canadian Climate Normals Data - St.Lawrence - Days with Precipitation) |
| Days with Precipitation >= 1 mm | 149.1 | (1991 to 2020 Canadian Climate Normals Data - St.Lawrence - Days with Precipitation) |
| Days with Precipitation >= 0.254 mm (p) | 192.6 | (estimated) |

| | |
|---|---|
| Time with unobstructed wind speed >19.3 km/h in percent (%) (I) | 46.9 |

**PM Sample Calculation**

$EF_{TPM}$ = 1.12x10-4 x J x 1.7 x (s (%)/1.5) x 365 x ((365-P)/235) x (I/15)

J - particulate aerodynamic factor

s - silt content (%)

p - # of days with >0.254 mm (0.01in) of precipitation per year

I - % of time with unobstructed wind speed >19.3 km/h

$EF_{TPM}$ = 1.12x10-4 x 1 x 1.7 x (6.9 (%)/1.5) x 365 x ((365-192.6)/235) x (46.9/15)

$EF_{TPM}$ = 7.33E-01 kg/m2

$ER_{TPM}$ = $EF_{TPM}$ kg/$m^2$ x Surface $Area_{SP1}$ $m^2$ x Active Surface Area (%) x (100% - Control Efficiency (%)) x 1000 g/kg ÷ 24hr/day ÷ 3600 s/hr

$ER_{TPM}$ = 0.733 x 0.2 x 60000 x (1 - 0.7) x 1000 g/kg ÷ 24hr/day ÷ 3600 s/hr

$ER_{TPM}$ = 3.05E+01 g/s

**Emission Summary:**

| Source ID | Description | Surface Area ($m^2$) | % of Active Surface Area | Active Surface Area ($m^2$) | s (%) | PM Emission Factor (kg/$m^2$) | Control Efficiency (%) | Control Efficiency Description | Emission Rates (g/s) | | | Emission Rate (kg/y) | | | TPM (Kg/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | PM | PM10 | PM2.5 | PM | PM10 | PM2.5 | |
| Stockpile_OB | Wind Erosion from Overburden Stockpile | 60000 | 20% | 12000 | 6.9 | 7.33E-01 | 70% | Watering as per FDMP | 8.37E-02 | 4.18E-02 | 6.28E-03 | 2.64E+03 | 1.32E+03 | 1.98E+02 | 2.64E+03 |
| Stockpile_Topsoil | Wind Erosion from Topsoil Stockpile | 50000 | 20% | 10000 | 6.9 | 7.33E-01 | 70% | Watering as per FDMP | 6.97E-02 | 3.49E-02 | 5.23E-03 | 2.20E+03 | 1.10E+03 | 1.65E+02 | 2.20E+03 |
| Stockpile_Rock | Wind Erosion from Waste Rock Stockpile 1 | 60000 | 20% | 12000 | 6.9 | 7.33E-01 | 70% | Watering as per FDMP | 8.37E-02 | 4.18E-02 | 6.28E-03 | 2.64E+03 | 1.32E+03 | 1.98E+02 | 2.64E+03 |
| Stockpile_Rock_2 | Wind Erosion from Waste Rock Stockpile 2 | 54000 | 20% | 10800 | 6.9 | 7.33E-01 | 70% | Watering as per FDMP | 7.53E-02 | 3.77E-02 | 5.65E-03 | 2.38E+03 | 1.19E+03 | 1.78E+02 | 2.38E+03 |
| | | | | | | | | **Emission Estimating Technique[1]** | EF | EF | EF | | | | |
| | | | | | | | | **Emission Data Quality[2]** | ADQ | ADQ | ADQ | | | | |

## ***EO1 - Operation Activity - Material Handling Emissions***

The material handling emissions associated with loading/unloading to stockpiles in the Overburden Dump, Waste Rock Dump and topsoil stroage areas were estimated using the emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

**Sample Emission Calculations - ORE_MH:**

**PM Sample Calculation using the Drop Equation**

$EF_{PM}$ = k x 0.0016 x (Mean Wind Speed m/s ÷2.2)$^{1.3}$ ÷ (Material Moisture Content % ÷ 2)$^{1.4}$ (kg/tonne)

Particle Size Multiplier

$EF_{PM}$ = 0.74 x 0.0016 x (6.16452991452991 m/s ÷2.2)^1.3 ÷ (4% ÷ 2)^1.4 (kg/tonne)

$EF_{PM}$ = 1.71E-03 kg/tonne

$ER_{PM\text{-}annual}$ = Emission Factor (kg/tonne) x Loading Rate (tonne/day) x # of Transfers x 1000 g/kg ÷ 3600 s/hr

$ER_{PM\text{-}annual}$ = 0.0017 (kg/tonne) x 78 (tonne/hr) x 24 hr/day x 365 days/yr

$ER_{PM\text{-}kg/yrr}$ = 1.17E+03 kg/yr

| Contaminant | Aerodynamic Particle Size Multiplier (k) |
|---|---|
| PM | 0.74 |
| $PM_{10}$ | 0.35 |
| $PM_{2.5}$ | 0.053 |

**Reference:** Emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

| Overall average wind speed (m/s) | 6.16 |
|---|---|

**Reference**: Average of maximum hourly wind speeds from January to December from Canadian Climate Normals data for St.Lawrence, Nfld. Station, 1991-2020 Climate Normals and Averages.

**Emission Summary:**

| Source ID | Description | Contaminant | Emission Factor (kg/ tonne) | Emission Rate (kg/y) |
|---|---|---|---|---|
| ORE_MH | Above-Ground Ore Material Handling | PM | 1.71E-03 | 1.17E+03 |
| | | $PM_{10}$ | 8.10E-04 | 5.52E+02 |
| | | $PM_{2.5}$ | 1.23E-04 | 8.36E+01 |
| OP_WR | Waste Rock Material Handling | PM | 1.25E-03 | 4.33E+03 |
| | | $PM_{10}$ | 5.93E-04 | 2.05E+03 |
| | | $PM_{2.5}$ | 8.97E-05 | 3.10E+02 |
| ROM | Run-Of-Mine Ore Transfer to Stationary Grizzly | PM | 1.71E-03 | 1.17E+03 |
| | | $PM_{10}$ | 8.10E-04 | 5.52E+02 |
| | | $PM_{2.5}$ | 1.23E-04 | 8.36E+01 |
| FINE | Fine Ore Transfer from Storage Bin to Feed Conveyor for Dense Media Separation or Concentrate Regrind Circuit | PM | 1.71E-03 | 1.17E+03 |
| | | $PM_{10}$ | 8.10E-04 | 5.52E+02 |
| | | $PM_{2.5}$ | 1.23E-04 | 8.36E+01 |
| ONSPEC | On-spec Concentrate Stockpile Loading | PM | 6.49E-04 | 1.23E+02 |
| | | $PM_{10}$ | 3.07E-04 | 5.80E+01 |
| | | $PM_{2.5}$ | 4.65E-05 | 8.79E+00 |
| OFFSPEC | Off-spec Concentrate Stockpile Loading | PM | 6.49E-04 | 4.10E+01 |
| | | $PM_{10}$ | 3.07E-04 | 1.94E+01 |
| | | $PM_{2.5}$ | 4.65E-05 | 2.93E+00 |

***EO2 - Operation Activity - Blasting and Drilling Emissions***

Particulate matter (PM) emissions are estimated using the blasting emission factor for blasting in AP-42 Chapter 11.9 Western Coal Mining, Table 11.9-2, as shown in the formula below.

Drilling and blasting activities will occur within the proposed South Ridge and the existing Grebes Nest Pit (GNP) open pits during the Operations Phase of the Project to supply ore materials to sustain the current processing capacity of the AGS mill. The calculation for drilling and blasting emissions assumes the worst-case emissions scenario, occurring when 100% of ore is mined from the open pits.

The operating schedule for pit mining equipment and personnel will consist of two 10-hour shifts per day (totaling 20 hours of operation within a 24-hour period) for 350 days per year. Both ore and waste rock material will be blasted. Contaminants will be released from the open pits. Source parameters, such as the number of blasts per day and holes drilled per day, are summarized below. To estimate a 1-hour averaged emission rate for drilling, it was assumed that holes will be drilled throughout the production day (i.e., 80 holes divided by 20 operating hours per day = 4 holes/hour). To estimate a 1-hour averaged emission rate for blasting, a rate of 1 blast per hour was conservatively assumed.

**Emission Data:**

| **Ore Blasting** | **1-hr** | **24-hr** | **Annual** |
|---|---|---|---|
| **Number of Blasts:** | 1 | 1 | - |
| **Bulk Emulsion: Usage per Blast (mg)** | - | 0.7 | - |
| **Operating Hours per Day** | 20 | | |
| **Operating Days per Year** | 350 | | |
| **Blasting Face Area/Blast ($m^2$/blast):** | 60.0 | | |
| **CO emis factor (kg/mg)** | 2.3 | | |
| **NOX emis factor (kg/mg)** | 0.2 | | |
| **Waste Rock Blasting** | | | |
| **Number of Blasts:** | 1 | 1 | - |
| **Bulk Emulsion: Usage per Blast (mg)** | - | 4.3 | - |
| **Operating Hours per Day** | 20 | | |
| **Operating Days per Year** | 350 | | |
| **Blasting Face Area/Blast ($m^2$/blast):** | 600.0 | | |

| **Drilling** | |
|---|---|
| **Number of Holles Drilled Per Day** | 80 |
| **Number of Holles Drilled Per Hour** | 4 |
| **Drilling control** | 0.7 |
| **Operating Hours per Day** | 20 |
| **Operating Days per Year** | 350 |

**Sample Emission Calculations - PIT_DB:**

**PM Sample Calculation for PIT_DB**

$ER_{PM} = 0.00022 \times (\text{Area per Blast})^{1.5}$

$ER_{PM} = 0.00022 \times (\text{Area per Blast})^{1.5}$ (m2/blast) x 1000 g/kg x Number of Blasts per day x Particulate Size Scaling Ratio ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM\text{-}Annual}$ = 0.00022 x 60^1.5 (m2) x 1000 g/kg x 1 blasts/day x 350 days x 365 days/yr x 1 ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM\text{-}Annual}$ = 1.13E-03 g/s

$ER_{PM\text{-}kg/yr}$ = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

$ER_{PM\text{-}kg/yr}$ = 3.58E+01 kg/yr

**Emission Summary:**

**Blasting**

| Source ID | Description | Contaminant | Emission Factor (kg/hr) | Emission Rate (kg/y) |
|---|---|---|---|---|
| **Ore Blasting** | | | | |
| PIT_DB | Open Pit Drilling and Blasting | PM | 1.02E-01 | 3.58E+01 |
| PIT_DB | Open Pit Drilling and Blasting | CO | - | 5.64E+02 |
| PIT_DB | Open Pit Drilling and Blasting | $NO_X$ | - | 4.90E+01 |
| **Waste Rock Blasting** | | | | |
| PIT_DB | Open Pit Drilling and Blasting | PM | 3.23E+00 | 1.13E+03 |
| PIT_DB | Open Pit Drilling and Blasting | CO | - | 3.46E+03 |
| PIT_DB | Open Pit Drilling and Blasting | $NO_X$ | - | 3.01E+02 |

**References:**

1) PM Blasting Emission Factors and Scaling Ratios: AP-42 Chapter 11.9 Western Surface Coal Mining, Table 11.9-2, 1998.

**Drilling**

| Source ID | Description | Contaminant | Emission Factor (kg/ hole) | Emission Rate (kg/y) |
|---|---|---|---|---|
| PIT_DB | Open Pit Drilling and Blasting | PM | 0.59 | 4.96E+03 |

**Total Emissions by Source**

| Source ID | Description | Contaminant | CAS | Emission Rate (kg/y) |
|---|---|---|---|---|
| PIT_DB | Open Pit Drilling and Blasting | PM | N/A | 6.12E+03 |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{10}$ * | N/A | 3.06E+03 |
| PIT_DB | Open Pit Drilling and Blasting | $PM_{2.5}$ * | N/A | 1.53E+03 |
| PIT_DB | Open Pit Drilling and Blasting | CO | 630-08-0 | 4.03E+03 |
| PIT_DB | Open Pit Drilling and Blasting | $NO_X$ | 10102-44-0 | 3.50E+02 |

**Notes:**

* There are no Efs for PM10 and PM2.5 from drilling and blasting, therefore PM10 was assumed to be 50% of PM and PM2.5 was assumed to be 50% of PM10.

***EQ3 - Operation Phase - Open Pit Mining Equipment***

The calculation for emissions from diesel-fired mining equipment assumes the worst-case scenario, where 100% of mining occurs in open pits (underground mining will not commence until the third year of operation). Equipment counts, engine sizes, and fuel usage were determined based on the projected open pit mining fleet.

Crankcase emission standards from the U.S. EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition NR-009d (July 2010) (EPA Report NR-009d) were used to calculate exhaust emissions from the diesel-fired equipment that will operate during open pit mining. It was assumed that all on-site vehicles conform to at least Tier 3 emission standards.

| | |
|---|---|
| **Molar Mass SO2 (g/mol)** | 64 |
| **Molar Mass of Sulphur** | 32 |
| **S Content in Diesel Fuel (mg/kg)** | 15 |
| **Diesel Fuel Density (kg/L)** | 0.8430 |
| **EF SO2=** | 0.0253 |

**Summary of Construction Phase Vehicles**

| Equipment | Number of Units | Fuel per Vehicle (L/hr) | Engine Rating [hp] | Engine Rating [kW] | U.S. EPA Emission Standard | Daily Operating Hours per Unit | Days of Operation in a Year | Load Factor | Brake-Specific Fuel Consumption [lb/hp-hr] | CO [g/kW-hr] | NOx [g/kW-hr] | PM [g/kW-hr] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fusion Welder (Liner) | 1 | 0.69 | 24.8 | 18 | Tier_3 | 20 | 60 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Fusion Welder (HDPE) | 1 | 0.69 | 24.8 | 18 | Tier_3 | 20 | 60 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Mulcher | 1 | 21.1 | 173 | 129 | Tier_3 | 20 | 120 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Powerline Truck | 1 | 0.24 | 335 | 250 | Tier_3 | 20 | 60 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Piping/ Millwright Truck | 1 | 1.56 | 401 | 299 | Tier_3 | 20 | 30 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Hydraulic Excavator ore/waste CAT 390FL | 2 | 56 | 524 | 391 | Tier_3 | 20 | 210 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Hydraulic Excavator ovb/ore CAT 374FL | 1 | 62 | 472 | 352 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| CAT 777 Off-highway trucks ore/waste | 3.2 | 63.4 | 953 | 711 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 6.4 | 0.2 |
| Kenworth C500 ore haulage | 1 | 39.5 | 600 | 447 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Drill rig ore AC DTH | 1 | 22 | 225 | 168 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Drill rig waste AC DTH | 1 | 65 | 563 | 420 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Wheel Loader CAT 980K | 1 | 25 | 406 | 303 | Tier_3 | 20 | 240 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Wheel Dozer CAT 844H | 1 | 56 | 628 | 468 | Tier_3 | 20 | 165 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Track Dozer CAT D9 | 1 | 46 | 436 | 325 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Motor Grader CAT 14M | 1 | 18 | 259 | 193 | Tier_3 | 20 | 182.5 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Water/Sander Truck (oil highway truck) | 1 | 57 | 361 | 269 | Tier_3 | 20 | 90 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Hydraulic Excavator CAT 320E L | 2 | 18 | 153 | 114 | Tier_3 | 20 | 210 | 1 | 0.367 | 5 | 4 | 0.3 |
| Tow Truck CAT | 3 | 56 | 489 | 365 | Tier_3 | 20 | 240 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Tow Low Boy LPM (120-48-20) | 1 | 57 | 489 | 365 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Fuel/Lube Truck CT660 | 1 | 28.2 | 201 | 150 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Service Truck Kalmar DCD200-12lb | 1 | 50 | 361 | 269 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Bulk ANFO Explosives Truck | 1 | 28.2 | 489 | 365 | Tier_3 | 20 | 182.5 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Mini Bus Ford E Series | 1 | 10 | 489 | 365 | Tier_3 | 20 | 180 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Pick Up Truck 4x4 crew cab Chevrolet | 1 | 6 | 489 | 365 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Light Tower | 2 | 2.9 | 94 | 70 | Tier_3 | 20 | 365 | 1 | 0.408 | 5 | 4.7 | 0.4 |
| Dwatering Pump | 3 | 0 | 500 | 373 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Grade Control | 1 | 65.8 | 535 | 399 | Tier_3 | 20 | 150 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| Skid Loader | 1 | 1.33 | 74.3 | 55 | Tier_3 | 20 | 365 | 1 | 0.367 | 5 | 4.7 | 0.4 |
| ROM Loader | 1 | 5.75 | 406 | 303 | Tier_3 | 20 | 330 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| CAT ROM Dozer (844H) | 1 | 10 | 732 | 546 | Tier_3 | 20 | 330 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| 3/4 Ton Pickup Truck | 1 | 1.56 | 450 | 336 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |
| 1/2 Ton Pickup Truck | 1 | 1.56 | 390 | 291 | Tier_3 | 20 | 365 | 1 | 0.367 | 3.5 | 4 | 0.2 |

**Notes:**

Table 10 of the U.S. EPA's Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling - Report No. NR-005d was used to assign engine cycle load factors to the diesel mine equipment based on the type of equipment operated. Emission factors for CO, NOx, and PM were obtained from Table A4: Zero-Hour Steady State Emission Factors for Nonroad CI Engines, which are based on the horsepower and EPA emission standard tier rating of each diesel engine.

The operating time for pit mining equipment and personnel will be two 10-hour shifts per day (20 hours per day). Days per year based on Summary of South Ridge Equipments_Air Quality spreadsheet

| Equipment Type | Representative Cycle (2) | Load Factor Assignment | Cycle Load Factor | Notes |
|---|---|---|---|---|
| Fusion Welder (Liner) | NA | NA | 1 | - |
| Fusion Welder (HDPE) | NA | NA | 1 | - |
| Mulcher | NA | NA | 1 | - |
| Powerline Truck | NA | NA | 1 | - |
| Piping/ Millwright Truck | NA | NA | 1 | - |
| Hydraulic Excavator ore/waste CAT 390FL | Excavator | Hi LF | 1 | — |
| Hydraulic Excavator ovb/ore CAT 374FL | Excavator | Hi LF | 1 | — |
| CAT 777 Off-highway trucks ore/waste | Crawler | Hi LF | 1 | -3 |
| Kenworth C500 ore haulage | Crawler | Hi LF | 1 | -3 |
| Drill rig ore AC DTH | None | Avg 7-cycle | 1 | — |
| Drill rig waste AC DTH | None | Avg 7-cycle | 1 | — |
| Wheel Loader CAT 980K | Rubber Tired Loader | Hi LF | 1 | — |
| Wheel Dozer CAT 844H | Crawler | Hi LF | 1 | — |
| Track Dozer CAT D9 | Crawler | Hi LF | 1 | — |
| Motor Grader CAT 14M | Crawler | Hi LF | 1 | — |
| Water/Sander Truck (oil highway truck) | Crawler | LoLF | 1 | — |
| Hydraulic Excavator CAT 320E L | Excavator | Hi LF | 1 | — |
| Tow Truck CAT | Crawler | Hi LF | 1 | — |
| Tow Low Boy LPM (120-48-20) | None | Avg 7-cycle | 1 | — |
| Fuel/Lube Truck CT660 | Crawler | Hi LF | 1 | — |
| Service Truck Kalmar DCD200-12lb | Crawler | Hi LF | 1 | -3 |
| Bulk ANFO Explosives Truck | Crawler | Hi LF | 1 | — |
| Mini Bus Ford E Series | None | Avg 7-cycle | 1 | — |
| Pick Up Truck 4x4 crew cab Chevrolet | None | Avg 7-cycle | 1 | — |
| Light Tower | None | Avg 7-cycle | 1 | -3 |
| Dwatering Pump | None | Avg 7-cycle | 1 | -3 |
| Grade Control | NA | NA | 1 | - |
| Skid Loader | NA | NA | 1 | - |
| ROM Loader | NA | NA | 1 | - |
| CAT ROM Dozer (844H) | NA | NA | 1 | - |
| 3/4 Ton Pickup Truck | NA | NA | 1 | - |
| 1/2 Ton Pickup Truck | NA | NA | 1 | - |

**Sample Emission Calculations - PIT_EQUIP:**

**PM Sample Calculation for Hydraulic Excavator ore/waste CAT 390FL:**

$ER_{PM}$ = Number of Units x Engine Rating (hp) x Load Factor x Emission Factor (g/hp-hr) ÷ 3600 s/hr

$ER_{PM\text{-}1hr}$ = 2 x 524 hp x 1 x 0.2 ÷ 3600 s/hr

$ER_{PM\text{-}1hr}$ = 4.34E-02 g/s

$ER_{CO\text{-}annual}$ = Sum of all equipment type PM 1 hr emission rates (g/s) x Daily Operating Hours per Unit x Days of Operation in a Year x 24 hr/day x 365 days/yr

$ER_{CO\text{-}kg/yr}$ = $ER_{CO\text{-}annual}$ (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

1.37E+03 kg/yr

**Emission Summary:**

| Equipment Type | 1 hr Emission Rate (g/s) | | | |
|---|---|---|---|---|
| | CO | NOX | PM | SO2 |
| Fusion Welder (Liner) | 1.80E-02 | 2.05E-02 | 1.03E-03 | 4.88E-06 |
| Fusion Welder (HDPE) | 1.80E-02 | 2.05E-02 | 1.03E-03 | 4.88E-06 |
| Mulcher | 1.25E-01 | 1.43E-01 | 7.17E-03 | 1.48E-04 |
| Powerline Truck | 2.43E-01 | 2.78E-01 | 1.39E-02 | 1.71E-06 |
| Piping/ Millwright Truck | 2.91E-01 | 3.32E-01 | 1.66E-02 | 1.10E-05 |
| Hydraulic Excavator ore/waste CAT 390FL | 7.60E-01 | 8.68E-01 | 4.34E-02 | 7.87E-04 |
| Hydraulic Excavator ovb/ore CAT 374FL | 3.42E-01 | 3.91E-01 | 1.96E-02 | 4.36E-04 |
| Rigid Haul Truck ore/waste CAT 773G | 2.21E+00 | 4.04E+00 | 1.26E-01 | 1.43E-03 |
| Articulated Haul Truck ovb/ore CAT 740B | 4.35E-01 | 4.97E-01 | 2.49E-02 | 2.77E-04 |
| Drill rig ore AC DTH | 1.63E-01 | 1.86E-01 | 9.32E-03 | 1.55E-04 |
| Drill rig waste AC DTH | 4.08E-01 | 4.66E-01 | 2.33E-02 | 4.57E-04 |
| Wheel Loader CAT 980K | 2.94E-01 | 3.36E-01 | 1.68E-02 | 1.76E-04 |
| Wheel Dozer CAT 844H | 4.55E-01 | 5.20E-01 | 2.60E-02 | 3.93E-04 |
| Track Dozer CAT D9 | 3.16E-01 | 3.61E-01 | 1.81E-02 | 3.23E-04 |
| Motor Grader CAT 14M | 1.88E-01 | 2.15E-01 | 1.07E-02 | 1.26E-04 |
| Water/Sander Truck (oil highway truck) | 2.62E-01 | 2.99E-01 | 1.50E-02 | 4.00E-04 |
| Hydraulic Excavator CAT 320E L | 3.17E-01 | 2.54E-01 | 1.90E-02 | 2.53E-04 |
| Tow Truck CAT | 1.06E+00 | 1.22E+00 | 6.08E-02 | 1.18E-03 |
| Tow Low Boy LPM (120-48-20) | 3.55E-01 | 4.05E-01 | 2.03E-02 | 4.00E-04 |
| Fuel/Lube Truck CT660 | 1.46E-01 | 1.67E-01 | 8.33E-03 | 1.98E-04 |
| Service Truck Kalmar DCD200-12lb | 2.62E-01 | 2.99E-01 | 1.50E-02 | 3.51E-04 |
| Bulk ANFO Explosives Truck | 3.55E-01 | 4.05E-01 | 2.03E-02 | 1.98E-04 |
| Mini Bus Ford E Series | 3.55E-01 | 4.05E-01 | 2.03E-02 | 7.03E-05 |
| Pick Up Truck 4x4 crew cab Chevrolet | 3.55E-01 | 4.05E-01 | 2.03E-02 | 4.22E-05 |
| Light Tower | 1.95E-01 | 1.83E-01 | 1.56E-02 | 4.07E-05 |
| Dewatering Pump | 1.09E+00 | 1.24E+00 | 6.21E-02 | 0.00E+00 |
| Grade Control | 3.88E-01 | 4.43E-01 | 2.22E-02 | 4.62E-04 |
| Skid Loader | 7.70E-02 | 7.23E-02 | 6.16E-03 | 9.34E-06 |
| ROM Loader | 2.94E-01 | 3.36E-01 | 1.68E-02 | 4.04E-05 |
| CAT ROM Dozer (844H) | 5.31E-01 | 6.07E-01 | 3.03E-02 | 7.03E-05 |
| 3/4 Ton Pickup Truck | 3.26E-01 | 3.73E-01 | 1.86E-02 | 1.10E-05 |
| 1/2 Ton Pickup Truck | 2.83E-01 | 3.23E-01 | 1.62E-02 | 1.10E-05 |

| Source ID | Description | Contaminant | CAS | Emission Rate (g/s) | | | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|
| | | | | 1 hr | 24 hr | Annual | |
| PIT_EQUIP | Open Pit Mining Equipment | PM | N/A | 7.45E-01 | 6.21E-01 | 4.92E-01 | 1.55E+04 |
| | | $PM_{10}$ | N/A | 7.45E-01 | 6.21E-01 | 4.92E-01 | 1.55E+04 |
| | | $PM_{2.5}$ | N/A | 7.23E-01 | 4.35E-02 | 4.77E-01 | 1.50E+04 |
| | | CO | 630-08-0 | 1.29E+01 | 1.08E+01 | 8.50E+00 | 2.68E+05 |
| | | $NO_x$ | 10102-44-0 | 1.61E+01 | 1.34E+01 | 1.09E+01 | 3.43E+05 |
| | | $SO_2$ | 7746-09-55 | 8.46E-03 | 7.05E-03 | 5.37E-03 | 1.69E+02 |

**Notes:**

[1]Emission standards were not provided for PM10 and PM2.5; therefore, it was assumed that all PM emissions consist of PM10, and PM2.5 emissions are 97% of PM10 emissions.

***EO4 - Operation Activity - Individual Diesel Generator***

Emission factors used were take from US EPA AP-42, Section 3.4, Table 3.4-1 for engines over 600 HP; Section 3.2, Table 3.2-1 for engines below 600 HP; and US EPA Emission Standards.

Emission factors were derived from the U.S. EPA AP-42 Chapter 3.4 "Large Stationary Diesel and All Stationary Dual-Fuel Engines," Table 3.4-1, section dated 10/96. An assumed sulfur content of 15 ppm, which is the maximum allowable sulfur content in diesel per the

| Equipment | Number of Units | Power Rating (kW) | Engine Power Rating per Unit [hp] | U.S. EPA Emission Standard | Daily Operating Hours per Day | Operating Days per Year | Representative Cycle [1] | Load Factor Assignment [3] | Load Factor [3] | Brake-Specific Fuel Consumption | CO | $NO_X$ | PM | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr | lb/hp-hr |
| MILL_EPG | 1 | 250.00 | 335 | Tier_3 | 1 | 50 | None [2] | Avg 7-cycle | 0.43 | 0.367 | 0.00668 | 0.031 | 2.20E-03 | 2.20E-03 | 2.13E-03 | 5.57E-05 |

**Notes:**

1) Reference: NR-005d, Table 10: Page 15, Table 10. Compression-Ignition (CI) Load Factor Assignments by Equipment Type

2) Note: Load Factor of None = steady state

3) Reference: NR-005d, Table 9: Page 14, Table 9. Compression-Ignition Load Factors

| | |
|---|---|
| **Molar Mass SO2 (g/mol)** | 64 |
| **Molar Mass of Sulphur** | 32 |
| **S Content in Diesel Fuel (mg/kg)** | 15 |
| **Diesel Fuel Density (kg/L)** | 0.843 |
| **Fuel Consumption (MILL_EPG) L/hr** | 2.85E+01 |

**Reference**: 3(1)(e) Sulphur in Diesel Fuel Regulations (justice.gc.ca) (conservatively used a large diesel engine's limits)

**Sample Emission Calculations for NOx from the Diesel-fired engine (MILL_EPG):**

$ER_{NOx}$ = Number of Units x Max Input Rating (hp) x Emission Factor (g/kW-hr) x 0.7457 kW/hp ÷ 3600 s/hr

$ER_{NOx}$ = 1 x 335 hp x 14.074 g/hp-hr x 1 hour operating/day x 1 day/24 hr ÷ 365 days/yr ÷ 3600 s/hr

$ER_{NOx\text{-}Annual}$ = 7.48E-03 g/s

$ER_{NOx\text{-}kg/yr}$ = $ER_{NOx\text{-}annual}$ (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

$ER_{NOx\text{-}kg/yr}$ = 2.36E+02 kg/yr

**Emission Summary:**

| Source ID | Description | Contaminant | CAS | Emission Factor Value | Emission Factor Units | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|
| MILL_EPG | Emergency Diesel Generator at Mill | PM | N/A | 1.00 | g/hp-hr | 1.67E+01 |
| | | $PM_{10}$ | N/A | 1.00 | g/hp-hr | 1.67E+01 |
| | | $PM_{2.5}$ | N/A | 0.967 | g/hp-hr | 1.62E+01 |
| | | CO | 630-08-0 | 3.03 | g/hp-hr | 5.08E+01 |
| | | $NO_X$ | 10102-44-0 | 14.07 | g/hp-hr | 2.36E+02 |
| | | $SO_2$ | 7746-09-5 | 2.53E-02 | g/L | 3.60E-02 |

**Notes:**

1- All particulate matter (PM) is assumed to be PM10. PM2.5 is estimated to constitute 97% of PM10, based on the U.S. EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition NR-009d (July 2010) (EPA Report NR-009d).

2- "Sulphur in Diesel Fuel Regulations SOR/2002-254," dated June 2012 and promulgated under CEPA (CEPA 1999). The data is of "A-Average" quality for NOx, PM, and SO2, and "Average" quality for CO. The emission factor for oxides of sulfur was assumed to be the emission factor for sulfur di

## ***EO5 - Operation Activity - Crushing Circuit Dust Collector***

A baghouse dust collection system will serve the crushing circuit and collect dust from: the primary, secondary and tertiary crushers; screening; transfer points; and ore bin loading. The emission factor for PM was obtained from the Air and Waste Management Association's "Air Pollution Engineering Manual, 2nd ed.", Chapter 3: Control of Particulate Matter, section on fabric filters (baghouses). It is a conservative factor of "Above Average" quality.

**Sample Emission Calculations - DC:**

**PM Sample Calculation using the Drop Equation**

$ER_{PM}$ = Exhaust Flow Rate (m3/hr) x Emission Factor (mg/m3) ÷ 1000 mg/g ÷ 3600 s/hr

$ER_{PM}$ = 24000 x (23 mg/m3 ÷ 1000 (mg/g) x 350 days operating/365 days ÷ 3600 s/hr

$ER_{PM\text{-}annual}$ = 1.47E-01 g/s

$ER_{PM\text{-}kg/yr}$ = $ER_{PM\text{-}annual}$ (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

$ER_{PM\text{-}kg/yr}$ = 4.64E+03 kg/yr

| **Exhaust Flow Rate ($m^3$/hr)** | 24,000 |
|---|---|

**Emission Summary:**

| Source ID | Description | Contaminant | Emission Factor ($mg/m^3$) | Emission Rate (kg/y) |
|---|---|---|---|---|
| DC | Ore Crushing Circuit Dust Collector | PM | 2.30E+01 | 4.64E+03 |
| | | $PM_{10}$ | 1.15E+01 | 2.32E+03 |
| | | $PM_{2.5}$ | 5.75E+00 | 1.16E+03 |

**Notes:**

It was assumed that PM10 is 50% of PM and PM2.5 is 50% of PM10.

***EO6 - Sink Production Sulphide Flotation and Tailings Pond***

After the ore is crushed in the crushing circuit, it will be screened and washed, with undersize particles being fed to a dense media separator. Hydrocyclones will de-slime and further separate materials by particle size, with oversize particles undergoing additional grinding in a ball mill. The ball mill hydrocyclones will separate the re-ground products, with undersize material proceeding to the sulphides/slimes flotation circuit to remove sulphides from the ore before fluorspar concentration. Material will flow through a series of flotation cells, utilizing a 10% potassium amyl xanthate solution as the flotation collector. Tailings pulp from this sulphides/slimes flotation circuit will be pumped to a thickening tank to increase slurry density before entering the conditioning circuit, where fluorspar will be concentrated.

Potassium amyl xanthate decomposes into carbon disulphide and pentanol in air at ambient temperatures. The following method was referenced from the Australian National Pollutant Inventory "Emission Estimation Technique Manual for Nickel Concentrating, Smelting and Refining," dated June 1999.

The pH level in the floatation cells is maintained above 7 to prevent the formation of HCN. The tailings leaving the mill will be alkaline, estimated at pH 8.2 from testwork.

| Equipment | PAX Solution Usage Rate | Total flotation slurry feed rate | Slurry density | Mass feed rate of slurry to flotation | PAX Solution Usage Rate | PAX Usage Rate* |
|---|---|---|---|---|---|---|
| | g/tonne | m3/hr | kg/m3 | tonnes/hr | g/hr | g/hr |
| SULPH | 50 | 150.78 | 1270 | 191.49 | 9574.53 | 957.45 |

*Solution is 10% PAX

| | | |
|---|---|---|
| **Molecular Weight of Potassium Amyl Xanthhate (MWPAX)** | 202.4 | g/mol |
| **Molecular Weight of Carbon Disulphide (MWCS2)** | 76 | g/mol |
| **Molecular Weight of Pentanol** | 88.2 | g/mol |
| **Amount of CS2 produced per mole of PAX** | 0.5 | alkali conditions |
| **Amount of Pentanol produced per mole of PAX** | 0.5 | alkali conditions |

**Sample Calculation under Alkali conditions (>7) for SULPH:**

$ER_{CS2}$ = 0.5 x PAX Solution Usage Rate (g/tonnes) x Mass feed rate of slurry to flotation (tonnes/hr) x MWCS2 (g/mol)/MWxanthate (g/mol) ÷ 3600 s/hr

$ER_{CS2\text{-}annual}$ = 0.5 x 957.453 g x 76 g/mol x 350 operating days ÷ 365 days/yr ÷202.4 g/mol ÷ 3600 s/hr

$ER_{CS2\text{-}annual}$ = 4.79E-02 g/s

$ER_{CS2\text{-}kg/yr}$ = ERCS2-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

1.51E+03 kg/yr

**Emission Summary:**

| Source ID | Description | Contaminant | CAS Number | Emission Rate (kg/y) |
|---|---|---|---|---|
| SULPH | Sink Product Sulphide Flotation | Carbon Disulphide | 75-15-0 | 1.51E+03 |
| | | Pentanol | 71-41-0 | 1.75E+03 |
| TAILS | Tailings Pond | Carbon Disulphide | 75-15-0 | 1.51E+01 |
| | | Pentanol | 71-41-0 | 1.75E+01 |

**Notes:**

Emissions of carbon disukphide and pentanol from xanthale decompisition in the tailings pond were estimated as 1% of the rates of emissions frfom the flotation process, under the assumption from Australian NPI that the discharge flowrate of xanthates to tailings will be 1% of the xanthate usage rate in flotation

## ***EO7 - Operation Activity - Fluorspar Concentrate or Aggregate from DMS Float Process Haul Truck Loading***

Fluorspar will be concentrated using a froth flotation process. The concentrate will undergo thickening and filtration to remove water, producing a solid cake that will be conveyed to a heated building where on-spec and off-spec concentrates will be stored in stockpiles before being transported off-site. The building will have the capacity to store approximately 15,000 tonnes of on-spec concentrate and 5,000 tonnes of off-spec concentrate. Concentrate will be loaded from the stockpiles onto haul trucks for transport to the marine terminal, from where the product will be shipped to market. Trucks will be loaded with concentrate for only 20 days per year. Aggregate generated from the DMS float process will also be loaded into haul trucks for transport to the marine terminal for an additional 20 days per year.

Emissions from material loading onto haul trucks were estimated using the emission factors from Section 13.2.4 "Aggregate Handling and Storage Piles" of the AP 42 document (revised November 2006) using the emission factor (EF) equation as shown below.

**Sample Emission Calculations - TL:**

**PM Sample Calculation using the Drop Equation**

$EF_{PM}$ = k x 0.0016 x (Mean Wind Speed m/s ÷2.2)$^{1.3}$ ÷ (Material Moisture Content % ÷ 2)$^{1.4}$ (kg/tonne)

Particle Size Multiplier

$EF_{PM}$ = 0.74 x 0.0016 x (6.16452991452991 m/s ÷2.2)^1.3 ÷ (8 % ÷ 2)^1.4 (kg/tonne)

$EF_{PM}$ = 6.49E-04 kg/tonne

$ER_{PM\text{-}kg/yrr}$ = Emission Factor (kg/tonne) x Throughput (tonnes/yr)

$ER_{PM\text{-}kg/yrr}$ = 0.0006 (kg/tonne) x 208658 (tonnes/yr)

$ER_{PM\text{-}kg/yrr}$ = 1.35E+02 kg/yr

| Contaminant | Aerodynamic Particle Size Multiplier (k) |
|---|---|
| PM | 0.74 |
| $PM_{10}$ | 0.35 |
| $PM_{2.5}$ | 0.053 |

**Reference**: Emission factors from U.S. EPA, AP-42, Section 13.2.4 Aggregate Handling and Storage Pile, 2006, Equation 1).

| | |
|---|---|
| **Overall average wind speed (m/s) =** | 6.16 |

**Reference:** Average of maximum hourly wind speeds from January to December from Canadian Climate Normals data for St.Lawrence, Nfld. Station, 1991-2020 Climate Normals and Averages.

**Emission Summary:**

| Source ID | Description | Contaminant | Emission Factor (kg/tonne) | Emission Rate (kg/y) |
|---|---|---|---|---|
| TL | Haul Truck Loading for Transport to Marine Terminal | PM | 6.49E-04 | 1.35E+02 |
| | | $PM_{10}$ | 3.07E-04 | 6.40E+01 |
| | | $PM_{2.5}$ | 4.65E-05 | 9.70E+00 |

***EO8- Operation Phase - Fugitive Dust Emissions from Roadways***

During the operation phase of the Project, fugitive dust emissions will result from haulage on on-site unpaved roadways as ore is transported from the pits to the mill, waste rock and overburden are hauled from the mines to the dumps, and fluorspar concentrate and aggregate from DMS flotation are transported from the mill site to the marine terminal. These emissions are influenced by the parameters listed in the table below. The lengths of the haul routes were estimated based on the site layout, and the number of truck trips per day for each route was based on ore production rates or product transport rates, along with the carrying capacities of the trucks.

Annual averaged emissions would experience some natural mitigation due to the occurrence of snowy or rainy days throughout the year. Based on Canadian Climate Normals data for the St. Lawrence station (covering the period from 1991-2020), the region experiences an average of 169 days per year without snow cover or rain. Therefore, the calculation of annual emissions of fugitive dust from UPR1, UPR2, UPR3, and UPR4 assumes these emissions will occur over 169 days annually.

Natural mitigation was not accounted for in emissions from UPR5, as activity on this roadway occurs infrequently throughout the year (with the concentrate being transported for only 20 days per year and the aggregate for another 20 days per year). Hence, it was conservatively assumed that there will be no snow cover or precipitation on any of the 40 total days when concentrate and aggregate are hauled on UPR5.

| Contaminant | k (lb/VMT) | a | b |
|---|---|---|---|
| PM | 4.9 | 0.7 | 0.45 |
| $PM_{10}$ | 1.5 | 0.9 | 0.45 |
| $PM_{2.5}$ | 0.15 | 0.9 | 0.45 |

**Reference:** Emissions from vehicles travelling on unpaved roads were calculated using emission factors in US EPA AP-42, Section 13.2.2, Unpaved Roads (November 2006). Emission factors for vehicles travelling on unpaved roads, are calculated using equation 1a in Section 13.2.2, where k, a, and b are empirical constants obtained from Table 13.2.2-2.

**Sample Emission Calculations - UPR1:**

**PM (24-hr) Sample Calculation for UPR1**

$EF_{PM}$ = k (lb/VMT) x (s (%)/12)$^a$ x (W (ton)/3)$^b$ x 281.9 (g/VKT)/(lb/VMT)

s - silt content (%)

W - Average truck weight (ton)

$EF_{PM}$ = 4.9 lb/VMT x (8.3%/12)^0.7 x (141 ton/3)^0.45 x 281.9 (g/VKT)/(lb/VMT)

$EF_{PM}$ = 21.4 g/VKT

Daily VKT = Total # of trips on segment per day x One way distance (km) x 2 (for roundtrip)

Daily VKT = 24.9 trips per day x 4.8 km x 2

Daily VKT = 239.1 VKT/day

$ER_{PM\text{-}24hr}$ = Daily VKT (VKT/day) x Emission Factor (g/VKT) x (100% - Control Efficiency (%)) * Transportation Hours per Day ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM\text{-}24hr}$ = 239.1 VKT/day x 6035.57 g/VKT x (100 - 75)/100 ÷ 24hr/day ÷ 3600 s/hr

$ER_{PM\text{-}24hr}$ = 3.48E+00 g/s

$ER_{PM\text{-}annual}$ = ERPM-24hr (g/s) x 365 days operating x 1 yr/365 days ÷ 20 days/yr x 24 hr/day

$ER_{PM\text{-}annual}$ = 4.18E+00 g/s

$ER_{PM\text{-}kg/yr}$ = ERPM-annual (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

$ER_{PM\text{-}annual}$ = 1.32E+05 kg/yr

**Emission Summary:**

| Source ID | Description | Contaminant | Daily Tonnage | Daily Full Haul Trucks | Capacity of One Truck | Empty Industrial Vehicle | Full Industrial Vehicle Weight | Average Truck Weight | Daily VKT | Length | Control | EF (lb/VMT) | EF (g/VKT) | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | tonnes/day | trips/day | tonnes/truck | tonnes | tonnes | tons | VKT/day | km | % | | | |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | PM | 1868.190097 | 24.9 | 75 | 90.72 | 165.718 | 141.04 | 239.1 | 4.8 | 75 | 2.14E+01 | 6.04E+03 | 1.32E+05 |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | $PM_{10}$ | 1868.190097 | 24.9 | 75 | 90.72 | 165.718 | 141.04 | 239.1 | 4.8 | 75 | 6.09E+00 | 1.72E+03 | 3.75E+04 |
| UPR1 | Unpaved Road from South Ridge to ROM Pad | $PM_{2.5}$ | 1868.190097 | 24.9 | 75 | 90.72 | 165.718 | 141.04 | 239.1 | 4.8 | 75 | 6.09E-01 | 1.72E+02 | 3.75E+03 |
| UPR2 | Unpaved Road from South Ridge to | PM | 1931.05138 | 21.5 | 90 | 64.67 | 154.67 | 120.64 | 10.5 | 0.244 | 75 | 2.00E+01 | 5.63E+03 | 5.38E+03 |
| UPR2 | Unpaved Road from South Ridge to | $PM_{10}$ | 1931.05138 | 21.5 | 90 | 64.67 | 154.67 | 120.64 | 10.5 | 0.244 | 75 | 5.67E+00 | 1.60E+03 | 1.53E+03 |
| UPR2 | Unpaved Road from South Ridge to | $PM_{2.5}$ | 1931.05138 | 21.5 | 90 | 64.67 | 154.67 | 120.64 | 10.5 | 0.244 | 75 | 5.67E-01 | 1.60E+02 | 1.53E+02 |
| UPR3 | Unpaved Road from South Ridge to Waste | PM | 9477.639517 | 105.3 | 90 | 51.73 | 141.73 | 106.40 | 71.0 | 0.337 | 75 | 1.89E+01 | 5.32E+03 | 3.44E+04 |
| UPR3 | Unpaved Road from South Ridge to Waste | $PM_{10}$ | 9477.639517 | 105.3 | 90 | 51.73 | 141.73 | 106.40 | 71.0 | 0.337 | 75 | 5.36E+00 | 1.51E+03 | 9.79E+03 |
| UPR3 | Unpaved Road from South Ridge to Waste | $PM_{2.5}$ | 9477.639517 | 105.3 | 90 | 51.73 | 141.73 | 106.40 | 71.0 | 0.337 | 75 | 5.36E-01 | 1.51E+02 | 9.79E+02 |
| UPR4 | Unpaved Road from AGS to Marine Terminal | PM | 572 | 16.3 | 35 | 15 | 50 | 35.75 | 1453.3 | 5.45 | 75 | 1.15E+01 | 3.25E+03 | 4.32E+05 |
| UPR4 | Unpaved Road from AGS to Marine Terminal | $PM_{10}$ | 572 | 16.3 | 35 | 15 | 50 | 35.75 | 1453.3 | 5.45 | 75 | 3.28E+00 | 9.25E+02 | 1.23E+05 |
| UPR4 | Unpaved Road from AGS to Marine Terminal | $PM_{2.5}$ | 572 | 16.3 | 35 | 15 | 50 | 35.75 | 1453.3 | 5.45 | 75 | 3.28E-01 | 9.25E+01 | 1.23E+04 |

**Notes:**

CFI will implement regular and adequate maintenance of unpaved roads and apply water or other dust suppressants as needed to reduce dust emissions; therefore a control factor of 75% reduction was applied as per Table 4 of the Australian National Pollutant Inventory document "Emission Estimation Technique for Mining" version 3.1 dated January 2012, states that watering more than 2 L/m2 can achieve a 75% emission reduction.

## ***E09 - Operation Activity - Loading at Marine Terminal***

At the marine terminal, fluorspar concentrate or aggregate from the DMS float process will be transported from the storage facilities at the Mill Site to the feeder system via direct dumping from trucks. Loading of marine transport ships will occur through a covered conveyor, at the maximum loading rate indicated below. A feeder will supply the mobile ship loader continuously, eliminating the need for an intermediate storage area. Concentrate will be loaded for 20 days per year, while aggregate will be loaded for an additional 20 days per year.

Natural mitigation was not considered for emissions from loading at the marine terminal, as this activity occurs infrequently throughout the year.

Emissions from concentrate dumping from haul trucks into the ship feeder system were calculated using the emission factors from Section 13.2.4 "Aggregate Handling and Storage Piles" of the AP 42 document (revised November 2006), utilizing the emission factor (EF) equation as given below.

| Contaminant | Aerodynamic Particle Size Multiplier |
|---|---|
| PM | 0.74 |
| $PM_{10}$ | 0.35 |
| $PM_{2.5}$ | 0.053 |

**Reference:** Emission factors from Section 13.2.4 "Aggregate Handling and Storage Piles" of the AP 42 document (revised November 2006)

| Overall average wind speed (m/s) | 6.16 |
|---|---|

**Reference**: Average of maximum hourly wind speeds from January to December from Canadian Climate Normals data for St.Lawrence, Nfld. Station, 1991-2020 Climate Normals and Averages.

**Sample Emission Calculations - MAR_TD:**

**PM Sample Calculation**

$EF_{PM}$ = k x 0.0016 x (Mean Wind Speed m/s ÷2.2)$^{1.3}$ ÷ (Material Moisture Content % ÷ 2)$^{1.4}$ (kg/Mg)

Particle Size Multiplier

$EF_{PM}$ = 0.74 x 0.0016 x (6.16452991452991 m/s ÷2.2)^1.3 ÷ (8 % ÷ 2)^1.4 (kg/tonne)

$EF_{PM}$ = 6.49E-04 kg/tonnes

$ER_{PM}$ = Emission Factor (kg/tonnes) x Throughput tonnes/yr

$ER_{PM}$ = 1.35E+02 kg/yr

**Emission Summary:**

| Source ID | Description | Contaminant | EF (kg/Mg) | Emission Rate (kg/y) |
|---|---|---|---|---|
| MAR_TD | Transfer from Trucks into Ship Feeder | PM | 6.49E-04 | 1.35E+02 |
| | | $PM_{10}$ | 3.07E-04 | 6.40E+01 |
| | | $PM_{2.5}$ | 4.65E-05 | 9.70E+00 |
| MAR_CONV [1] | Loading onto Ship via Covered Conveyor | PM[2] | 7.00E-05 | 1.46E+01 |
| | | $PM_{10}$ | 3.50E-05 | 7.30E+00 |
| | | $PM_{2.5}$ | 1.75E-05 | 3.65E+00 |

**Notes:**

[1]Emission factors for conveyor transfer (MAR_CONV) were sourced from the U.S. EPA AP-42 Section 11.19.2: "Crushed Stone Processing and Pulverized Mineral Processing," Table 11.9.2-1, section dated 08/04.

[2]It was assumed that PM10 is 50% of PM and PM2.5 is 50% of PM10 for MAR CONV.
Emission factors for MAR_CONV is from AP-42 Section 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing

***EO10 - Operation Activity - Marine Vessel Emissions***

Emissions from marine vessels (ships) were estimated based on an operating scenario where a ship is docked at the port with auxiliary engines running for the entire duration of the docking period. Estimates of auxiliary engine number and size, docking time, and number of trips were provided by CFI. Emission factors for Marine Gas Oil (MGO) combustion in ship auxiliary engines were sourced from the British Columbia Chamber of Shipping document titled "2005-2006 BC Ocean-Going Vessel Emissions Inventory" (dated January 25, 2007), Table 18. For conservatism, emission factors for the "medium" engine type have been assumed in this assessment.

| Source ID | Number of Units | Power Rating (kW) | Time Ship Spends Docked Per Trip | Ship Trips Per Year |
|---|---|---|---|---|
| | | kW | hours | |
| SHIP_1 | 1 | 800 | 24 | 40 |
| SHIP_2 | 1 | 800 | 24 | 40 |
| SHIP_3 | 1 | 800 | 24 | 40 |

**NOx Sample Emission Calculations - SHIP_1:**

$ER_{NOx}$ = Number of Units x Max Input Rating (hp) x Emission Factor (g/kW-hr) x 0.7457 kW/hp ÷ 3600 s/hr

$ER_{NOx}$ = 1 x 800 kW x 13.9 g/kW-hr ÷ 3600 s/hr

$ER_{NOx\text{-}1\ hr}$ = 3.09E+00 g/s

$ER_{NOx\text{-}Annual}$ = $ER_{NOX\text{-}1\ hr}$ x Time Ship Spends Docked Per Trip x Ship Trips per Year

$ER_{NOx}$ = 3.09 x 24 hours/trip x 40 trips/yr ÷ 8760 hr/yr

$ER_{NOx\text{-}Annual}$ = 3.39E-01 g/s

$ER_{NOx\text{-}kg/yr}$ = $ER_{NOx\text{-}annual}$ (g/s) x 31,536,000 (seconds/year) / 1000 (g/kg)

$ER_{NOx\text{-}kg/yr}$ = 1.07E+04 kg/yr

**Emission Summary:**

| Source ID | Description | Contaminant | CAS | Emission Factor Value | Emission Factor Units | Emission Rate (kg/y) |
|---|---|---|---|---|---|---|
| SHIP_1 | Auxiliary Engine 1 | CO | 630-08-0 | 1.10 | g/kW-hr | 8.45E+02 |
| SHIP_1 | Auxiliary Engine 1 | $NO_X$ | 10102-44-0 | 13.90 | g/kW-hr | 1.07E+04 |
| SHIP_1 | Auxiliary Engine 1 | PM | N/A | 0.27 | g/kW-hr | 2.07E+02 |
| SHIP_1 | Auxiliary Engine 1 | $PM_{10}$ | N/A | 0.27 | g/kW-hr | 2.07E+02 |
| SHIP_1 | Auxiliary Engine 1 | $PM_{2.5}$ | N/A | 0.24 | g/kW-hr | 1.84E+02 |
| SHIP_1 | Auxiliary Engine 1 | $SO_2$ | 7446-09-05 | 4.20 | g/kW-hr | 3.23E+03 |
| SHIP_2 | Auxiliary Engine 2 | CO | 630-08-0 | 1.10 | g/kW-hr | 8.45E+02 |
| SHIP_2 | Auxiliary Engine 2 | $NO_X$ | 10102-44-0 | 13.90 | g/kW-hr | 1.07E+04 |
| SHIP_2 | Auxiliary Engine 2 | PM | N/A | 0.27 | g/kW-hr | 2.07E+02 |
| SHIP_2 | Auxiliary Engine 2 | $PM_{10}$ | N/A | 0.27 | g/kW-hr | 2.07E+02 |
| SHIP_2 | Auxiliary Engine 2 | $PM_{2.5}$ | N/A | 0.24 | g/kW-hr | 1.84E+02 |
| SHIP_2 | Auxiliary Engine 2 | $SO_2$ | 7446-09-05 | 4.20 | g/kW-hr | 3.23E+03 |
| SHIP_3 | Auxiliary Engine 3 | CO | 630-08-0 | 1.10 | g/kW-hr | 8.45E+02 |
| SHIP_3 | Auxiliary Engine 3 | $NO_X$ | 10102-44-0 | 13.90 | g/kW-hr | 1.07E+04 |
| SHIP_3 | Auxiliary Engine 3 | PM | N/A | 0.27 | g/kW-hr | 2.07E+02 |
| SHIP_3 | Auxiliary Engine 3 | $PM_{10}$ | N/A | 0.27 | g/kW-hr | 2.07E+02 |
| SHIP_3 | Auxiliary Engine 3 | $PM_{2.5}$ | N/A | 0.24 | g/kW-hr | 1.84E+02 |
| SHIP_3 | Auxiliary Engine 3 | $SO_2$ | 7446-09-05 | 4.20 | g/kW-hr | 3.23E+03 |

**Notes:**

Emission factors for Marine Gas Oil (MGO) combustion in ship auxiliary engines were sourced from the British Columbia Chamber of Shipping document titled "2005-2006 BC Ocean-Going Vessel Emissions Inventory" (dated January 25, 2007), Table 18. For conservatism, emission factors for the "medium" engine type have been assumed in this assessment.

All PM is assumed to be PM10. SO2 emission factor conservatiely assumes that all SOX is SO2 and also that sulphur content in MGO is 1%

Attachment 4

# GHG Emission Calculation Sheets

**Table 1.**
**Project Emission Sources and Inputs**
**CFI GHG Inventory**

| Scope | Source Category | Emission Activity | Fuel Type | Annual Consumption Estimate Unit | Baseline Consumption Estimate | Project Consumption Year 1 Estimate (Pro-rated Year 1: Construction phase: 8 months; Operation phase: 6 months) | Project Consumption Year 2 Estimate (Pro-rated Year 1: Operation phase only: 12 months) |
|---|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | | |
| Scope 1 | Combustion in Stationary Sources | Emissions from diesel powered dewatering pump and diesel power generator | Diesel | L | 505,122 | 252,561 | 0 |
| Scope 1 | On-Site Transportation | On-site vehicle tailpipie emissions, due to diesel combustion | Diesel | L | 27,016,290 | 13,446,299 | 0 |
| Scope 1 | Process-Related | Emissions from blasting surface materials using explosives | Diesel | tonnes | 1,898 | 949 | 0 |
| Scope 2 | Purchased Electricity | Indirect emissions from electricity purchase | Electricity Consumption | MWh | 4,392 | 2,196 | 0 |
| **Operation Phase** | | | | | | | |
| Scope 1 | Combustion in Stationary Sources | Emissions from propane-fired underground mine air heater | Propane | L | 2,446,447 | 1,223,224 | 2,446,447 |
| Scope 1 | Combustion in Stationary Sources | Emissions from emergency generators and dewatering pump | Diesel | L | 1,580,876 | 790,438 | 1,580,876 |
| Scope 1 | Combustion in Stationary Sources | Emissions from marine vessel auxiliary engines while ship is docked at port | Marine Gas Oil | L | 241,379 | 120,690 | 241,379 |
| Scope 1 | On-Site Transportation | On-site vehicle tailpipie emissions, due to diesel combustion | Diesel | L | 6,183,800 | 3,180,730 | 6,361,460 |
| Scope 1 | Process-Related | Emissions from blasting ore and waste rock using explosives | Diesel | tonnes | 1,750 | 875 | 1,750 |
| Scope 2 | Purchased Electricity | Indirect emissions from electricity purchase | Electricity Consumption | MWh | 48,180 | 24,090 | 48,180 |

**Notes:**
This table summarizes results from the GHG analysis undertaken to determine GHG Emissions. The supporting calculations, for each source category, are provided in the calculation
Emissions associated with purchased energy not included in stationary comustion or purchased electricity. This includes sources such as purchased steam, heat, cooling, and chilled

Abbreviations:
$CO_2e$- carbon dioxide equivalent
GHG - greenhouse gas
MT - metric tonnes

**Table 2A**
**Project Baseline Annual GHG Emissions Estimates by Source Category**
**Falkirk GHG Inventory**

| Scope | Source Category | Fuel Type | Annual Consumption Estimate | Annual Emissions (Tonnes) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CO2 | CH4 | N2O | CO2e | % of Project Total Direct GHG Emissions | % of Project Total Indirect GHG |
| **Operation Phase** | | | | | | | **28.774** | | |
| Scope 1 | Combustion in Stationary Sources | Propane | 2,446,447 | 3,694 | 0.06 | 0.26 | 3,774 | 14% | |
| Scope 1 | Combustion in Stationary Sources | Diesel | 1,580,876 | 4,210 | 0.21 | 0.63 | 4,404 | | |
| Scope 1 | Combustion in Stationary Sources | Marine Gas Oil | 241,379 | 754 | 0.07 | 0.02 | 761 | | |
| Scope 1 | On-Site Transportation | Diesel | 6,183,800 | 16,467 | 0.93 | 6.80 | 18,518 | 67% | |
| Scope 1 | Process-Related | Diesel | 1,750 | 353 | | | 353 | 1.3% | |
| Scope 2 | Purchased Electricity | Electricity Consumption | 48,180 | | | | 964 | | 3.3% |

**Notes:**
emissions factors obtained from Enviornment Canada: National Inventory Report 1990-2012: Greenhouse Gas Sources and Sinks in Canada. (Accessed September 13, 2015)

**Table 2B**
**Year 1 Projected Annual GHG Emissions Estimates by Source Category**
**CFI GHG Inventory**

| Scope | Source Category | Fuel Type | Annual Consumption Estimate Unit | Project Consumption Estimate | Annual Emissions (Tonnes) | | | | | | Emission Factor (g/L fuel) | Emission Factor (g/L fuel) | Emission Factor (g/L fuel) | Emission Factor Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CO2 | CH4 | N2O | CO2e | % of Project Total Direct GHG Emissions | % of Project Total Indirect GHG Emissions | CO2 | CH4 | N2O | |
| **Construction Phase (6 months)** | | | | | | | | **4,220** | | | | | | |
| Scope 1 | Combustion in Stationary Sources | Diesel | L | 252,561 | 677 | 1.97E-02 | 5.56E-03 | 679 | 16% | | 2681 | 0.0780 | 0.0220 | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 4.3 |
| Scope 1 | On-Site Transportation | Diesel | L | 1,223,787 | 3,280 | 1.71E-01 | 1.00E-01 | 3,312 | 79% | | 2681 | 0.1400 | 0.0820 | NIR 2023 Par 2: Table A6.1-15; HDDVs Moderate Control |
| Scope 1 | Process-Related | Explosives | tonnes | 949 | 192 | - | - | 192 | 5% | | | | | Aligned with baseline GHG emission methodology developed by Golder |
| Scope 2 | Purchased Electricity | Electricity Consumption | MWh | 2,196 | - | - | - | 37 | | 0.9% | | | | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 5.1 |
| **Operation Phase (6 months)** | | | | | | | | **6,284** | | | | | | |
| Scope 1 | Combustion in Stationary Sources | Propane | L | - | - | 0.00E+00 | 0.00E+00 | - | 0% | | 2681 | 0.0780 | 0.0220 | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 4.3 |
| Scope 1 | Combustion in Stationary Sources | Diesel | L | 790,438 | 2,119 | 6.17E-02 | 1.74E-02 | 2,125 | 36% | | 2681 | 0.0780 | 0.0220 | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 4.3 |
| Scope 1 | Combustion in Stationary Sources | Marine Gas Oil | L | 120,690 | 278 | 2.65E-02 | 7.56E-03 | 281 | 5% | | 2307 | 0.2193 | 0.0627 | NIR 2023 Par 2: Table A6.1-15; Marine Gasoline |
| Scope 1 | On-Site Transportation | Diesel | L | 1,199,990 | 3,217 | 8.76E-02 | 2.72E-01 | 3,291 | 56% | | 2681 | 0.0730 | 0.2270 | NIR 2023 Par 2: Table A6.1-15; Off-road Diesel Tier 4 |
| Scope 1 | Process-Related | Explosives | tonnes | 875 | 177 | - | - | 177 | 3% | | | | | Aligned with baseline GHG emission methodology developed by Golder |
| Scope 2 | Purchased Electricity | Electricity Consumption | MWh | 24,090 | - | - | - | 410 | | 7% | | | | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 5.1 |
| **Total Year 1 Projected GHG Emissions** | | | | | | | | **10,504** | | | | | | |

**Notes:**
Emissions factors obtained from Environment and Climate Change Canada: National Inventory Report 1990-2023 (2025 Edition Part 3): Greenhouse Gas Sources and Sinks in Canada. Table A12-2(Accessed
Emission factor for purchased electricity obtained from Environment and Climate Change Canada: Emission Factors and Reference Values (October 2025 Version 3.0) https://publications.gc.ca/collections/collection_2025/eccc/En84-294-2025-eng.pdf
GWP obtained from Emissions factors obtained from Environment and Climate Change of Canada: National Inventory Report 1990-2023 (2025 Edition Part 1): Greenhouse Gas Sources and Sinks in Canada. Table 1-1 (Accessed December 19, 2025)

| | |
|---|---|
| CO2 | 1 |
| CH4 | 28 |
| N2O | 265 |
| SF6 | 23500 |
| NF3 | 16100 |

**Table 2C**
**Year 2 Projected Annual GHG Emissions Estimates by Source Category**
**CFI GHG Inventory**

| Scope | Source Category | Fuel Type | Annual Consumption Estimate Unit | Project Consumption Estimate | Annual Emissions (Tonnes) | | | | | | Emission Factor (g/L fuel) | Emission Factor (g/L fuel) | Emission Factor (g/L fuel) | Emission Factor Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CO2 | CH4 | N2O | CO2e | % of Project Total Direct GHG Emissions | % of Project Total Indirect GHG Emissions | CO2 | CH4 | N2O | |
| **Operation Phase (12 months)** | | | | | | | | **7,568** | | | | | | |
| Scope 1 | Combustion in Stationary Sources | Propane | L | - | - | 0.00E+00 | 0.00E+00 | - | 0% | | 1515 | 0.024 | 0.022 | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 43.1 |
| Scope 1 | Combustion in Stationary Sources | Diesel | L | 1,580,876 | 4,238 | 1.23E-01 | 1.71E-01 | 4,287 | 64% | | 2681 | 0.078 | 0.108 | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 4.3 |
| Scope 1 | Combustion in Stationary Sources | Marine Gas Oil | L | 241,379 | 557 | 5.29E-02 | 1.51E-02 | 562 | 8% | | 2307 | 0.21931 | 0.06266 | NIR 2023 Par 2: Table A6.1-15; Marine Gasoline |
| Scope 1 | On-Site Transportation | Diesel | L | 563,598 | 1,511 | 4.11E-02 | 1.28E-01 | 1,546 | 23% | | 2681 | 0.073 | 0.227 | NIR 2023 Par 2: Table A6.1-15; Off-road Diesel Tier 4 |
| Scope 1 | Process-Related | Explosives | tonnes | 1,750 | 353 | - | - | 353 | 5% | | | | | Aligned with baseline GHG emission methodology developed by Golder |
| Scope 2 | Purchased Electricity | Electricity Consumption | MWh | 48,180 | - | - | - | 819 | | 11% | | | | Emission Factors and Reference Values (En84-294-2025-eng.pdf) Table 5.1 |
| **Total Year 2 Projected GHG Emissions** | | | | | | | | **7,568** | | | | | | |

**Notes:**
Emissions factors obtained from Environment and Climate Change Canada: National Inventory Report 1990-2023 (2025 Edition Part 3): Greenhouse Gas Sources and Sinks in Canada. Table A12-2(Accessed December 18. 2025)
Emission factor for purchased electricity obtained from Environment and Climate Change Canada: Emission Factors and Reference Values (October 2025 Version 3.0) https://publications.gc.ca/collections/collection_2025/eccc/En84-294-2025-eng.pdf
GWP obtained from Emissions factors obtained from Environment and Climate Change of Canada: National Inventory Report 1990-2023 (2025 Edition Part 1): Greenhouse Gas Sources and Sinks in Canada. Table 1-1 (Accessed December 19, 2025)

| | |
|---|---|
| CO2 | 1 |
| CH4 | 28 |
| N2O | 265 |
| SF6 | 23500 |
| NF3 | 16100 |

# Appendix 6.2-2: South Ridge Project Final Calpuff Air Dispersion Modelling

# Final Report

## CALPUFF Air Dispersion Modelling for the South Ridge Project

**Prepared for:**

CANADA FLUORSPAR INC.

P.O. Box 337
St. Lawrence, Newfoundland and Labrador
A0E 2V0

**Prepared by:**

**Independent Environmental Consultants**
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IEC Project No.: SX25-0033

February 2026

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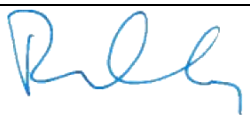
| Vice President | Paul Kirby |  |

## EXECUTIVE SUMMARY

Canada Fluorspar Inc. (CFI), a company 100% owned by Fluorspar Holdings, restarted production in 2023 from its mine / AGS Vein near St. Lawrence, Newfoundland and Labrador (NL). The AGS Vein contains a high-quality, acid-grade fluorspar concentrate, with a current resource estimate of approximately 10 years. CFI has also identified other fluorspar ore bodies in the vicinity of the AGS, which could be mined. The proposed South Ridge Project (the Project) is a small satellite pit that will support and sustain the existing mining operations and is located approximately two kilometres (km) southwest of St. Lawrence, along Iron Springs Road between the AGS Mine and Blue Beach Marine Terminal.

To assess the potential effects of the Project on ambient air quality against Newfoundland and Labrador Air Quality Standards (AQS), an air dispersion modelling assessment was completed. Modelling was performed using the CALMET/CALPUFF modelling package to predict ground level concentrations of $NO_2$, $SO_2$, CO, TPM, $PM_{10}$ and $PM_{2.5}$ resulting from the Project. The production scenario used in the assessment was conservatively based on uncontrolled emissions from the maximum expected activity rates during the lifespan of the Project.

A meteorological data set was generated for the period 2022 to 2024 using the Weather Research and Forecasting Non-Hydrostatic Mesoscale Model (WRF-NMM) run on a grid having a horizontal resolution of four kilometres (km). The outputs from WRF-NMM were used to generate hourly surface data (wind speed, wind direction, temperature, cloud cover, etc.) as well as upper air profiles for seventeen (17) “pseudo” station locations within the CALMET modelling domain. The resulting “pseudo” observations were used to run the CALMET model for a 20 km by 20 km domain having a horizontal grid spacing of 200 m. The CALMET model was then used to run CALPUFF following DECCC guidance (DOEC, 2012a).

For the South Ridge Project, with the exception of 24-hour TPM and 24-hour $PM_{10}$ under extraordinary circumstances, the maximum pollutant concentrations are all predicted to be well below their respective provincial AQS at the closest sensitive receptors. The maximum predicted 1-hour $NO_2$ concentration is 57.6% of the AQS, and the maximum predicted 24-hour $NO_2$ concentration is 27.8% of the AQS. The maximum predicted 24-hour $PM_{2.5}$ concentration is 29.0% of the AQS, while both $SO_2$ and CO are less than 0.6% of their respective AQS over all averaging periods. For TPM and $PM_{10}$, the 24-hour AQS may be exceeded at the sensitive receptors if winds are strong, the roads, stockpiles and pit are extremely dry, and production is at a maximum. Standard mitigation measures during such events will curb those emissions and ambient concentrations.

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## 1.0 INTRODUCTION

Canada Fluorspar Inc. (CFI) are seeking to develop the South Ridge Pit (the Project), approximately 3.5 kilometres (km) southeast of the existing processing plant (see Figure 2.1). As part of the Environment Assessment (EA) registration process, the Newfoundland and Labrador Department of Environment, Conservation and Climate Change (DECCC) require plume dispersion modelling, using the CALPUFF modelling system, to be completed to detail the air quality impacts of the development of the new pit. The modelling is to consider all potential emissions from the pit operations, including but not limited to drilling, hauling, excavating, wind erosion, stockpiles, vehicular/equipment emissions, in-pit processing and material handling. Per condition 7 of DECCC guidance (DOEC, 2012b), only those emission sources which account for at least 1% of total emissions are considered in the model.

On behalf of CFI, Independent Environmental Consultants (IEC) was retained to perform air dispersion modelling to assess compliance of the new pit against Newfoundland and Labrador Air Quality Standards (AQS). CFI will also use the results of the modelling study to support an application to the Facility's Certificate of Approval (CofA).

Air dispersion modelling was performed using the CALMET/CALPUFF modelling package to predict ground-level concentrations of nitrogen dioxide ($NO_2$), sulphur dioxide ($SO_2$), carbon monoxide (CO), total particulate matter (TPM), particulate matter less than 10 microns ($PM_{10}$), and particulate matter less than 2.5 microns ($PM_{2.5}$). To determine the potential impact on local air quality, modelled concentrations were compared to the AQS outlined in Schedule A of the *Air Pollution Control Regulation, 2022 (NLR 11/22)*. The applicable AQS are provided in Table 1.1.

The air dispersion modelling assessment and this report conform to the following documents published by the DECCC (formerly the Department of Environment & Conservation [DOEC]):

- *Guideline for Plume Dispersion Modelling. GD-PPD-019.2*, Newfoundland & Labrador Department of Environment & Conservation (DOEC, 2012a), and
- *Determination of Compliance with the Ambient Air Quality Standards. GD-PPD-009.4*, Newfoundland & Labrador Department of Environment & Conservation (DOEC, 2012b).

Section 2.0 of this report provides a description of the Project, and the production/emissions scenarios that were modelled. The CALMET and CALPUFF methodologies are outlined in Section 3.0, and the results of the modelling assessment are summarized in Section 4.0. Lastly, Section 5.0 presents the conclusions of the study.

**Table 1.1: Newfoundland and Labrador Air Quality Standards**

| Pollutant | Air Quality Standards (AQS) | | | | |
|---|---|---|---|---|---|
| | 1-hour | 3-hour | 8-hour | 24-hour | Annual |
| $SO_2$ | 344 ppb (900 µg/m³) | 229 ppb (600 µg/m³) | -- | 115 ppb (300 µg/m³) | 23 ppb (60 µg/m³) [1] |
| TPM | -- | -- | -- | 120 µg/m³ | 60 µg/m³ [2] [3] |
| $PM_{10}$ | -- | -- | -- | 50 µg/m³ | -- |
| $PM_{2.5}$ | -- | -- | -- | 25 µg/m³ | 8.8 µg/m³ [1] |
| $NO_2$ | 213 ppb (400 µg/m³) | -- | -- | 106 ppb (200 µg/m³) | 53 ppb (100 µg/m³) [1] |
| CO | 30582 ppb (35000 µg/m³) | -- | 13107 ppb (15000 µg/m³) | -- | -- |

**Source:** AQS from Schedule A of *the Air Pollution Control Regulation, 2022* (NLR 11/22). Values in () are equivalencies at reference conditions for modelling purposes.
**ppb**: parts per billion
**µg/m³**: micrograms per cubic metre
**Notes:**
All AQS at reference conditions (25 °C, 101.325 kPa)
[1] Arithmetic mean
[2] Geometric mean
[3] Per communication with the DECCC, the geometric mean AQS applies to discrete sampling only. The arithmetic mean applies otherwise.

## 2.0 PROJECT DESCRIPTION

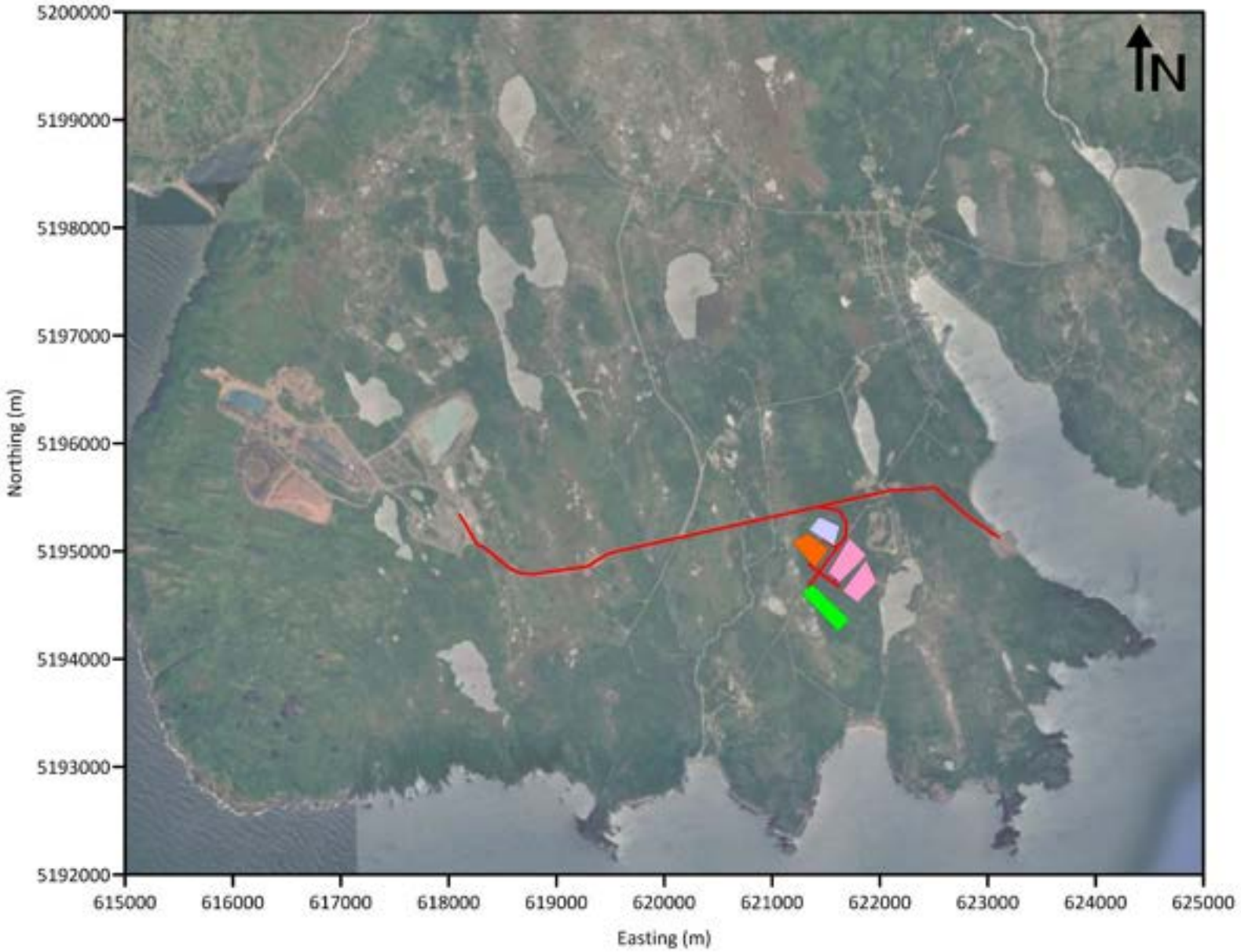
Canada Fluorspar Inc. (CFI) are seeking to develop the South Ridge Pit, approximately 3.5 km southeast of the existing processing plant. The Project includes the mining of the South Ridge Pit, the development of an overburden stockpile, a topsoil stockpile and two waste rock stockpiles, as well as a truck haul road connecting the main haul road to the Project area. Ore will be trucked to the existing AGS site for processing, with final product trucked to the Blue Beach dock for final shipping. Figure 2.1 provides the generic project layout plan.

### 2.1 PRODUCTION SCENARIO AND EMISSION RATES

The South Ridge Project will operate for approximately 18 months, with various equipment and activities operating at different times over this period. Appreciating that actual production may vary compared to projected production, it is conservatively assumed that the maximum production will occur all at the same time for each emission source, even if it may not be logistically correct or possible. For example, the maximum topsoil removal will not be occurring at the same time as maximum ore removal, but both are modelled simultaneously. This approach is conservative and consistent with the approach expected by DECCC.

Emissions are considered from three groups of sources, namely roads, stockpiles and the South Ridge Pit itself. Per DECCC guidance, only sources which account for at least 1% of the total emissions need to be considered and those sources are included in Table 2.1 through Table 2.6. However, appreciating some emissions are dependent on the weather, some emission sources, such as wind erosion from stockpiles, may fall below the 1% threshold but are included as they may be significant contributors under windy conditions.

Table 2.1 provide details of the road segments that are modelled, while Table 2.2 summarizes the road dust and fuel combustion emissions for each segment. Table 2.3 provides details of the various combustion (i.e., equipment) sources that were included in the model, the engine size of the source and where it's used in the Project. Table 2.4 provides details on the dimensions of the stockpiles and the South Ridge Pit that are modelled, while Table 2.5 and Table 2.6 show the dust and combustion emission rates from the stockpiles and pit.




**LEGEND:**

- South Ridge Pit
- Waste Rock Stockpiles
- Overburden Stockpile
- Topsoil Stockpile
- Haul Roads

**NOTES:**

**SCALE:**

0 m 1000 m 2000 m

**REVISIONS:**

| No. | Date | By | Revision |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**REFERENCE:**

Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21

SCIENCE ENGINEERING PLANNING iec

**Canada Fluorspar Inc.**
South Ridge Project

Project Layout Plan

| Drawn By: | Approved By: | Figure No.: |
|---|---|---|
| BL | PLK | 2.1 |
| Date: February 2026 | Project No.: SX25-0033 | |

**Table 2.1: Modelled Haul Road Segments**

| Road Segment | Start Easting (m)[1] | Start Northing (m)[1] | Stop Easting (m)[1] | Stop Northing (m)[1] | Segment Length (m) |
|---|---|---|---|---|---|
| Road Segment #1 | 618106 | 5195336 | 618259 | 5195070 | 306.9 |
| Road Segment #2 | 618259 | 5195070 | 618335 | 5195030 | 85.9 |
| Road Segment #3 | 618335 | 5195030 | 618569 | 5194841 | 300.8 |
| Road Segment #4 | 618569 | 5194841 | 618661 | 5194799 | 101.1 |
| Road Segment #5 | 618661 | 5194799 | 618786 | 5194786 | 125.7 |
| Road Segment #6 | 618786 | 5194786 | 619286 | 5194857 | 505.0 |
| Road Segment #7 | 619286 | 5194857 | 619473 | 5194974 | 220.6 |
| Road Segment #8 | 619473 | 5194974 | 619611 | 5195010 | 142.6 |
| Road Segment #9 | 619611 | 5195010 | 621435 | 5195413 | 1868.0 |
| Road Segment #10 | 621435 | 5195413 | 622108 | 5195565 | 690.0 |
| Road Segment #11 | 622108 | 5195565 | 622516 | 5195588 | 408.6 |
| Road Segment #12 | 622516 | 5195588 | 622825 | 5195317 | 411.0 |
| Road Segment #13 | 622825 | 5195317 | 623101 | 5195128 | 334.5 |
| Road Segment #14 | 621435 | 5195413 | 621622 | 5195377 | 190.4 |
| Road Segment #15 | 621622 | 5195377 | 621688 | 5195269 | 126.6 |
| Road Segment #16 | 621688 | 5195269 | 621684 | 5195143 | 126.1 |
| Road Segment #17 | 621684 | 5195143 | 621604 | 5195032 | 136.8 |
| Road Segment #18 | 621604 | 5195032 | 621469 | 5195120 | 161.1 |
| Road Segment #19 | 621604 | 5195032 | 621436 | 5194805 | 282.4 |
| Road Segment #20 | 621436 | 5194805 | 621340 | 5194878 | 120.6 |
| Road Segment #21 | 621436 | 5194805 | 621335 | 5194669 | 169.4 |
| Road Segment #22 | 621436 | 5194805 | 621566 | 5194708 | 162.2 |
| Road Segment #23 | 621566 | 5194708 | 621595 | 5194748 | 49.4 |
| Road Segment #24 | 621566 | 5194708 | 621622 | 5194669 | 68.2 |

**Notes:**
[1] NAD 83 UTM zone 21

**Table 2.2: Modelled Haul Road Segment Emission Rates (Combustion + Road Dust)**

| Road Segment | TPM (g/s/m) | $PM_{10}$ (g/s/m) | $PM_{2.5}$ (g/s/m) | CO (g/s/m) | $NO_2$ (g/s/m) | NO (g/s/m) | $SO_2$ (g/s/m) |
|---|---|---|---|---|---|---|---|
| Road Segment #1 | 2.330E-03 | 6.638E-04 | 6.793E-05 | 3.225E-05 | 3.646E-06 | 2.140E-05 | 6.800E-08 |
| Road Segment #2 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #3 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #4 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #5 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #6 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #7 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #8 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #9 | 2.329E-03 | 6.631E-04 | 6.724E-05 | 1.935E-05 | 2.188E-06 | 1.284E-05 | 4.080E-08 |
| Road Segment #10 | 4.504E-05 | 1.595E-05 | 5.546E-06 | 7.815E-05 | 8.908E-06 | 5.229E-05 | 1.648E-07 |
| Road Segment #11 | 4.504E-05 | 1.595E-05 | 5.546E-06 | 7.815E-05 | 8.908E-06 | 5.229E-05 | 1.648E-07 |
| Road Segment #12 | 4.504E-05 | 1.595E-05 | 5.546E-06 | 7.815E-05 | 8.908E-06 | 5.229E-05 | 1.648E-07 |
| Road Segment #13 | 4.504E-05 | 1.595E-05 | 5.546E-06 | 7.815E-05 | 8.908E-06 | 5.229E-05 | 1.648E-07 |
| Road Segment #14 | 1.105E-02 | 3.149E-03 | 3.222E-04 | 1.433E-04 | 1.634E-05 | 9.590E-05 | 3.022E-07 |
| Road Segment #15 | 1.105E-02 | 3.149E-03 | 3.222E-04 | 1.433E-04 | 1.634E-05 | 9.590E-05 | 3.022E-07 |
| Road Segment #16 | 1.105E-02 | 3.149E-03 | 3.222E-04 | 1.433E-04 | 1.634E-05 | 9.590E-05 | 3.022E-07 |
| Road Segment #17 | 1.105E-02 | 3.149E-03 | 3.222E-04 | 1.433E-04 | 1.634E-05 | 9.590E-05 | 3.022E-07 |
| Road Segment #18 | 7.010E-04 | 2.040E-04 | 2.628E-05 | 1.220E-04 | 1.380E-05 | 8.100E-05 | 2.572E-07 |
| Road Segment #19 | 2.984E-03 | 8.499E-04 | 8.667E-05 | 4.040E-05 | 4.479E-06 | 2.629E-05 | 8.520E-08 |
| Road Segment #20 | 1.499E-02 | 4.265E-03 | 4.298E-04 | 1.987E-04 | 2.031E-05 | 1.192E-04 | 4.191E-07 |
| Road Segment #21 | 3.041E-02 | 8.652E-03 | 8.694E-04 | 4.031E-04 | 4.033E-05 | 2.367E-04 | 8.502E-07 |
| Road Segment #22 | 3.041E-02 | 8.652E-03 | 8.694E-04 | 4.031E-04 | 4.033E-05 | 2.367E-04 | 8.502E-07 |
| Road Segment #23 | 3.041E-02 | 8.652E-03 | 8.694E-04 | 4.031E-04 | 4.033E-05 | 2.367E-04 | 8.502E-07 |
| Road Segment #24 | 2.438E-02 | 6.935E-03 | 6.969E-04 | 3.235E-04 | 3.237E-05 | 1.900E-04 | 6.823E-07 |

**Table 2.3: Modelled Combustion Sources**

| Source | Horsepower | Quantity | Active Area |
|---|---|---|---|
| Atlas Copco T45 Drill | 340 | 2 | Pit |
| Cat MD6200 Drill | 587 | 1 | Pit |
| Cat 395 Excavator | 551 | 1 | Pit |
| Cat 992 Loader | 814 | 1 | Pit |
| Cat 777 Haul Truck | 1025 | 4 | Pit, waste dumps, and haul roads |
| Cat 777 Water Cart | 1025 | 1 | Pit, waste dumps, and haul roads |
| Cat D9 Dozer | 487 | 1 | Pit, waste dumps, and haul roads |
| 4.9 m Motor Grader (16M) | 290 | 1 | Haul roads and waste dumps |
| Light Plants | 14 | 2 | Pit and Dump areas |
| Pit Pumps | 134 | 1 | Pit |
| Tractor Trailer | 500 | 1 | Ore Stockpile area and travel to AGS ROM Pad |

**Table 2.4: Modelled Stockpiles and South Ridge Pit**

| Feature | Easting (m)[1] | Northing (m) [1] | Easting (m) [1] | Northing (m) [1] | Easting (m) [1] | Northing (m) [1] | Easting (m) [1] | Northing (m) [1] | Area ($m^2$) |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil Stockpile | 621344 | 5195198 | 621575 | 5195050 | 621626 | 5195231 | 621440 | 5195317 | 40040 |
| Overburden Stockpile | 621524 | 5195016 | 621397 | 5194846 | 621184 | 5195089 | 621335 | 5195166 | 52190 |
| North Rock Stockpile | 621519 | 5194801 | 621629 | 5194713 | 621876 | 5194965 | 621714 | 5195121 | 65740 |
| South Rock Stockpile | 621872 | 5194918 | 621655 | 5194631 | 621793 | 5194523 | 621971 | 5194711 | 59210 |
| South Ridge Pit | 621717 | 5194364 | 621612 | 5194257 | 621272 | 5194614 | 621369 | 5194693 | 66410 |

**Notes:**
[1] NAD 83 UTM zone 21

**Table 2.5: Modelled Material Handling Emission Rates from Stockpiles and South Ridge Pit**

| Feature | TPM (g/s) | $PM_{10}$ (g/s) | $PM_{2.5}$ (g/s) |
|---|---|---|---|
| Topsoil Stockpile | 1.081E-02 | 5.115E-03 | 7.746E-04 |
| Overburden Stockpile | 4.326E-02 | 2.046E-02 | 3.098E-03 |
| North Rock Stockpile | 1.044E-01 | 4.939E-02 | 7.479E-03 |
| South Rock Stockpile | 7.323E-02 | 3.463E-02 | 5.245E-03 |
| South Ridge Pit | 2.448E-01 | 1.158E-01 | 1.753E-02 |

**Table 2.6: Modelled Dust and Combustion Emission Rates from South Ridge Pit**

| South Ridge Pit | TPM ($g/s/m^2$) | $PM_{10}$ ($g/s/m^2$) | $PM_{2.5}$ ($g/s/m^2$) | CO ($g/s/m^2$) | $NO_2$ ($g/s/m^2$) | NO ($g/s/m^2$) | $SO_2$ ($g/s/m^2$) |
|---|---|---|---|---|---|---|---|
| Non-Combustion | 2.803E-04 | 1.033E-04 | 1.114E-05 | N/A | N/A | N/A | N/A |
| Combustion | 0 | 0 | 2.265E-06 | 9.194E-05 | 9.568E-05 | 5.616E-05 | 1.935E-07 |

## 2.2 AIR EMISSIONS ASSUMPTIONS

For each month of projected operation, CFI provided detailed data on expected fuel usage by equipment type, including the location where the equipment will be used, the number of pieces of equipment that will be in operation, and the volume of material to be moved by material type. This data was then used to generate emission factors and rates based on industry standard protocols, as detailed below. For the generation of the emissions factors and rates, Table 2.7 provides a summery of the key assumptions that were applied for modelling the worse-case emission scenario and also indicates the degree of conservatism the assumptions added to the modelling results. Overall, the model inputs provide a moderate to high degree of conservatism.

Following Table 2.7, the emission factors are presented for each modelled emission source. As noted above, only sources which account for at least 1% of the total emissions are considered.

**Table 2.7: Worst-Case Emissions Assumptions**

| Assumption | Effect on Emissions | Degree of Conservatism |
|---|---|---|
| Soil silt content = 8.3% | Emissions directly related to silt content | Low |
| Engines operate at 100% load, 100% of the time | Doesn't account for idling, down-time or reduced loads | Moderate / High |
| The maximum monthly material movement for all material is occurring at the same time (e.g., maximum topsoil movement is occurring at the same time as maximum ore movement) | All material movement occurring at the same time is unrealistic | High |
| Stockpile / Road dust suppression = 0% | Routine watering could reduce emissions by over 50%; over 90% in winter due to snow cover | High |
| Material moisture content = 10% | Given the location, moisture content is likely higher, which would reduce emissions | Moderate / High |
| Stockpile wind erosion threshold wind speed = 5.1 m/s | 5.4 m/s is considered normal threshold | Low |

### *2.2.1 Unpaved Road Dust*

Unpaved industrial road dust was calculated using the U.S. EPA AP-42 emission factor equation from Chapter 13.2.2 - Unpaved Roads (U.S. EPA, 2006a) as follows:

$E = k \times (s/12)^a \times (W/3)^b \times 281.9$

Where: E = size specific emission factor (lb/VMT)

k = particle size multiplier, see table below

s = surface material silt content (%) = 8.3%

W = mean vehicle weight (tons) where 1 tonne = 1.1 tons

a /b = constants, see table below

281.9 = conversion from lb/VMT to g/VKT

| Factors | k | a | b |
|---|---|---|---|
| TPM | 4.9 | 0.7 | 0.45 |
| $PM_{10}$ | 1.5 | 0.9 | 0.45 |
| $PM_{2.5}$ | 0.15 | 0.9 | 0.45 |

### *2.2.2 Vehicle and Equipment Combustion*

Except for $SO_2$, combustion emissions from vehicle and equipment use were calculated using the U.S. emission standards for non-road compression-ignition engines (U.S., 2016) as follows:

ER = EF x Q x R x L / 3600

Where: ER = emission rate (g/s)

EF = emission factor (g/kW-h), see table below.

Q = equipment quantity (number)

R = engine rating (kW)

L = engine operating load (%)

3600 = conversion from hours to seconds

| Engine Size | Type | Engine Tier | Fuel | Emission Factor | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TPM | $PM_{10}$ | $PM_{2.5}$ | CO | $SO_2$ | NOx | Units |
| kW <8 | Off-road | Tier 4 | Diesel | 0.40 | 0.40 | 0.40 | 8.0 | 7.38E-03 | 7.5 | g/kWh |
| 8 <= kW < 19 | Off-road | Tier 4 | Diesel | 0.40 | 0.40 | 0.40 | 6.6 | 7.38E-03 | 7.5 | g/kWh |
| 19 <= kW < 37 | Off-road | Tier 4 | Diesel | 0.03 | 0.03 | 0.03 | 5.5 | 7.38E-03 | 4.7 | g/kWh |
| 37 <= kW <56 | Off-road | Tier 3 | Diesel | 0.40 | 0.40 | 0.40 | 5.0 | 7.38E-03 | 4.7 | g/kWh |
| 56 <= kW < 75 | Off-road | Tier 3 | Diesel | 0.40 | 0.40 | 0.40 | 5.0 | 7.38E-03 | 4.7 | g/kWh |
| 75 <= kW < 130 | Off-road | Tier 3 | Diesel | 0.30 | 0.30 | 0.30 | 5.0 | 7.38E-03 | 4.0 | g/kWh |
| 130 <= kW < 225 | Off-road | Tier 3 | Diesel | 0.20 | 0.20 | 0.20 | 3.5 | 7.38E-03 | 4.0 | g/kWh |
| 225 <= kW < 450 | Off-road | Tier 3 | Diesel | 0.20 | 0.20 | 0.20 | 3.5 | 7.38E-03 | 4.0 | g/kWh |
| 450 <= kW < 560 | Off-road | Tier 3 | Diesel | 0.20 | 0.20 | 0.20 | 3.5 | 7.38E-03 | 4.0 | g/kWh |
| 560 <= kW < 900 | Off-road | Tier 4 | Diesel | 0.04 | 0.04 | 0.04 | 3.5 | 7.38E-03 | 3.5 | g/kWh |
| kW >= 900 | Off-road | Tier 4 | Diesel | 0.04 | 0.04 | 0.04 | 3.5 | 7.38E-03 | 3.5 | g/kWh |

$SO_2$ emissions were estimated using the emission factor equation from U.S. EPA AP-42 Chapter 3.4 - Large Stationary Diesel and All Stationary Dual-fuel Engines (U.S. EPA, 2025) of 8.09E-03 lb/hp-hr x sulphur content. A sulphur content of 15 ppm was used per the *Sulphur in Diesel Fuel Regulations* (SOR/2002-254) (GC, 2002).

Of note, emissions of particulate matter from combustion were assumed to be 100% $PM_{2.5}$. In other words, emissions of TPM = $PM_{10}$ = $PM_{2.5}$. This assumption was recommended by the DECCC.

Also, emissions of $NO_2$ and NO were based on a $NO_2/NO_x$ ratio of 10%, which, upon consultation with DECCC, is the new recommended ratio for internal combustion engines. $NO_2$ and NO were calculated as follows:

$NO_2 = NO_x \times 10\%$ and,

$NO = (NO_x - NO_2) \times (\text{MW of NO} \div \text{MW of } NO_2) = (NO_x - NO_2) \times (30 \div 46) = NO_x \times 0.5870$.

Where: MW = Molecular Weight in g/mol.

### *2.2.3 Material Handling*

Dust emissions from handling materials in the pit and at the stockpiles was calculated using the U.S. EPA AP-42 emission factor equation from Chapter 13.2.4 – Aggregate Handing and Storage Piles (U.S. EPA 2006b), as follows:

$E = k \times 0.0016 \times (U/2.2)^{1.3} / (M/2)^{1.4}$

Where: E = emission factor in kg/megagram

k = particle size multiplier, see table below

U = mean wind speed (m/s) = 6.6 m/s

M = material moisture content (%) = 10%

| Factor | TPM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|
| k | 0.74 | 0.35 | 0.053 |

### *2.2.4 Wind Erosion*

Dust emissions from stockpile wind erosion were calculated using the emission factor equation from the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook (Countess Environmental, 2006), as follows:

$E = k \times 1.9 \times (s/1.5) \times (F/15) \times 1.16E\text{-}06$

Where: E = emission factor (kg/ha/day)

k = particle size multiplier

s = material silt content (%) = 8.3%

F = % of time that the unobstructed wind speed exceeds 5.4 m/s at mean pile height = 100% as variable emissions were applied in the model

1.16E-06 = conversion from kg/ha/day to $g/m^2/s$

| Factor | TPM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|
| k | 1 | 0.5 | 0.075 |

# 3.0 MODELLING METHODOLOGY

## 3.1 MODEL SELECTION

The CALMET/CALPUFF modelling system is the preferred regulatory model in Newfoundland and Labrador. For the assessment, Version 6.5 of the CALMET model and Version 7.3.2 of the CALPUFF model were used. CALMET is a meteorological model that produces hourly, three-dimensional gridded wind fields from available meteorological, terrain and land use data. CALPUFF is a non-steady state puff dispersion model that utilizes the CALMET wind fields and accounts for spatial changes in meteorology, variable surface conditions, and plume interactions with terrain. CALPUFF can be used for both simple and complex terrain.

The Project is in an area having complex terrain and is located near a water body, emphasizing the need to use CALPUFF.

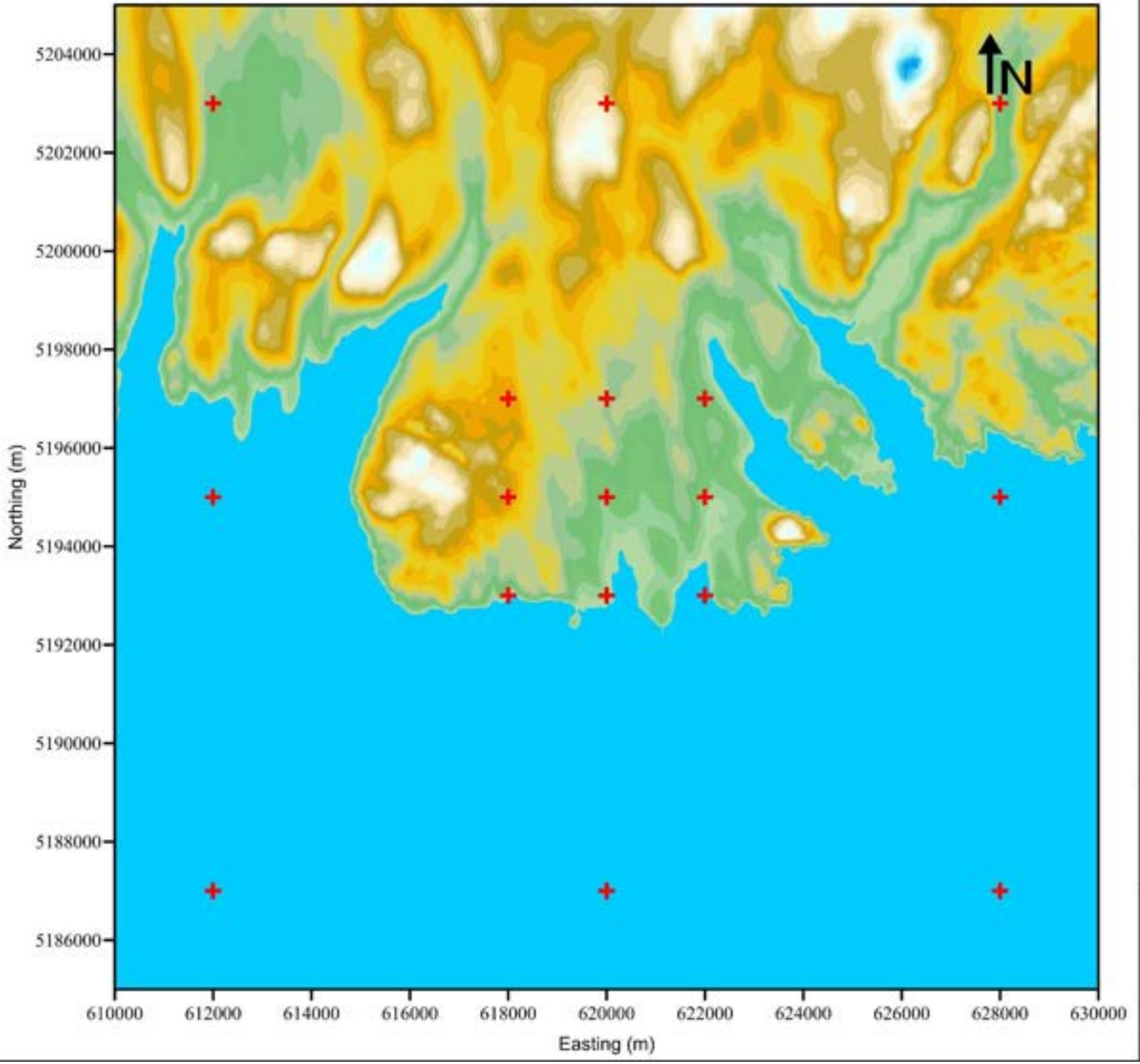
## 3.2 CALMET

The CALMET model was used to develop hourly meteorological data fields to use in CALPUFF. Three (3) years of meteorological data were developed covering the period 2022 to 2024. The CALMET model was run over a large 20 km by 20 km modelling domain having a grid spacing of 200 m. Figure 3.1 shows the CALMET modelling domain.

The outputs from the CALMET model were used to capture the regional wind flow pattern and were used as the inputs into CALPUFF's air dispersion calculations. Ten (10) vertical layers were included for the wind field. The layer heights are shown in Table 3.1.

**Table 3.1: CALMET Wind Field Layer Heights**

| Vertical Height of Layer (m) | Layer Height of Top (m) | Notes |
|---|---|---|
| 20 | 20 | 10-meter meteorology |
| 20 | 40 | 30-meter meteorology |
| 40 | 80 | |
| 80 | 160 | |
| 140 | 300 | |
| 300 | 600 | |
| 400 | 1,000 | |
| 500 | 1,500 | |
| 700 | 2,200 | |
| 800 | 3,000 | |




**LEGEND:**

"Pseudo" Stations

280
260
240
220
200
180
160 Terrain Elevation (m)
140
120
100
80
60
40
20
0

**NOTES:**

**SCALE:**

0 m 2000 m 4000 m

**REVISIONS:**

| No. | Date | By | Revisions |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**REFERENCE:**

WGS-84 UTM (m) Zone 21

SCIENCE ENGINEERING PLANNING | iec

Canada Fluorspar Inc.
South Ridge Project

CALMET Domain, "Pseudo" Stations and Terrain Contours

| Drawn By: | Approved By: | Figure No.: |
|---|---|---|
| BL | | 3.1 |
| Date: February 2026 | Project No.: SX25-0033 | |

### *3.2.1 Meteorology*

As outlined in the modelling guidance (DOEC, 2012a), CALMET can accept inputs from mesoscale meteorological models. The mesoscale model outputs can be directly applied to CALMET or used to generate hourly surface and upper air data. The latter approach was used for this assessment. The mesoscale model used was the Weather Research and Forecast (WRF) Non-Hydrostatic Mesoscale Model (WRF-NMM). WRF-NMM was initialized using archived Global Forecast System (GFS) mesoscale analysis wind fields produced by the National Center for Environmental Prediction (NCEP). The GFS data is generated every 6 hours over a 25 km by 25 km grid and is based on all available surface and upper air observations. WRF-NMM modelling was used to cover a large area with a horizontal resolution of approximately 4 km by 4 km.

The output from the WRF-NMM model was used to generate hourly surface data in CD-144 format (wind speed, wind direction, temperature, cloud cover, etc.) as well as upper air profiles. Hourly surface and upper air data were generated for seventeen (17) locations in the CALMET modelling domain. The locations of the seventeen "pseudo" stations are shown in Figure 3.1.

In place of WRF-NMM outputs, it was recommended by the DECCC to use sea surface temperature data from the NOAA Optimum Interpolation (OI) Sea Surface Temperature (SST) V2 database (NOAA, 2019). This data was used to create the sea surface file for input to CALMET.

### *3.2.2 Terrain Data*

Terrain data inputs for CALMET were processed through the TERREL program. TERREL is a pre-processor program provided with the CALMET/CALPUFF modelling system that accepts surface elevation data in a variety of formats to produce grid-cell averaged terrain files for use in the MAKEGEO processor. For this modelling assessment, the Forest And Buildings removed Copernicus DEM (FABDEM v1-2, 2023), a global elevation map that removes building and tree height biases from the Copernicus GLO 30 Digital Elevation Model (DEM), was used. The 1-arc second grid spacing data is available on-line from the University of Bristol (https://data.bris.ac.uk/data/dataset/s5hqmjcdj8yo2ibzi9b4ew3sn).

To account for terrain elevation changes in the operations and Project areas since the development of the FABDEM database, terrain elevations were manually adjusted based on digital drawings provided by CFI.

The resulting gridded terrain file produced by TERREL is presented graphically in Figure 3.1. The outputs from TERREL were also used to assign ground elevations to the modelled sources and the discrete receptors used in CALPUFF (see Section 3.3.1).

### *3.2.3 Land Use Data*

Upon consultation with DECCC, gridded land use classifications for the CALMET meteorological domain were derived from the Earth Observation for Sustainable Development (EOSD) project which has an approximate horizontal resolution of 30 metres (https://natural-resources.canada.ca/forest-forestry/sustainable-forest-management/forest-cover-map). This land use data was further edited by IEC by recoding small inland water bodies (land use code 51) to reflect times of the year when the water bodies are covered in ice. For such periods, the land use classification was changed to 91 (perennial snow or ice). Additionally, to account for land

use changes in the operations and Project areas since the development of the EOSD database, land use categories were manually adjusted based on digital drawings provided by CFI.

The time periods used to generate the CALMET land use files are outlined in Table 3.2 and are derived from the Copernicus ERA5 re-analysis of snow covering and lake ice cover (https://cds.climate.copernicus.eu/datasets). The timeframes differ slightly from the timeframes provided in the *Plume Dispersion Modelling* guidance document (DOEC, 2012a) and have been updated to reflect actual meteorological conditions versus generic conditions in the guidance. The surface parameters used in CALMET are provided in the *Plume Dispersion Modelling* guidance document (DOEC, 2012a); however, they have been reproduced in Table 3.3 for completeness.

The resulting gridded land use file produced by MAKEGEO for the 'summer' and 'spring / autumn without snow' periods is provided in Figure 3.2.

**Table 3.2: Seasonal Land Use Periods used in CALMET**

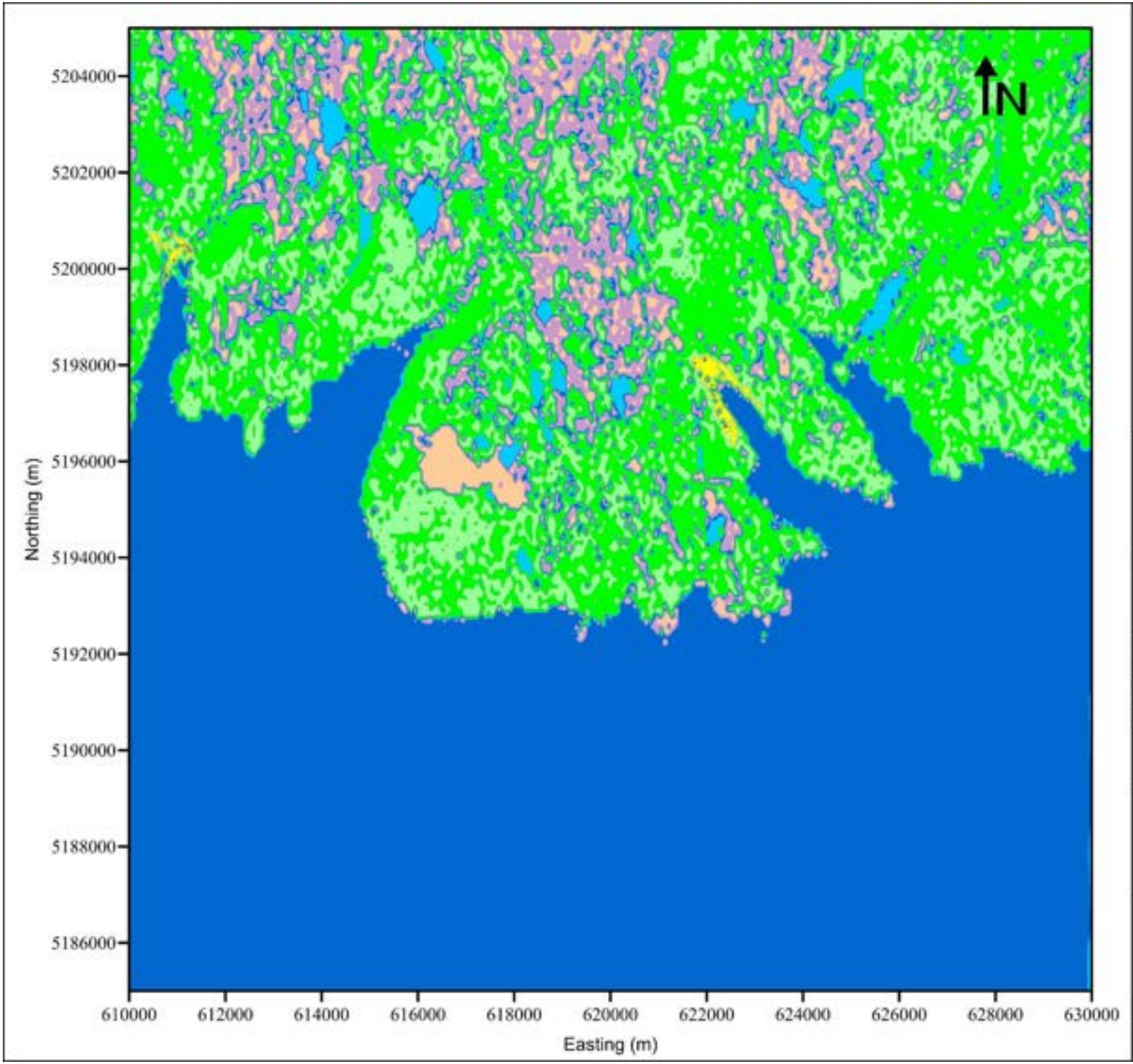
| Season | Calendar Days | | |
|---|---|---|---|
| | **2022** | **2023** | **2024** |
| Summer | May 16 to October 31 | May 16 to October 31 | May 16 to October 31 |
| Spring / Autumn **without** snow | March 31 to May 15 and November 1 to December 14 | May 1 to May 15 and November 1 to December 28 | May 1 to May 15, November 1 to December 3 and December 12 to December 31 |
| Winter **with** snow | January 1 to March 30 and December 15 to December 31 | January 1 to April 30 and December 29 to December 31 | January 1 to April 30 and December 4 to December 11 |
| Frozen Ocean | n/a | n/a | n/a |
| Frozen Lakes | February 16 to March 27 | February 8 to April 12 | January 20 to March 28 |

**Table 3.3: Season Land Use Parameters**

| Non-Winter[1] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Input Land Use Category** | **$z_0$ (m)** | **Albedo** | **Bowen Ratio** | **Soil Heat Flux Parameter** | **Anthropogenic Heat Flux (W/m²)** | **Leaf Area Index** | **Output Category ID** |
| 31 - Herbaceous Rangeland | 0.05 | 0.25 | 1.0 | 0.15 | 0.0 | 0.5 | 30 |
| 32 - Shrub and Brush Rangeland | 0.05 | 0.25 | 1.0 | 0.15 | 0.0 | 0.5 | 30 |
| 41 - Deciduous Forest Land | 1.0 | 0.1 | 1.0 | 0.15 | 0.0 | 7.0 | 40 |
| 42 - Evergreen Forest Land | 1.0 | 0.1 | 1.0 | 0.15 | 0.0 | 7.0 | 40 |
| 43 - Mixed Forest Land | 1.0 | 0.1 | 1.0 | 0.15 | 0.0 | 7.0 | 40 |
| 51 - Fresh Water | 0.001 | 0.1 | 0.0 | 1.0 | 0.0 | 0.0 | 51 |
| 55 - Salt Water | 0.001 | 0.1 | 0.0 | 1.0 | 0.0 | 0.0 | 55 |
| 61 - Forested Wetland | 1.0 | 0.1 | 0.5 | 0.25 | 0.0 | 2.0 | 61 |
| 62 - Non-forested Wetland | 0.2 | 0.1 | 0.1 | 0.25 | 0.0 | 1.0 | 62 |
| 74 - Bare Exposed Rock | 0.05 | 0.3 | 1.0 | 0.15 | 0.0 | 0.05 | 70 |
| 77 - Mixed Barren Land | 0.05 | 0.3 | 1.0 | 0.15 | 0.0 | 0.05 | 70 |
| 81 - Shrub and Brush Tundra | 0.2 | 0.3 | 0.5 | 0.15 | 0.0 | 0.0 | 80 |
| 82 - Herbaceous Tundra | 0.2 | 0.3 | 0.5 | 0.15 | 0.0 | 0.0 | 80 |
| 90 - Perennial Snow or Ice | 0.05 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 90 |
| **Winter with Snow Cover[1]** | | | | | | | |
| **Input Land Use Category** | **$z_0$ (m)** | **Albedo** | **Bowen Ratio** | **Soil Heat Flux Parameter** | **Anthropogenic Heat Flux (W/m²)** | **Leaf Area Index** | **Output Category ID** |
| 31 - Herbaceous Rangeland | 0.005 | 0.7 | 0.5 | 0.15 | 0.0 | 0.5 | 30 |
| 32 - Shrub and Brush Rangeland | 0.005 | 0.7 | 0.5 | 0.15 | 0.0 | 0.5 | 30 |
| 41 - Deciduous Forest Land | 0.5 | 0.5 | 0.5 | 0.15 | 0.0 | 0.0 | 40 |
| 42 - Evergreen Forest Land | 1.3 | 0.35 | 0.5 | 0.15 | 0.0 | 7.0 | 40 |
| 43 - Mixed Forest Land | 0.9 | 0.42 | 0.5 | 0.15 | 0.0 | 3.5 | 40 |
| 51 - Fresh Water | 0.001 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 51 |
| 55 - Salt Water | 0.001 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 55 |
| 61 - Forested Wetland | 0.5 | 0.3 | 0.5 | 0.15 | 0.0 | 0.0 | 61 |
| 62 - Non-forested Wetland | 0.2 | 0.6 | 0.5 | 0.15 | 0.0 | 0.0 | 62 |
| 74 - Bare Exposed Rock | 0.002 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 70 |
| 77 - Mixed Barren Land | 0.002 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 70 |
| 81 - Shrub and Brush Tundra | 0.005 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 80 |
| 82 - Herbaceous Tundra | 0.005 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 80 |
| 90 - Perennial Snow or Ice | 0.05 | 0.7 | 0.5 | 0.15 | 0.0 | 0.0 | 90 |

| Winter without Snow Cover[1] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Input Land Use Category** | **$z_0$ (m)** | **Albedo** | **Bowen Ratio** | **Soil Heat Flux Parameter** | **Anthropogenic Heat Flux ($W/m^2$)** | **Leaf Area Index** | **Output Category ID** |
| 31 - Herbaceous Rangeland | 0.01 | 0.20 | 1.0 | 0.15 | 0.0 | 0.5 | 30 |
| 32 - Shrub and Brush Rangeland | 0.01 | 0.20 | 1.0 | 0.15 | 0.0 | 0.5 | 30 |
| 41 - Deciduous Forest Land | 0.6 | 0.17 | 1.0 | 0.15 | 0.0 | 7.0 | 40 |
| 42 - Evergreen Forest Land | 1.3 | 0.12 | 0.8 | 0.15 | 0.0 | 7.0 | 40 |
| 43 - Mixed Forest Land | 0.95 | 0.14 | 0.9 | 0.15 | 0.0 | 7.0 | 40 |
| 51 - Fresh Water | 0.001 | 0.10 | 0.0 | 1.0 | 0.0 | 0.0 | 51 |
| 55 - Salt Water | 0.001 | 0.10 | 0.0 | 1.0 | 0.0 | 0.0 | 51 |
| 61 - Forested Wetland | 0.6 | 0.14 | 0.3 | 0.25 | 0.0 | 2.0 | 61 |
| 62 - Non-forested Wetland | 0.2 | 0.14 | 0.1 | 0.25 | 0.0 | 1.0 | 62 |
| 74 - Bare Exposed Rock | 0.05 | 0.20 | 1.5 | 0.15 | 0.0 | 0.05 | 70 |
| 77 - Mixed Barren Land | 0.05 | 0.20 | 1.5 | 0.15 | 0.0 | 0.05 | 70 |
| 81 - Shrub and Brush Tundra | 0.100 | 0.20 | 1.0 | 0.15 | 0.0 | 0.0 | 80 |
| 82 - Herbaceous Tundra | 0.1 | 0.20 | 1.0 | 0.15 | 0.0 | 0.0 | 80 |
| 90 - Perennial Snow or Ice | 0.002 | 0.70 | 0.50 | 0.15 | 0.0 | 0.0 | 90 |

**Notes:**
[1] For periods used in CALMET, see Table 3.2




**LEGEND:**

Land Use Category

90
80
70
60
55
50
40
30
20
10

**NOTES:**

**SCALE:**

0 m 2000 m 4000 m

**REVISIONS:**

| No. | Date | By | Revisions |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**REFERENCE:**

WGS-84 UTM (m) Zone 21

SCIENCE ENGINEERING PLANNING iec

Canada Fluorspar Inc.
South Ridge Project

CALMET Land Use (Non-Winter and Winter Without Snow)

| Drawn By: | Approved By: | Figure No.: |
|---|---|---|
| BL | | 3.2 |
| Date: February 2026 | Project No.: SX25-0033 | |

### *3.2.4 CALMET Options*

Provincial modelling guidance (DOEC, 2012a) was followed when selecting the appropriate CALMET options. The main CALMET options used are summarized in Table 3.4.

**Table 3.4: CALMET Options**

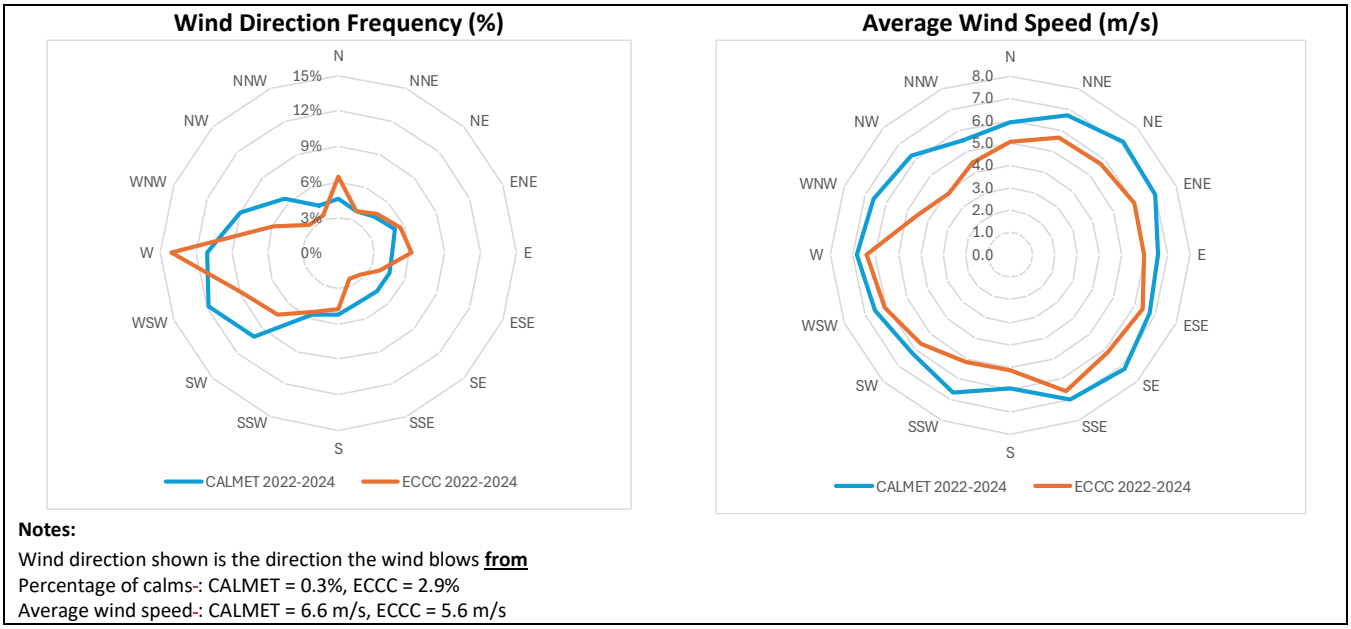
| CALMET Option | Selected Option | Explanation |
|---|---|---|
| No. of Vertical Layers | NZ = 10 | 10 vertical layers used: 0, 20, 40, 80, 160, 300, 600, 1000, 1500, 2200, 3000 m |
| No Observation Mode | NOOBS = 0 | Use surface, overwater, or upper air observations |
| Method to compute cloud fields | ICLOUD = 0 | Gridded clouds not used |
| Use varying radius of influence | LVARY = T | Use varying radius of influence |
| Maximum radius of influence over land in the surface layer | RMAX1 = 8 | Maximum radius of influence of surface stations over land is 8 km |
| Maximum radius of influence over land in the layer aloft | RMAX2 = 8 | Maximum radius of influence of upper air stations over land is 8 km |
| Maximum radius of influence over water | RMAX3 = 10 | Maximum radius of influence of upper air stations over water is 10 km |
| Minimum radius of influence used in the wind field interpolation | RMIN= 0.1 | Minimum radius of influence of stations is 0.1 km |
| Radius of influence of terrain features | TERRAD = 4 (no default) | Terrain effects are considered up to 4 km for each grid point |
| Relative weighting of the first guess field and observations in the surface layer | R1 = 1 | Weighting used for surface layer is 1km |
| Relative weighting of the first guess field and observations in the layers aloft | R2 = 1 | Weighting used for layers aloft is 1 km |
| Surface met. station to use for the surface temperature | ISURFT = -1 | Use 2-D spatially varying surface temperatures |
| Option for overwater lapse rates used in convective mixing height growth | ITWPROG = 0 | Use SEA.DAT lapse rates and deltaT (or assume neutral conditions if missing) |
| 3D relative humidity from observations or from prognostic data | IRHPROG = 0 | Use RH from SURF.DAT file |
| 3D temperature from observations or from prognostic data | ITPROG = 0 | Use Surface and upper air stations |
| Land use categories for temperature interpolation over water | JWAT1 = 55<br>JWAT2 = 55 | Temperature interpolation set over ocean |

### *3.2.5 CALMET Results*

Wind direction frequencies and the average wind speed (by direction), as measured at the Environment and Climate Change Canada (ECCC) weather station in St. Lawrence (Climate Station ID 8403619), and for a CALMET grid node near the ECCC station, are presented as a wind rose in Figure 3.3. Both the ECCC and the CALMET frequencies distributions show that the wind predominately blows nominally from the west with a secondary frequent wind from the east. Winds from the north and south are less common. In terms of wind speed, both the ECCC data and the CALMET data align quite well, with CALMET predicting a higher average wind speed of 6.6 m/s compared to ECCC averaging 5.6 m/s. The wind speed is relatively consistent across all directions with winds from the north to northwest tending to be slightly lighter than winds from other directions. Overall, there is good agreement in wind data between the ECCC data and the CALMET data.

In addition, Figure 3.4 shows the hourly temperature for both ECCC and CALMET. As can be seen in the Figure, the temperatures align well with each other, with ECCC tending to report slightly higher maximum and lower minimum temperatures. Figure 3.5 presents hourly mixing height profiles for each CALMET year and for the grid point near the ECCC station. As can be seen, the mixing height grows after sunrise and collapses after sunset, while peaking in the early afternoon as expected. These profiles demonstrate that CALMET is reproducing the physical parameters that are important for air dispersion modelling.

**Figure 3.3: CALMET Wind Rose (2022-2024)**




**Notes:**
Wind direction shown is the direction the wind blows **from**
Percentage of calms: CALMET = 0.3%, ECCC = 2.9%
Average wind speed: CALMET = 6.6 m/s, ECCC = 5.6 m/s

**Figure 3.4: Observed and Modelled Hourly Temperature Profiles at St. Lawrence (2022-2024)**

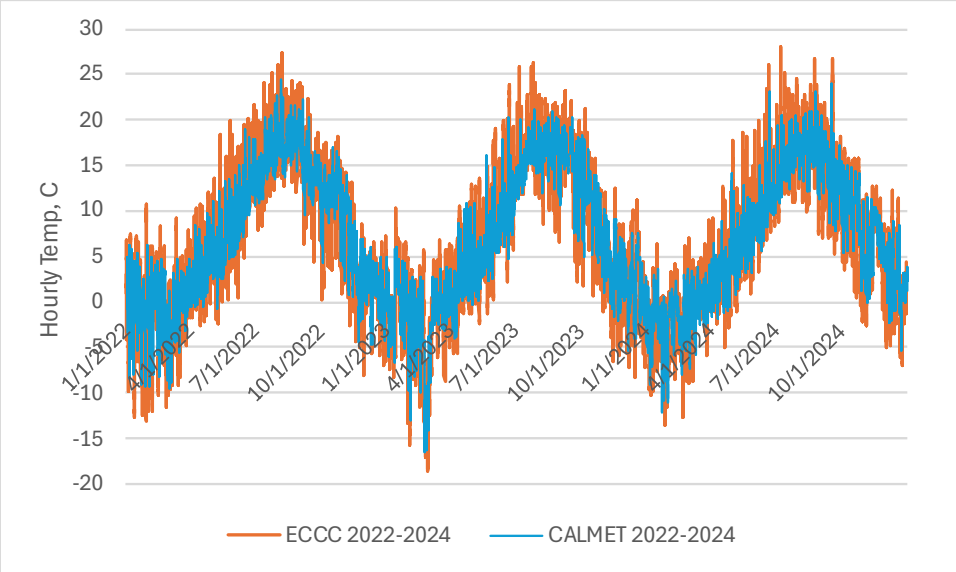
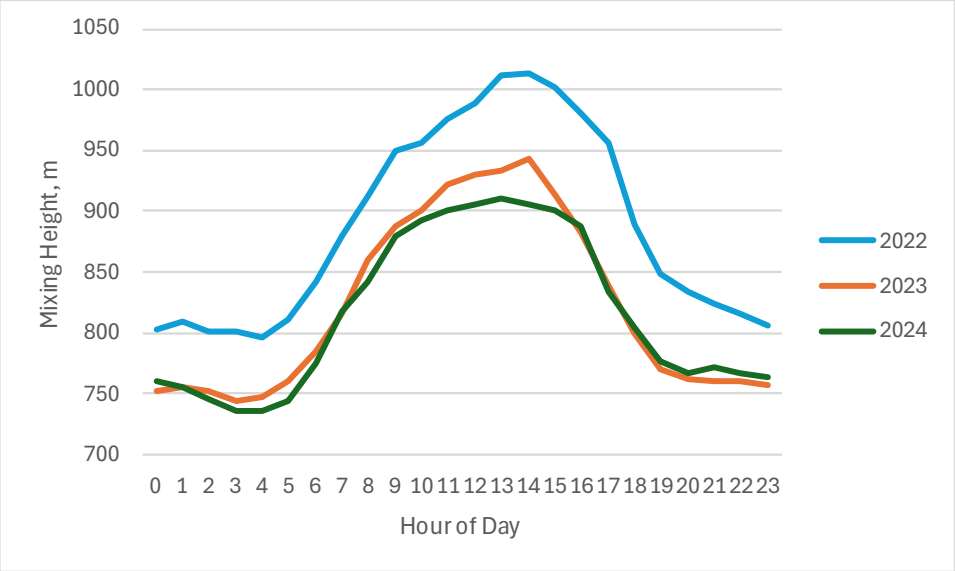



**Figure 3.5: Hourly Mixing Height Profiles from CALMET (2022-2024)**



## 3.3 CALPUFF

### *3.3.1 Modelling Domain and Receptor Grid*

A 20 km by 20 km modelling domain was used in the CALPUFF model runs. Receptors were chosen based on recommendations provided in section 2.4 of provincial modelling guidance (DOEC, 2012a) which states:

- 50 metre spacing from the centre of the operation out to 500 metres;
- 100 metre spacing from 500 metres out to 1000 metres;
- 200 metre spacing from 1000 metres out to 2000 metres;
- 500 metre spacing beyond 2000 metres;
- 50 metre spacing within all residential areas located less than 1000 metres of the administrative boundary;
- 100 metre spacing within all residential areas located beyond 1000 metres of the administrative boundary, but located within 2000 metres of the administrative boundary;
- 200 metre spacing within all residential areas located beyond 2000 metres of the administrative boundary; and
- Discrete receptors are to be placed along the property's administrative boundary at 20 metre intervals or less.

Given the extent of the Project area and the proximity of the various communities, a higher resolution nested receptor grid was developed and used in the model. Specifically, receptors were placed with:

- 50 metre spacing within the current operational production area, as well as the South Ridge Project area, and including Blue Beach Marine Terminal;
- 100 metre spacing within the communities of St. Lawrence, Lawn, the cabin area located to the south of the project area, and all areas within 2000 metres from the Project area; and
- 500 metre spacing within all other areas.

The Project has no pre-defined administrative boundary.

The full receptor grid contains 6,147 receptors and is illustrated in Figure 3.6.

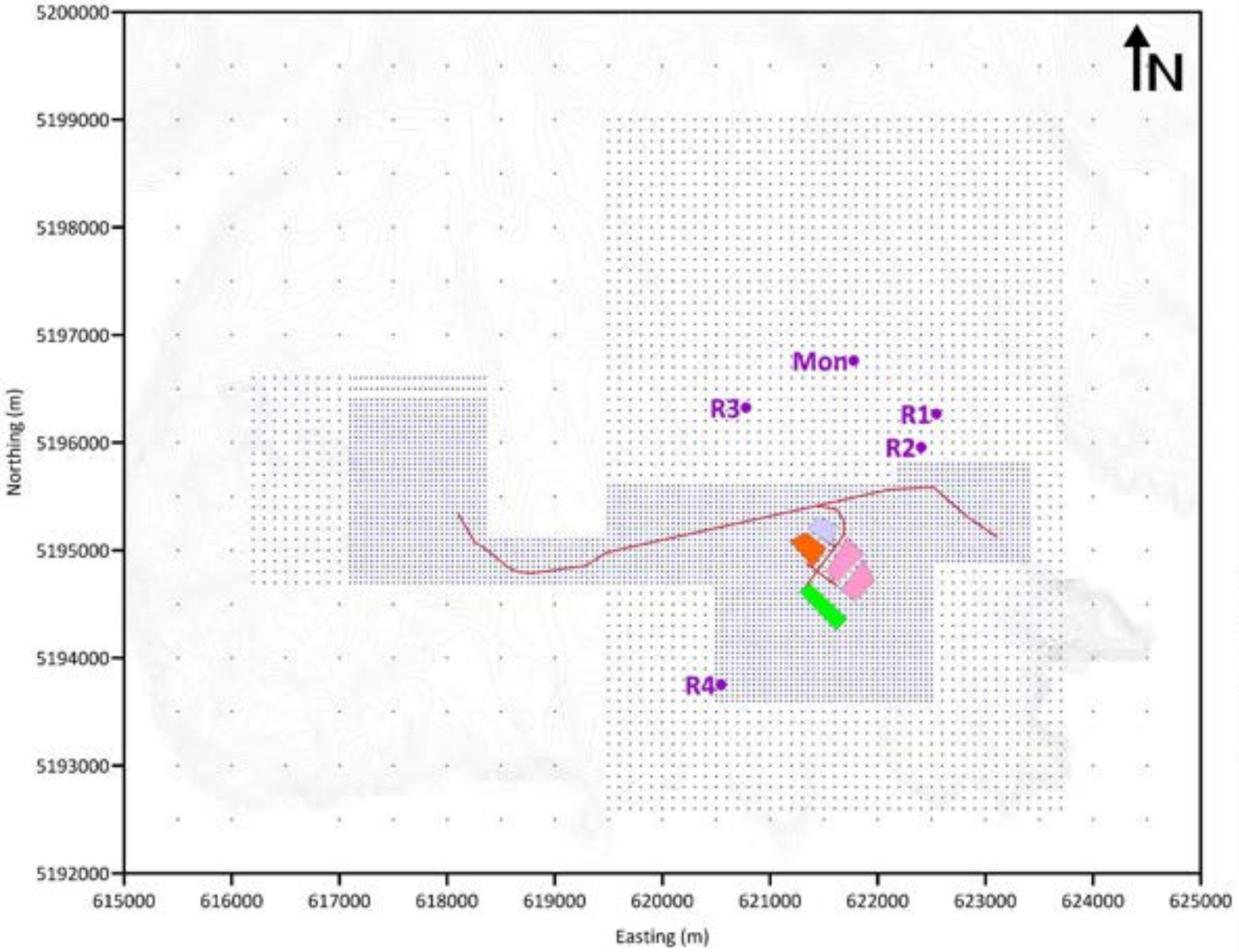
### *3.3.2 Sensitive Receptors*

In addition to the nested receptor grid, results from five (5) sensitive receptors were obtained from the modelled results. These receptor locations are noted in Figure 3.6 and are detailed in Table 3.5. For the ambient air monitoring station ("Mon"), the receptor location was pre-defined as a unique receptor in CALPUFF model runs. For the other four receptors, the results were extracted for the receptor location from 25-metre gridded contours.

**Table 3.5: Sensitive Receptors**

| Receptor Name | Easting (m) [1] | Northing (m) [1] | Receptor Description |
|---|---|---|---|
| R1 | 622545 | 5196268 | Closest Home within Town of St. Lawrence. Located on Corporation Place. |
| R2 | 622404 | 5195958 | Closest residential structure northwest of the Project on road south of Pollux Crescent. |
| R3 | 620776 | 5196324 | Closest Home North of the Project. Located on Salt Cover Brook. |
| R4 | 620543 | 5193752 | Closest residential structure to the Project found within the RV Park located north of Iron Spring Road. |
| Mon | 621776 | 5196763 | Ambient Air Monitoring Station |

**Notes:**
[1] NAD 83 UTM zone 21




**LEGEND:**

- South Ridge Pit
- Waste Rock Stockpiles
- Overburden Stockpile
- Topsoil Stockpile
- Haul Roads
- Sensitive Receptors
- Discrete Receptors

**NOTES:**

**SCALE:**

0 m 1000 m 2000 m

**REVISIONS:**

| No. | Date | By | Revision |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**REFERENCE:**

WGS-84 UTM (m) Zone 21

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**Canada Fluorspar Inc.**

South Ridge Project

# CALPUFF Receptors

| Drawn By: | Approved By: | Figure No.: |
|---|---|---|
| BL | PLK | 3.6 |
| Date: February 2026 | Project No.: SX25-0033 | |

### *3.3.3 Building Downwash*

As no point sources were modelled as part of the assessment, the effects of building downwash were not considered.

### *3.3.4 CALPUFF Options*

Provincial modelling guidance (DOEC, 2012a) was followed when selecting the appropriate CALPUFF options. The options used in this assessment are presented in Table 3.6.

**Table 3.6: CALPUFF Options**

| Parameter | Name of parameter and interpretation | Default value | Selected value | Selected value interpretation |
|---|---|---|---|---|
| NSE | Number of emitted species | 8 | 7 | Emitted species |
| NSPEC | Number of chemical species | 8 | 10 | Emitted species and species implicated in chemical transformations |
| MBDW | Method used to simulate building downwash | 1 | 2 | Not used |
| MSPLIT | Puff splitting allowed | 0 | 1 | Yes |
| MCHEM | Chemical mechanism | 1 | 6 | Updated RIVAD scheme with ISORROPIA equilibrium |
| MAQCHEM | Aqueous phase transformation | 0 | 0 | Transformation rates not modelled |
| MLWC | Liquid water content | 1 | 0 | Water content estimated from cloud cover and presence of precipitation |
| MDISP | Method used to compute dispersion coefficients | 3 | 2 | Dispersion coefficients from internally calculated micrometeorological variables |
| MPDF | Probability density function (PDF) used for dispersion under convective conditions | 0 | 1 | Yes |
| MREG | Test options specified to verify if they conform to (US-EPA) regulatory values | 1 | 0 | No checks are made |
| MOZ | Ozone data input option | 1 | 1 | read hourly ozone concentrations from the OZONE.DAT data file |
| MH2O2 | H2O2 data input option | 1 | 0 | Monthly background value |
| NINT | Number of particle size intervals | 9 | 5 | Used to evaluate effective particle deposition velocity |

### *3.3.5 Chemical Characteristics of Modelled Species*

As required by provincial modelling guidance (DOEC, 2012a), the RIVAD/ISORROPIA chemical mechanism, inclusive of wet and dry deposition of particles as gases, was modelled for combustion sources. This mechanism requires a special sequence of pollutants: $SO_2$, $SO_4$, NO, $NO_2$, $HNO_3$ and $NO_3$. Since the diesel-powered equipment does not emit $SO_4$, $HNO_3$ or $NO_3$, their emission rates were set to zero in the model.

The dry and wet deposition parameters used were based on provincial modelling guidance and are presented in Table 3.7 (dry deposition parameters for particles), Table 3.8 (dry deposition parameters for gases), and Table 3.9 (wet deposition parameters). Background concentrations of ammonia ($NH_3$), and hydrogen peroxide ($H_2O_2$) are required for the RIVAD/ISORROPIA chemical mechanism and are summarized in Table 3.10. Hourly ozone ($O_3$), which is also required for the RIVAD/ISORROPIA chemical mechanism, was obtained from the DECCC for the National Air Pollutant Surveillance (NAPS) station location near Salt Pond, Buin, approximately 27.5 km northeast of the Project. As $O_3$ concentrations do not vary over short distances unless it is scavenged by nitric oxide (NO), the data from this station is deemed representative of the $O_3$ levels near South Ridge.

**Table 3.7: Dry Deposition Parameters for Particle Species**

| Species | Geometric Mass Mean Diameter (µm) | Geometric Standard Deviation (µm) |
|---|---|---|
| $SO_4$ | 0.48 | 2 |
| $NO_3$ | 0.48 | 2 |
| P1 (d < 2.5 µm) | 1.25 | 1.242 |

**Table 3.8: Dry Deposition Parameters for Gaseous Species**

| Species | Diffusivity ($cm^2/s$) | Alpha Star | Reactivity | Mesophyllic Resistance | Henry's Law Coefficient |
|---|---|---|---|---|---|
| $SO_2$ | 0.1509 | 1000 | 8 | 0 | 0.04 |
| NO | 0.1345 | 1 | 2 | 25 | 18 |
| $NO_2$ | 0.1656 | 1 | 8 | 5 | 3.5 |
| $HNO_3$ | 0.1628 | 1 | 18 | 0 | 8.0E-08 |
| CO | 0.186 | 1 | 2 | 61 | 44 |

**Table 3.9: Wet Deposition Parameters for Modelling Species**

| Species | Scavenging Coefficient | |
|---|---|---|
| | Liquid Precipitation | Frozen Precipitation |
| $SO_2$ | 3.0E-05 | 0 |
| $SO_4$ | 1.0E-04 | 3.0E-05 |
| NO | 0 | 0 |
| $NO_2$ | 0 | 0 |
| $HNO_3$ | 6.0E-05 | 0 |
| $NO_3$ | 1.0E-04 | 3.0E-05 |
| P1 (d < 2.5 µm) | 1.0E-04 | 3.0E-05 |
| CO | 0 | 0 |

**Table 3.10: Monthly Background Concentrations of $NH_3$ and $H_2O_2$**

| Month | Ammonia ($NH_3$) (ppb) | Hydrogen Peroxide ($H_2O_2$) (ppb) |
|---|---|---|
| January | 0.5 | 0.2 |
| February | 0.5 | 0.2 |
| March | 0.5 | 0.2 |
| April | 0.5 | 0.2 |
| May | 0.5 | 0.2 |
| June | 0.5 | 0.2 |
| July | 0.5 | 0.2 |
| August | 0.5 | 0.2 |
| September | 0.5 | 0.2 |
| October | 0.5 | 0.2 |
| November | 0.5 | 0.2 |
| December | 0.5 | 0.2 |

## 4.0 MODELLING RESULTS

The following sections outline the results of the air dispersion modelling assessment in accordance with section 5 of the *Plume Dispersion Modelling Guideline* (DOEC, 2012a). Compliance at the sensitive receptors is assessed in Section 0 of this report, which compares the maximum predicted concentrations to applicable Air Quality Standards (AQS). As stated in provincial guidance for the determination of compliance (DOEC, 2012b), meteorological anomalies may result in the over prediction of modelled concentrations. As a result, compliance for each modelled year is based on the following:

- 9$^{th}$ highest level at any given receptor for a 1-hour averaging period
- 6$^{th}$ highest level at any given receptor for a 3-hour averaging period
- 3$^{rd}$ highest level at any given receptor for an 8-hour averaging period
- 2$^{nd}$ highest level at any given receptor for a 24-hour averaging period
- 1$^{st}$ highest level at any given receptor for an annual averaging period.

Background concentrations were not added to the predicted concentrations, and modelled results were directly compared to the AQS. In addition to the tabular results presented in Section 0, Appendix A provides isopleths for predicted concentration for each modelled year per the *Plume Dispersion Modelling Guideline* (DOEC, 2012).

### 4.1 MAXIMUM PREDICTED CONCENTRATIONS AT SENSITIVE RECEPTOR LOCATIONS

Tables 4.1 to 4.3 provide the maximum predicted concentrations (meteorological anomalies removed) of $NO_2$, $SO_2$, CO, TPM, $PM_{10}$, and $PM_{2.5}$ for each modelled year (2022 to 2024) at the sensitive receptor locations. As can be seen in the Tables, with the exception of 24-hour TPM and 24-hour $PM_{10}$, all maximum pollutant concentrations are predicted to be well below their respective air quality standards (AQS) in each modelled year. The highest concentrations are predicted at R2 for the modelled year 2022. The maximum predicted 1-hour $NO_2$ concentration is 57.6% of the AQS, and the maximum predicted 24-hour $NO_2$ concentration is 27.8% of the AQS. The maximum predicted 24-hour $PM_{2.5}$ concentration is 29.0% of the AQS, while both $SO_2$ and CO are less than 0.6% of their respective AQS over all averaging periods. For TPM and $PM_{10}$, the 24-hour AQS may be sporadically exceeded (three or four times a year) at the sensitive receptors if winds are strong, the roads, stockpiles and pit are extremely dry and production is at maximum. Standard mitigation measures during such events will curb those emissions and the resulting concentrations.

**Table 4.1: Summary of Maximum Predicted Concentrations at Sensitive Receptors, 2022**

| Pollutant | Averaging Period | Units | AQS | R1 | | R2 | | R3 | | R4 | | Mon | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS |
| $NO_2$ | 1-hour | µg/m³ [1] | 400 [1] | 168.6 | 42.1% | 230.6 | 57.6% | 115.0 | 28.7% | 123.1 | 30.8% | 97.2 | 24.3% |
| | 24-hour | µg/m³ [1] | 200 [1] | 40.5 | 20.2% | 55.6 | 27.8% | 17.5 | 8.7% | 16.4 | 8.2% | 23.2 | 11.6% |
| | Annual | µg/m³ [1] | 100 [1] | 1.4 | 1.4% | 1.9 | 1.9% | 1.2 | 1.2% | 1.3 | 1.3% | 0.8 | 0.8% |
| $SO_2$ | 1-hour | µg/m³ [1] | 900 [1] | 0.3 | 0.04% | 0.4 | 0.05% | 0.2 | 0.03% | 0.3 | 0.03% | 0.2 | 0.02% |
| | 3-hour | µg/m³ [1] | 600 [1] | 0.2 | 0.03% | 0.3 | 0.05% | 0.2 | 0.03% | 0.1 | 0.02% | 0.1 | 0.02% |
| | 24-hour | µg/m³ [1] | 300 [1] | 0.09 | 0.03% | 0.11 | 0.04% | 0.04 | 0.01% | 0.03 | 0.01% | 0.05 | 0.02% |
| | Annual | µg/m³ [1] | 60 [1] | 0.003 | 0.005% | 0.004 | 0.007% | 0.002 | 0.003% | 0.002 | 0.004% | 0.002 | 0.003% |
| CO | 1-hour | µg/m³ [1] | 35,000 [1] | 167.4 | 0.5% | 211.5 | 0.6% | 114.6 | 0.3% | 119.7 | 0.3% | 92.2 | 0.3% |
| | 8-hour | µg/m³ [1] | 15,000 [1] | 66.9 | 0.4% | 80.0 | 0.5% | 42.1 | 0.3% | 39.6 | 0.3% | 54.0 | 0.4% |
| TPM | 1-hour | µg/m³ | N/A | 475.6 | N/A | 709.0 | N/A | 488.9 | N/A | 390.5 | N/A | 380.8 | N/A |
| | 24-hour | µg/m³ | 120 | 97.9 | 81.6% | **136.3** | **113.6%** | 90.5 | 75.4% | 50.2 | 41.8% | 62.3 | 51.9% |
| | Annual | µg/m³ | 60 | 6.3 | 10.5% | 9.7 | 16.2% | 5.3 | 8.8% | 4.2 | 6.9% | 4.1 | 6.9% |
| $PM_{10}$ | 1-hour | µg/m³ | N/A | 304.6 | N/A | 463.9 | N/A | 238.8 | N/A | 195.8 | N/A | 224.3 | N/A |
| | 24-hour | µg/m³ | 50 | **70.3** | **140.6%** | **95.8** | **191.6%** | 44.9 | 89.8% | 23.5 | 47.0% | 47.8 | 95.5% |
| | Annual | µg/m³ | N/A | 3.2 | N/A | 4.6 | N/A | 2.6 | N/A | 1.9 | N/A | 2.1 | N/A |
| $PM_{2.5}$ | 1-hour | µg/m³ | N/A | 25.4 | N/A | 34.9 | N/A | 17.6 | N/A | 10.5 | N/A | 19.7 | N/A |
| | 24-hour | µg/m³ | 25 | 5.4 | 21.5% | 7.3 | 29.0% | 3.5 | 14.1% | 2.4 | 9.6% | 3.9 | 15.8% |
| | Annual | µg/m³ | 8.8 | 0.4 | 5.3% | 0.7 | 8.3% | 0.3 | 4.0% | 0.2 | 2.6% | 0.3 | 3.3% |

**Notes:**
N/A – not applicable
Compliance with AQS based on the 9th hourly, 6th 3-hour, 3rd 8-hour and 2nd daily maximums.
[1] – Regulatory standard is in ppb. Represents the conversion from ppb to µg/m³
R1: Closest Home within Town of St. Lawrence. Located on Corporation Place. 622545 E, 5196268 N, NAD 83 UTM zone 21
R2: Closest residential structure northwest of the Project on road south of Pollux Crescent. 622404 E, 5195958 N, NAD 83 UTM zone 21
R3: Closest Home North of the Project. Located on Salt Cover Brook. 620776 E, 5196324 N, NAD 83 UTM zone 21
R4: Closest residential structure to the Project found within the RV Park located north of Iron Spring Road. 620543 E, 5193752 N, NAD 83 UTM zone 21
Mon: Ambient Monitoring Station. 621776 E, 5196763 N, NAD 83 UTM zone 21

**Table 4.2: Summary of Maximum Predicted Concentrations at Sensitive Receptors, 2023**

| Pollutant | Averaging Period | Units | AQS | R1 | | R2 | | R3 | | R4 | | Mon | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS |
| $NO_2$ | 1-hour | µg/m³ [1] | 400 [1] | 157.5 | 39.4% | 201.0 | 50.2% | 183.7 | 45.9% | 112.5 | 28.1% | 143.5 | 35.9% |
| | 24-hour | µg/m³ [1] | 200 [1] | 25.0 | 12.5% | 31.5 | 15.7% | 23.3 | 11.7% | 23.7 | 11.9% | 23.6 | 11.8% |
| | Annual | µg/m³ [1] | 100 [1] | 1.4 | 1.4% | 2.0 | 2.0% | 0.8 | 0.8% | 1.1 | 1.1% | 1.1 | 1.1% |
| $SO_2$ | 1-hour | µg/m³ [1] | 900 [1] | 0.3 | 0.04% | 0.4 | 0.04% | 0.4 | 0.04% | 0.2 | 0.03% | 0.3 | 0.03% |
| | 3-hour | µg/m³ [1] | 600 [1] | 0.2 | 0.03% | 0.2 | 0.04% | 0.2 | 0.03% | 0.1 | 0.02% | 0.2 | 0.04% |
| | 24-hour | µg/m³ [1] | 300 [1] | 0.06 | 0.02% | 0.07 | 0.02% | 0.05 | 0.02% | 0.05 | 0.02% | 0.05 | 0.02% |
| | Annual | µg/m³ [1] | 60 [1] | 0.003 | 0.005% | 0.004 | 0.006% | 0.003 | 0.005% | 0.003 | 0.005% | 0.002 | 0.004% |
| CO | 1-hour | µg/m³ [1] | 35,000 [1] | 153.4 | 0.4% | 192.5 | 0.5% | 184.2 | 0.5% | 116.9 | 0.3% | 142.5 | 0.4% |
| | 8-hour | µg/m³ [1] | 15,000 [1] | 70.2 | 0.5% | 87.9 | 0.6% | 51.2 | 0.3% | 38.0 | 0.3% | 57.1 | 0.4% |
| TPM | 1-hour | µg/m³ | N/A | 488.4 | N/A | 665.1 | N/A | 593.2 | N/A | 340.1 | N/A | 467.7 | N/A |
| | 24-hour | µg/m³ | 120 | 74.0 | 61.6% | 106.4 | 88.6% | 90.1 | 75.1% | 54.3 | 45.2% | 87.2 | 72.7% |
| | Annual | µg/m³ | 60 | 5.7 | 9.4% | 8.6 | 14.4% | 6.4 | 10.7% | 5.0 | 8.4% | 4.8 | 8.0% |
| $PM_{10}$ | 1-hour | µg/m³ | N/A | 285.9 | N/A | 371.4 | N/A | 365.8 | N/A | 160.1 | N/A | 301.8 | N/A |
| | 24-hour | µg/m³ | 50 | 43.5 | 86.9% | **57.8** | **115.6%** | **55.0** | **110.1%** | 31.5 | 63.0% | **51.4** | **102.9%** |
| | Annual | µg/m³ | N/A | 3.0 | N/A | 4.2 | N/A | 3.4 | N/A | 2.4 | N/A | 2.7 | N/A |
| $PM_{2.5}$ | 1-hour | µg/m³ | N/A | 21.1 | N/A | 27.8 | N/A | 30.9 | N/A | 10.4 | N/A | 24.0 | N/A |
| | 24-hour | µg/m³ | 25 | 3.4 | 13.6% | 4.7 | 18.6% | 4.5 | 17.9% | 3.0 | 12.2% | 3.9 | 15.8% |
| | Annual | µg/m³ | 8.8 | 0.4 | 4.5% | 0.6 | 7.0% | 0.4 | 4.6% | 0.3 | 3.3% | 0.3 | 3.6% |

**Notes:**
N/A – not applicable
Compliance with AQS based on the 9th hourly, 6th 3-hour, 3rd 8-hour and 2nd daily maximums.
[1] – Regulatory standard is in ppb. Represents the conversion from ppb to µg/m³
R1: Closest Home within Town of St. Lawrence. Located on Corporation Place. 622545 E, 5196268 N, NAD 83 UTM zone 21
R2: Closest residential structure northwest of the Project on road south of Pollux Crescent. 622404 E, 5195958 N, NAD 83 UTM zone 21
R3: Closest Home North of the Project. Located on Salt Cover Brook. 620776 E, 5196324 N, NAD 83 UTM zone 21
R4: Closest residential structure to the Project found within the RV Park located north of Iron Spring Road. 620543 E, 5193752 N, NAD 83 UTM zone 21
Mon: Ambient Monitoring Station. 621776 E, 5196763 N, NAD 83 UTM zone 21

**Table 4.3: Summary of Maximum Predicted Concentrations at Sensitive Receptors, 2024**

| Pollutant | Averaging Period | Units | AQS | R1 | | R2 | | R3 | | R4 | | Mon | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS |
| $NO_2$ | 1-hour | µg/m³ [1] | 400 [1] | 114.5 | 28.6% | 156.3 | 39.1% | 124.4 | 31.1% | 146.7 | 36.7% | 95.8 | 24.0% |
| | 24-hour | µg/m³ [1] | 200 [1] | 17.7 | 8.9% | 23.8 | 11.9% | 23.5 | 11.7% | 26.5 | 13.2% | 12.8 | 6.4% |
| | Annual | µg/m³ [1] | 100 [1] | 1.2 | 1.2% | 1.8 | 1.8% | 0.8 | 0.8% | 1.7 | 1.7% | 0.7 | 0.7% |
| $SO_2$ | 1-hour | µg/m³ [1] | 900 [1] | 0.2 | 0.03% | 0.3 | 0.03% | 0.3 | 0.03% | 0.3 | 0.03% | 0.2 | 0.02% |
| | 3-hour | µg/m³ [1] | 600 [1] | 0.1 | 0.02% | 0.2 | 0.03% | 0.2 | 0.03% | 0.2 | 0.03% | 0.1 | 0.02% |
| | 24-hour | µg/m³ [1] | 300 [1] | 0.04 | 0.01% | 0.05 | 0.02% | 0.05 | 0.02% | 0.05 | 0.02% | 0.03 | 0.01% |
| | Annual | µg/m³ [1] | 60 [1] | 0.002 | 0.004% | 0.003 | 0.006% | 0.002 | 0.003% | 0.004 | 0.006% | 0.001 | 0.002% |
| CO | 1-hour | µg/m³ [1] | 35,000 [1] | 112.1 | 0.3% | 148.0 | 0.4% | 132.4 | 0.4% | 144.4 | 0.4% | 92.7 | 0.3% |
| | 8-hour | µg/m³ [1] | 15,000 [1] | 41.0 | 0.3% | 59.5 | 0.4% | 46.2 | 0.3% | 51.7 | 0.3% | 33.2 | 0.2% |
| TPM | 1-hour | µg/m³ | N/A | 354.1 | N/A | 519.2 | N/A | 468.4 | N/A | 436.0 | N/A | 336.0 | N/A |
| | 24-hour | µg/m³ | 120 | 58.9 | 49.1% | 91.5 | 76.2% | **123.3** | **102.7%** | 78.7 | 65.6% | 50.2 | 41.9% |
| | Annual | µg/m³ | 60 | 5.8 | 9.6% | 9.1 | 15.2% | 4.7 | 7.9% | 5.8 | 9.7% | 3.5 | 5.8% |
| $PM_{10}$ | 1-hour | µg/m³ | N/A | 207.7 | N/A | 270.1 | N/A | 301.4 | N/A | 215.7 | N/A | 207.1 | N/A |
| | 24-hour | µg/m³ | 50 | 34.0 | 68.1% | 49.9 | 99.8% | **58.4** | **116.7%** | 39.7 | 79.5% | 29.1 | 58.1% |
| | Annual | µg/m³ | N/A | 2.9 | N/A | 4.2 | N/A | 2.5 | N/A | 2.7 | N/A | 1.8 | N/A |
| $PM_{2.5}$ | 1-hour | µg/m³ | N/A | 15.3 | N/A | 20.1 | N/A | 22.4 | N/A | 11.1 | N/A | 17.0 | N/A |
| | 24-hour | µg/m³ | 25 | 2.9 | 11.6% | 4.2 | 16.8% | 4.2 | 16.8% | 2.8 | 11.0% | 2.5 | 9.8% |
| | Annual | µg/m³ | 8.8 | 0.4 | 4.9% | 0.6 | 8.0% | 0.3 | 3.5% | 0.3 | 4.0% | 0.2 | 2.9% |

**Notes:**
N/A – not applicable
Compliance with AQS based on the 9th hourly, 6th 3-hour, 3rd 8-hour and 2nd daily maximums.
[1] – Regulatory standard is in ppb. Represents the conversion from ppb to µg/m³
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### 4.2 ISOPLETHS OF CONCENTRATIONS AND TOP-50 TABLES

Provincial modelling guidance (DOEC, 2012a) requires that isopleths and Top-50 tables (without meteorological anomalies removed) be created for each pollutant and averaging time that has a modelled concentration which is more than 50% of the AQS. As no administrative boundary is defined for the Project area, receptors were placed in and on features within the Project area to better define the impacts of the Project and therefore Top-50 tables would only provide concentrations within those features. As a result, Top-50 tables were not generated for this report. Within the entire modelling domain, the modelled concentrations of $SO_2$ and CO, over all regulatory timeframes, were below 50% of the associated air quality standard and as such isopleths for those pollutants are not included in this report. For all other pollutants and timeframes, the associated isopleths are included in Appendix A and specifically are per Table 4.4.

It is important to note that the predicted concentrations shown in the isopleths of Appendix A represent the maximum concentrations predicted by the model at each location at any time during the assessment period. In other words, the contour plots are not representative of a single moment in time but rather a consolidation of worst-case concentrations for each receptor, which may occur in different years, days, or hours under different meteorological conditions.

As can be seen in the isopleths in Appendix A, the highest concentrations for all pollutants occur in and around the pit and stockpiles, and to a lesser extent along the main haul road, with concentrations dropping off very quickly, as expected, with increasing distance from these sources. Standard mitigation efforts such as pit, stockpile and road watering, which were not accounted for in the model, would significantly reduce particulate emissions.

**Table 4.4: Summary of Isopleths**

| Appendix Figure | Isopleth |
|---|---|
| A.1 | Maximum 1-Hour $NO_2$, 2022 |
| A.2 | Maximum 1-Hour $NO_2$, 2023 |
| A.3 | Maximum 1-Hour $NO_2$, 2024 |
| A.4 | Maximum 24-Hour $NO_2$, 2022 |
| A.5 | Maximum 24-Hour $NO_2$, 2023 |
| A.6 | Maximum 24-Hour $NO_2$, 2024 |
| A.7 | Annual $NO_2$, 2022 |
| A.8 | Annual $NO_2$, 2023 |
| A.9 | Annual $NO_2$, 2024 |
| A.10 | Maximum 1-Hour TPM, 2022 |
| A.11 | Maximum 1-Hour TPM, 2023 |
| A.12 | Maximum 1-Hour TPM, 2024 |
| A.13 | Maximum 24-Hour TPM, 2022 |
| A.14 | Maximum 24-Hour TPM, 2023 |
| A.15 | Maximum 24-Hour TPM, 2024 |
| A.16 | Annual TPM, 2022 |
| A.17 | Annual TPM, 2023 |
| A.18 | Annual TPM, 2024 |

| Appendix Figure | Isopleth |
|---|---|
| A.19 | Maximum 1-Hour $PM_{10}$, 2022 |
| A.20 | Maximum 1-Hour $PM_{10}$, 2023 |
| A.21 | Maximum 1-Hour $PM_{10}$, 2024 |
| A.22 | Maximum 24-Hour $PM_{10}$, 2022 |
| A.23 | Maximum 24-Hour $PM_{10}$, 2023 |
| A.24 | Maximum 24-Hour $PM_{10}$, 2024 |
| A.25 | Maximum 1-Hour $PM_{2.5}$, 2022 |
| A.26 | Maximum 1-Hour $PM_{2.5}$, 2023 |
| A.27 | Maximum 1-Hour $PM_{2.5}$, 2024 |
| A.28 | Maximum 24-Hour $PM_{2.5}$, 2022 |
| A.29 | Maximum 24-Hour $PM_{2.5}$, 2023 |
| A.30 | Maximum 24-Hour $PM_{2.5}$, 2024 |
| A.31 | Annual $PM_{2.5}$, 2022 |
| A.32 | Annual $PM_{2.5}$, 2023 |
| A.33 | Annual $PM_{2.5}$, 2024 |

## 5.0 CONCLUSIONS

Air dispersion modelling using the CALMET/CALPUFF modelling system was performed to evaluate the impacts of CFI's South Ridge Project on the local air quality. $NO_2$, $SO_2$, CO, TPM, $PM_{10}$ and $PM_{2.5}$ were modelled, and predicted concentrations were compared to Newfoundland and Labrador Air Quality Standards (AQS) in accordance with DECCC guidance. A three-year modelling period (2022 to 2024) was used.

For the South Ridge Project, with the exception of 24-hour TPM and 24-hour $PM_{10}$ under extraordinary circumstances, the maximum pollutant concentrations are all predicted to be well below their respective provincial AQS at the closest sensitive receptors. At the sensitive receptors, the maximum predicted 1-hour $NO_2$ concentration is 57.6% of the AQS, and the maximum predicted 24-hour $NO_2$ concentration is 27.8% of the AQS. The maximum predicted 24-hour $PM_{2.5}$ concentration is 29.0% of the AQS, while both $SO_2$ and CO are less than 0.6% of their respective AQS over all averaging periods. For TPM and $PM_{10}$, the 24-hour AQS may be sporadically exceeded if winds are strong, the roads, stockpiles and pit are extremely dry and production is at maximum. Standard mitigation measures during such events will curb those emissions and the resulting concentrations.

## 6.0 REFERENCES

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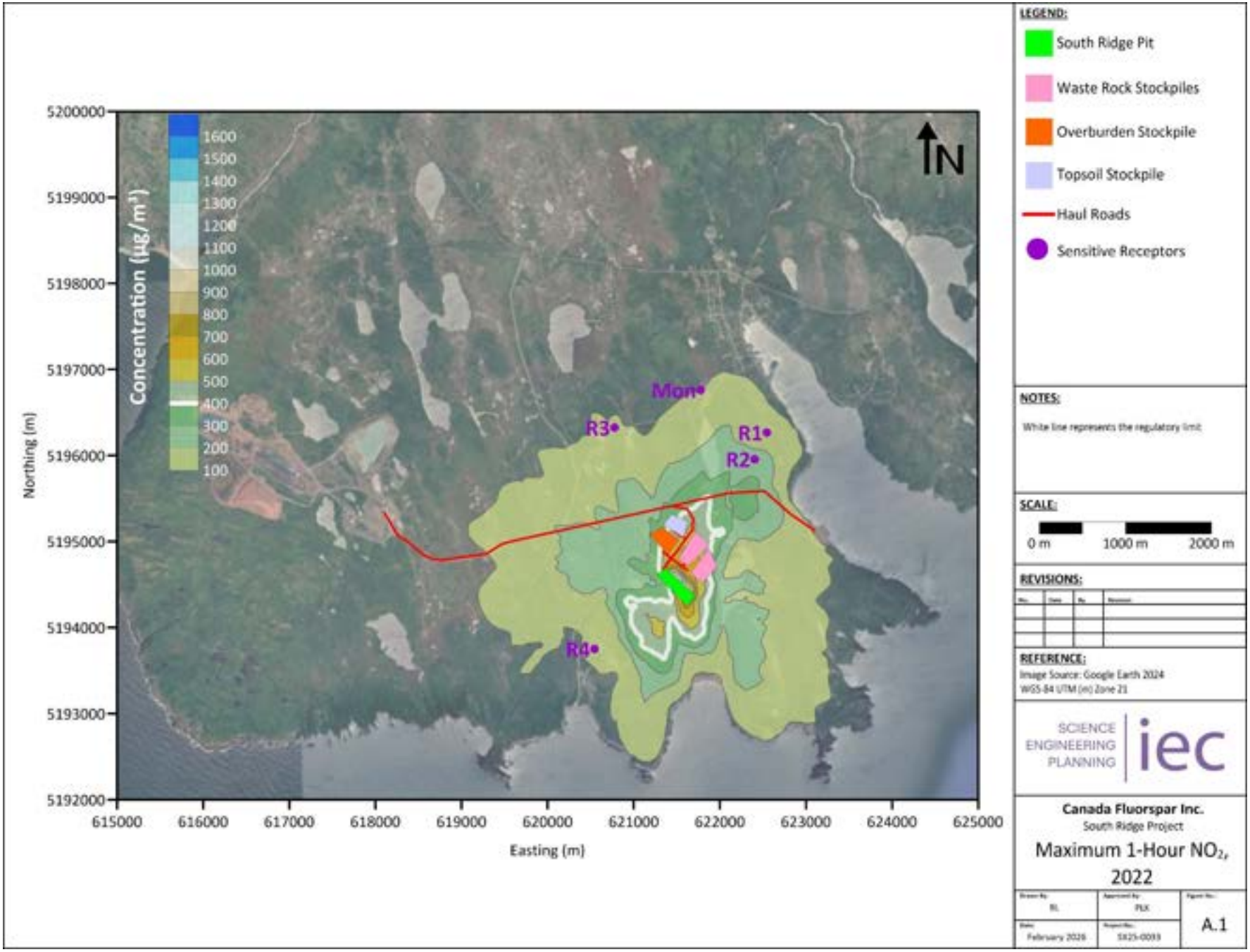
# Appendix A:

**Isopleths**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LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
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2000 m
REVISIONS:
REFERENCE:
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Maximum 1-Hour NO2, 2022
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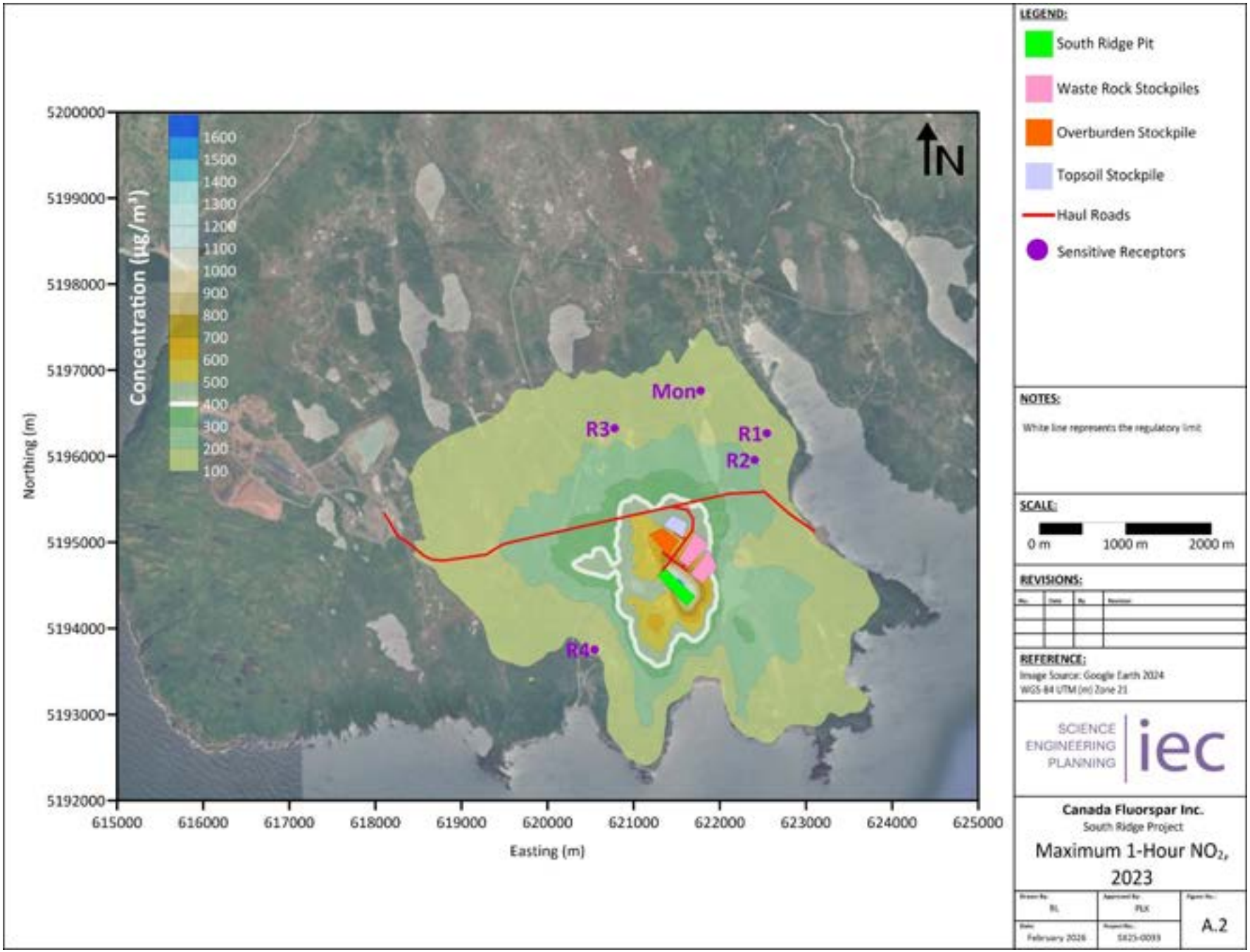
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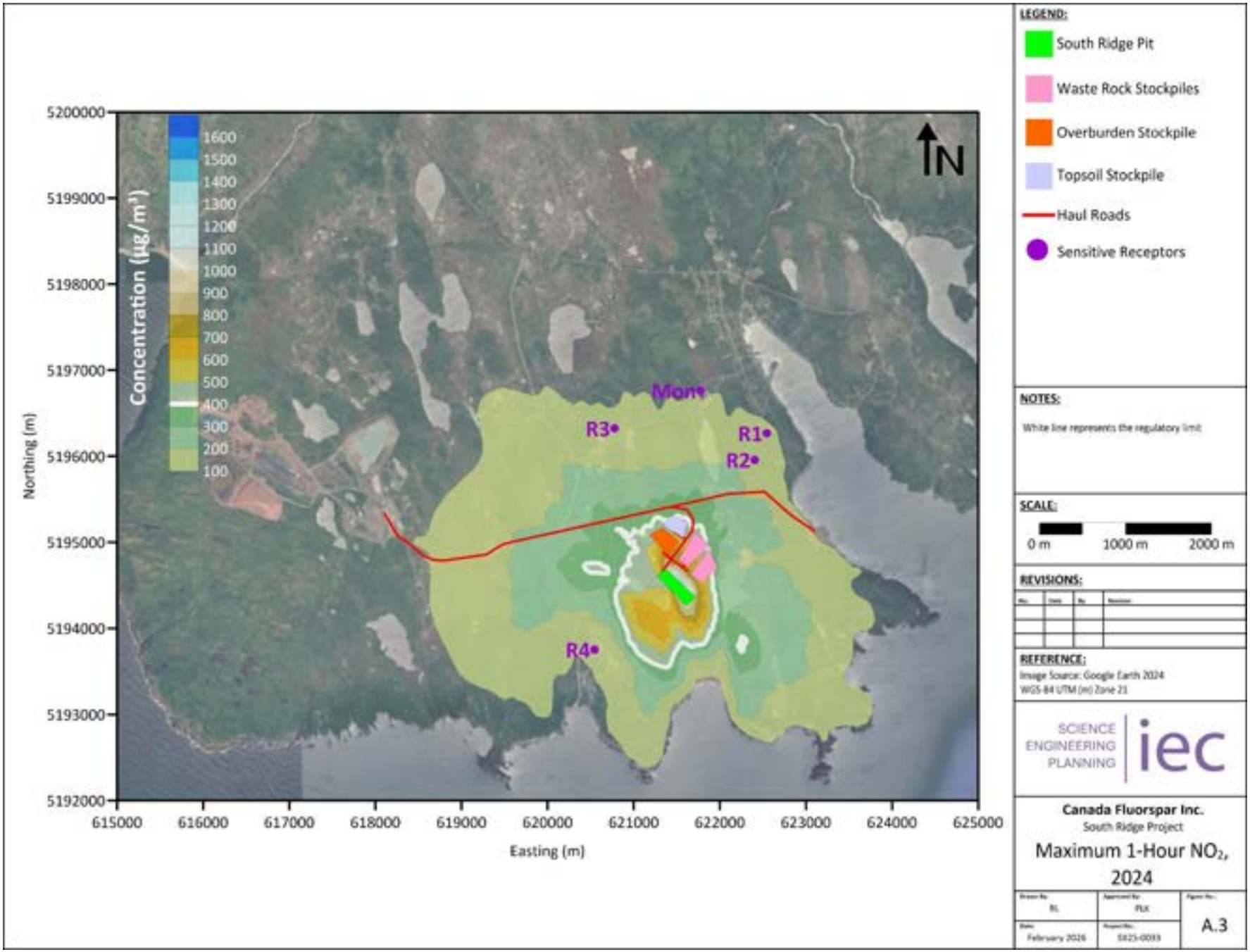
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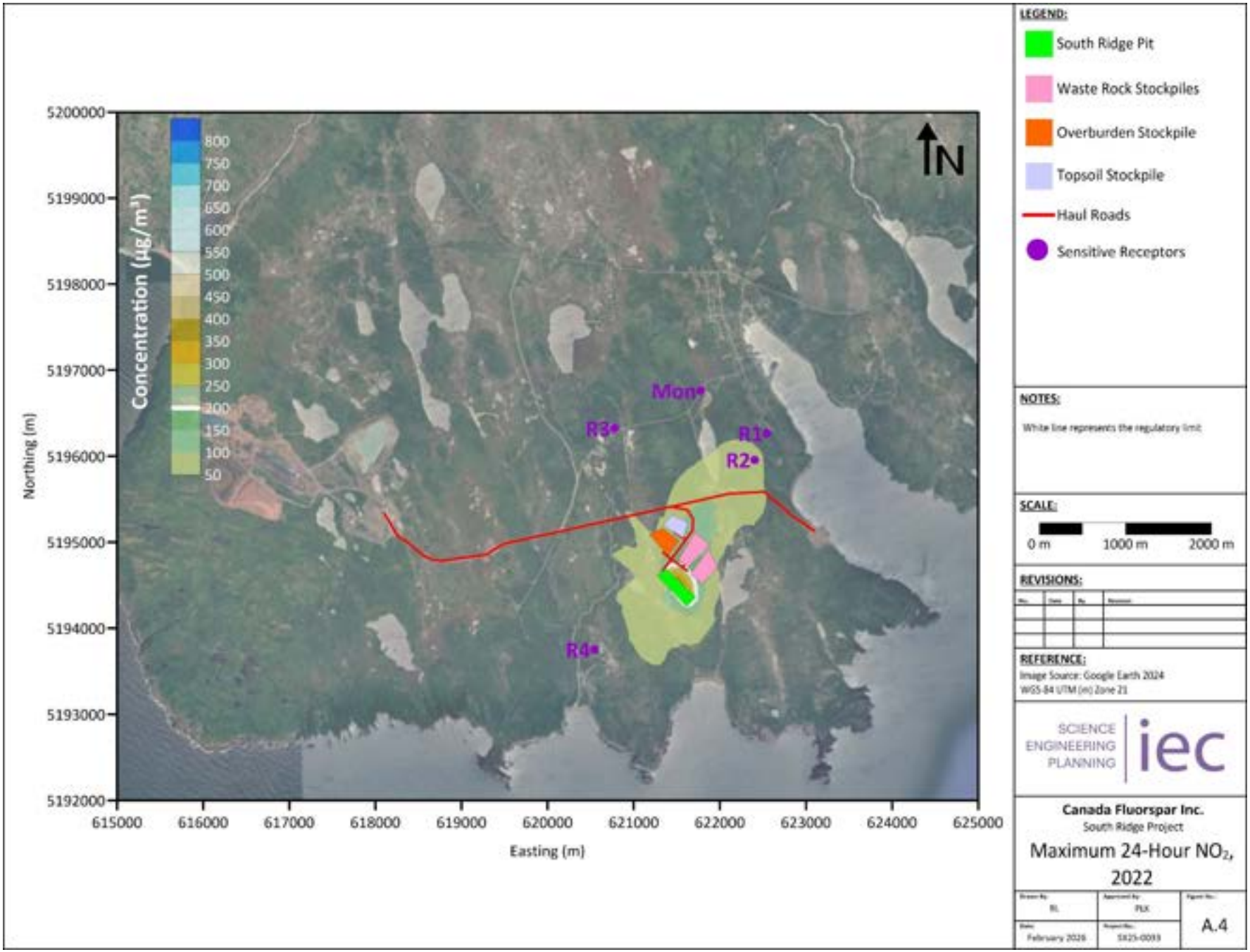
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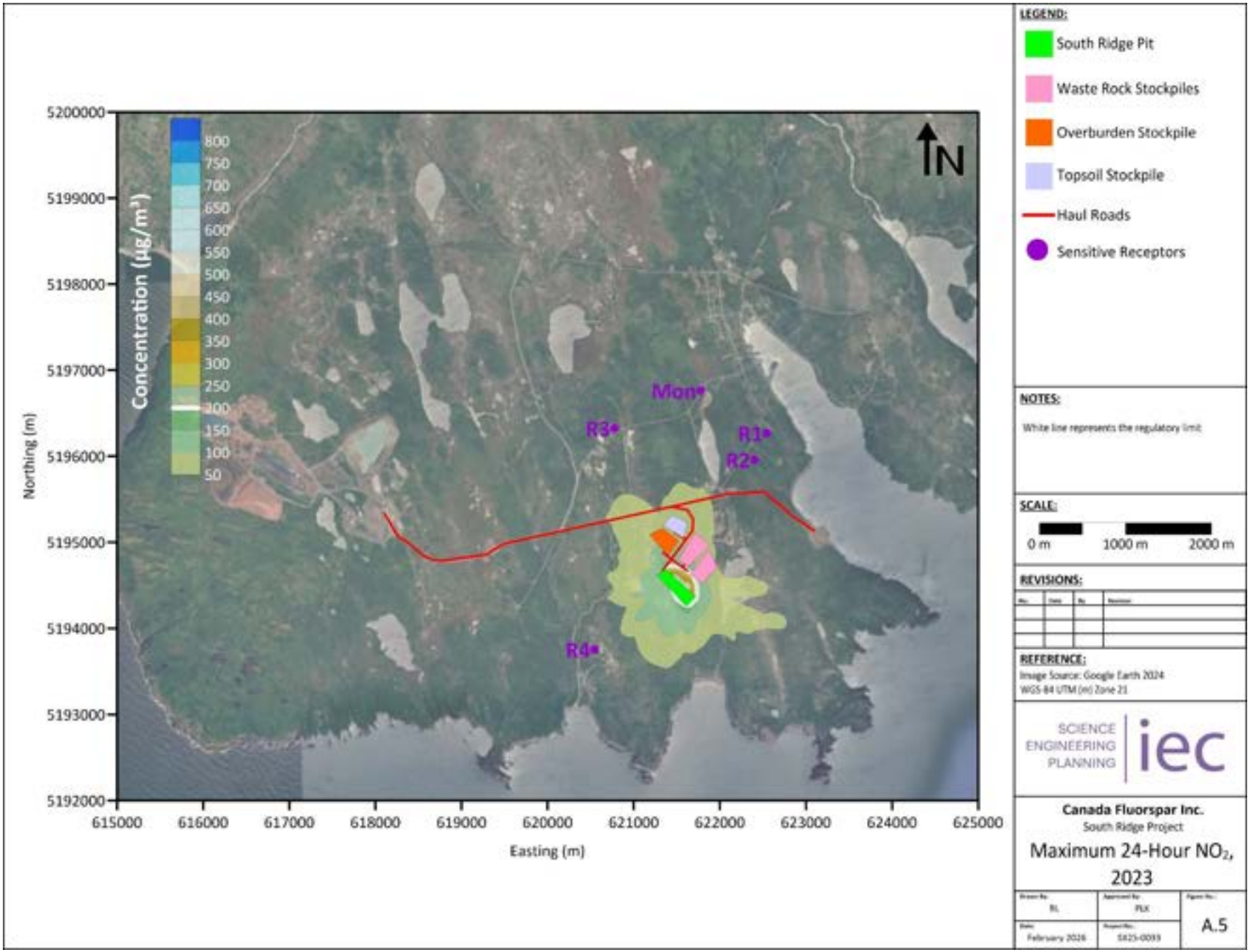
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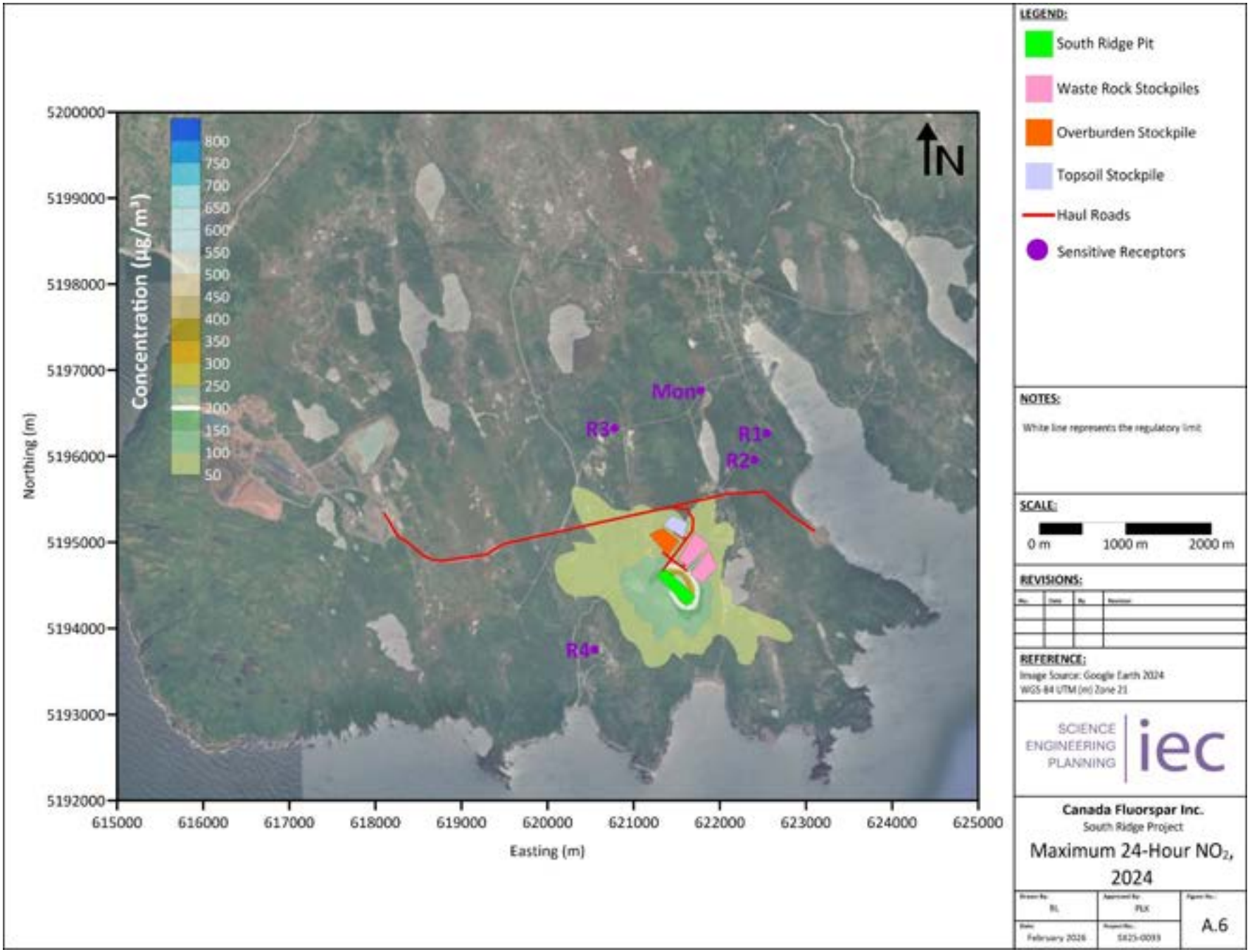
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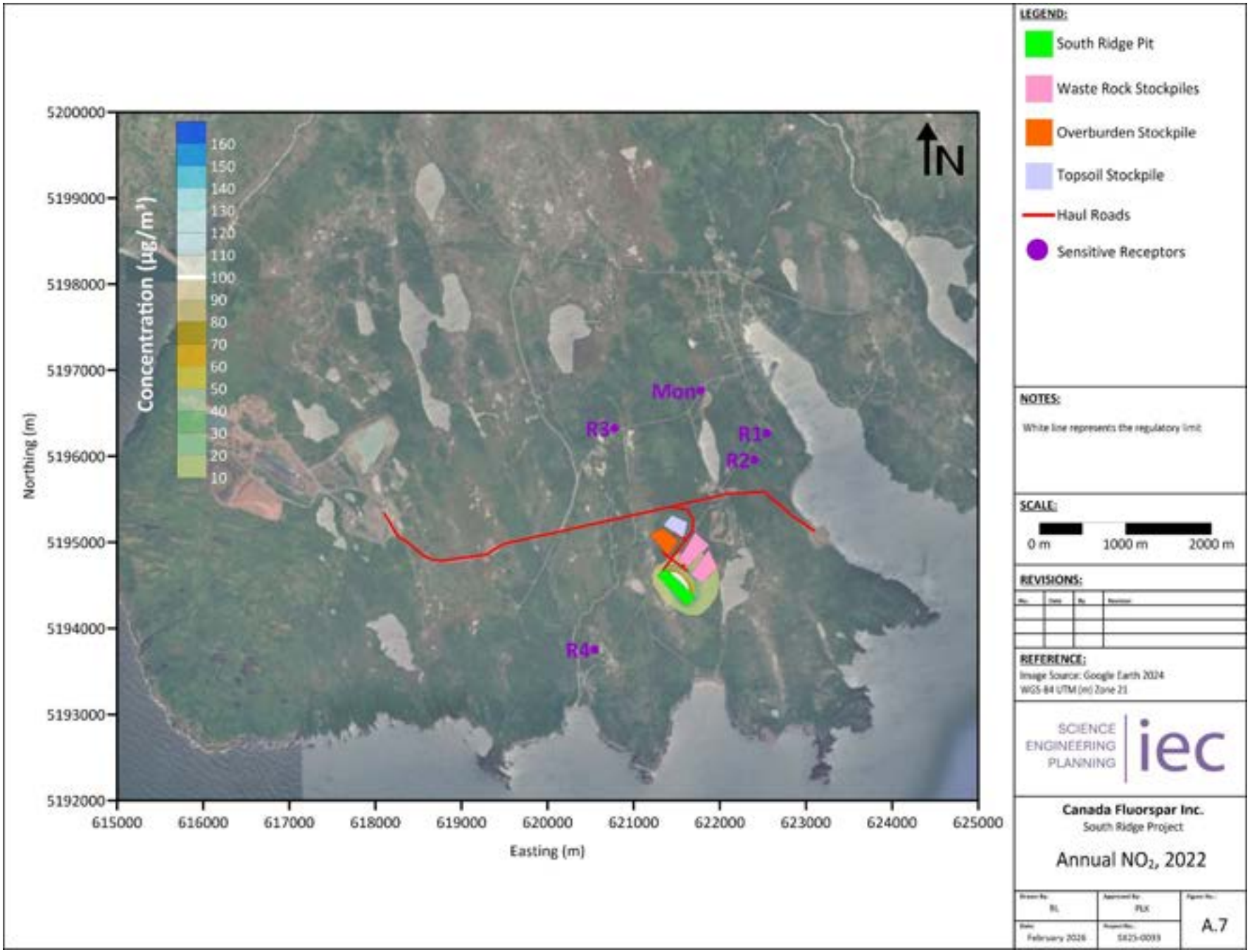
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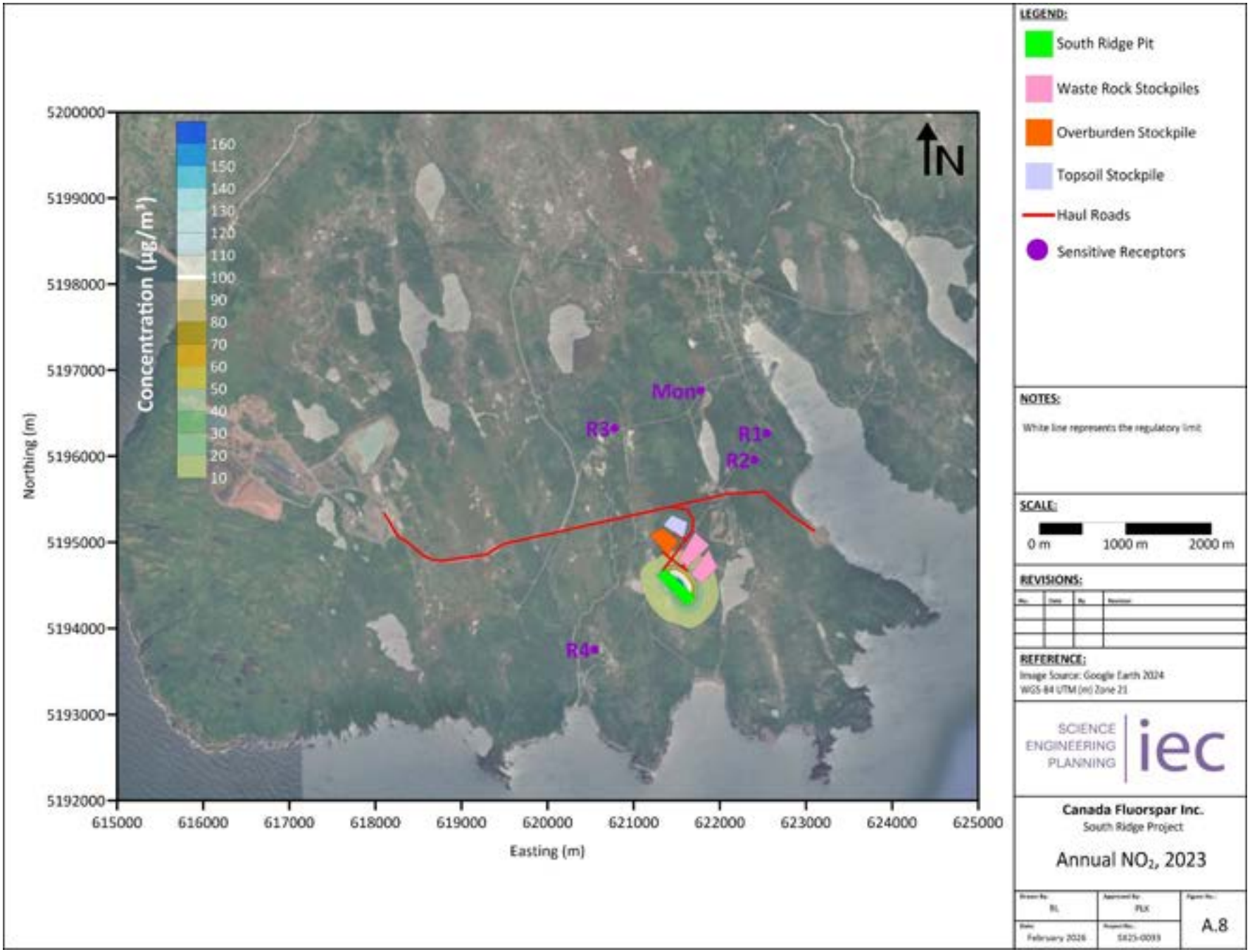
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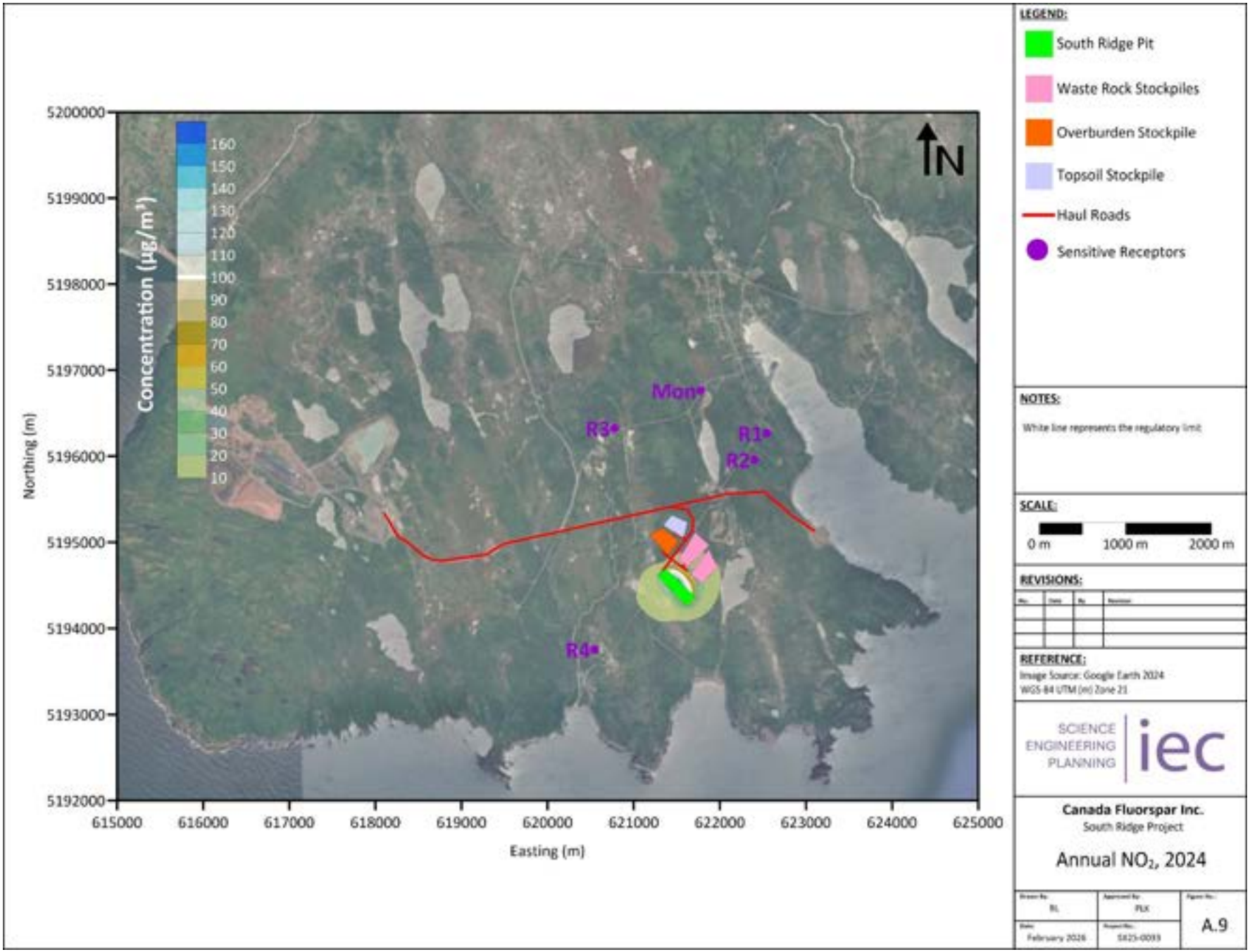
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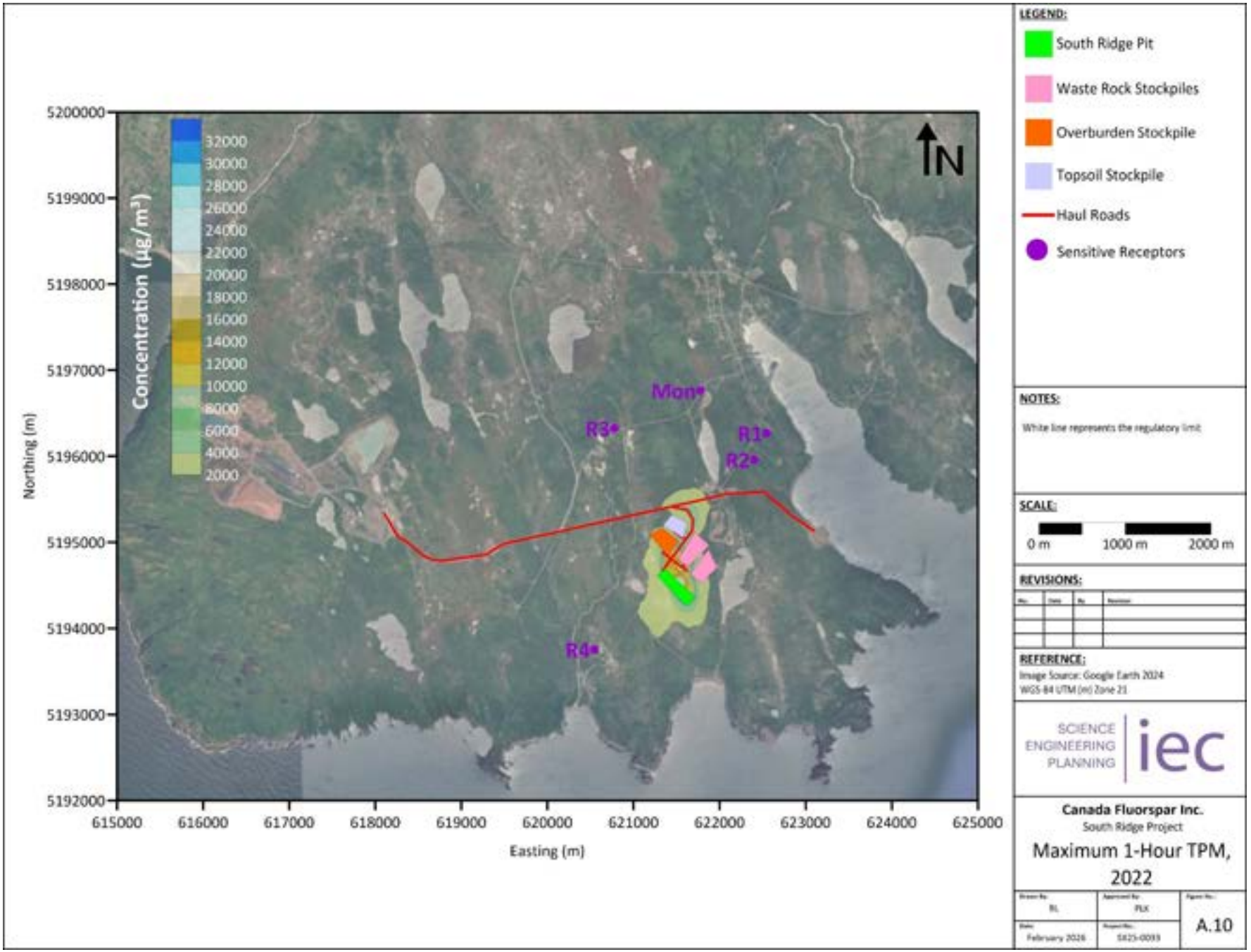
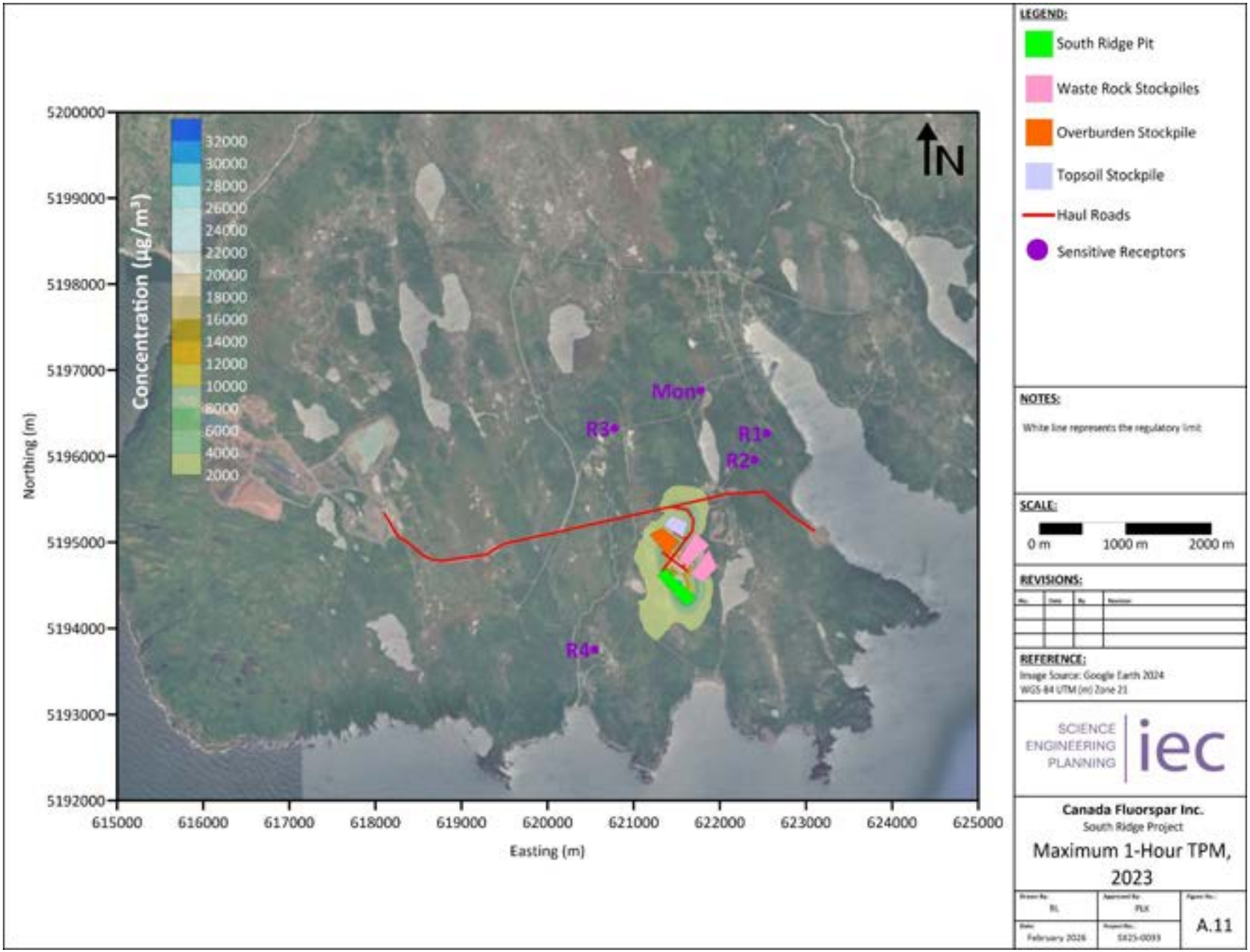
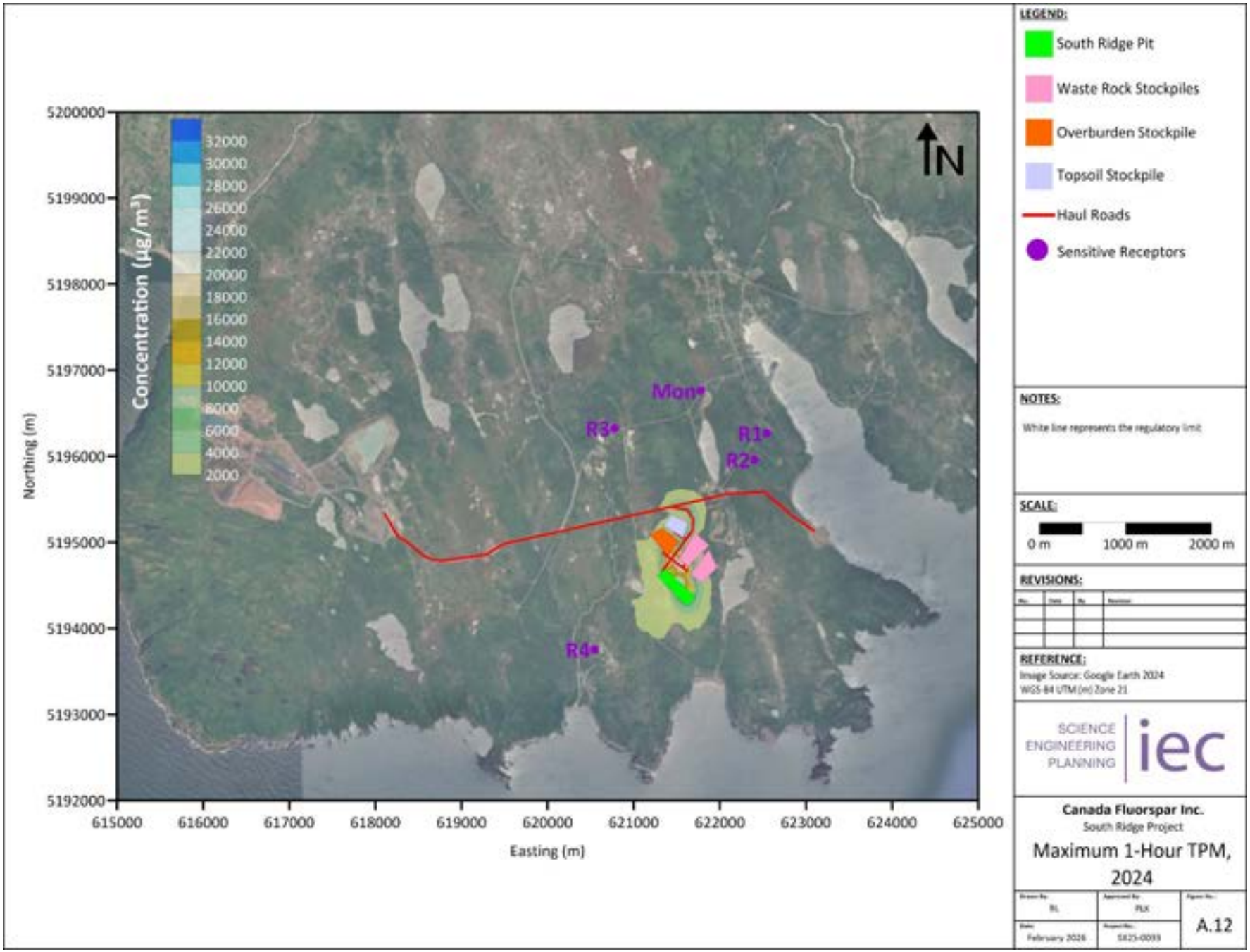
February 2026
A.9


Concentration (µg/m³)
32000
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour TPM, 2022
BL
PLK
February 2026
A.10


Concentration (µg/m³)
32000
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour TPM, 2023
BL
PLK
February 2026
A.11


Concentration (µg/m³)
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30000
28000
26000
24000
22000
20000
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10000
8000
6000
4000
2000
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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PLANNING
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Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour TPM, 2024
BL
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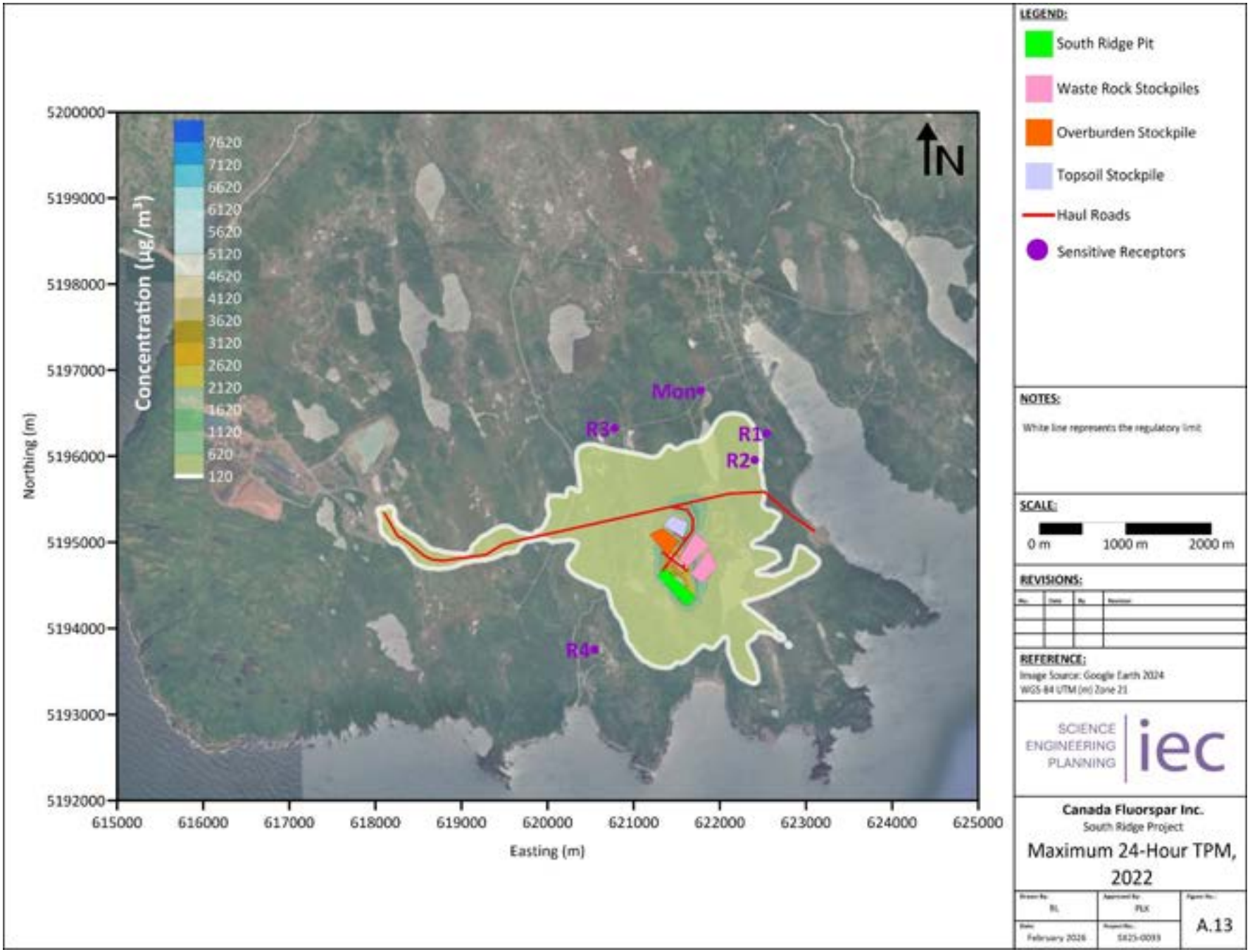
February 2026
A.12


Concentration (µg/m³)
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6620
6120
5620
5120
4620
4120
3620
3120
2620
2120
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620
120
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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PLANNING
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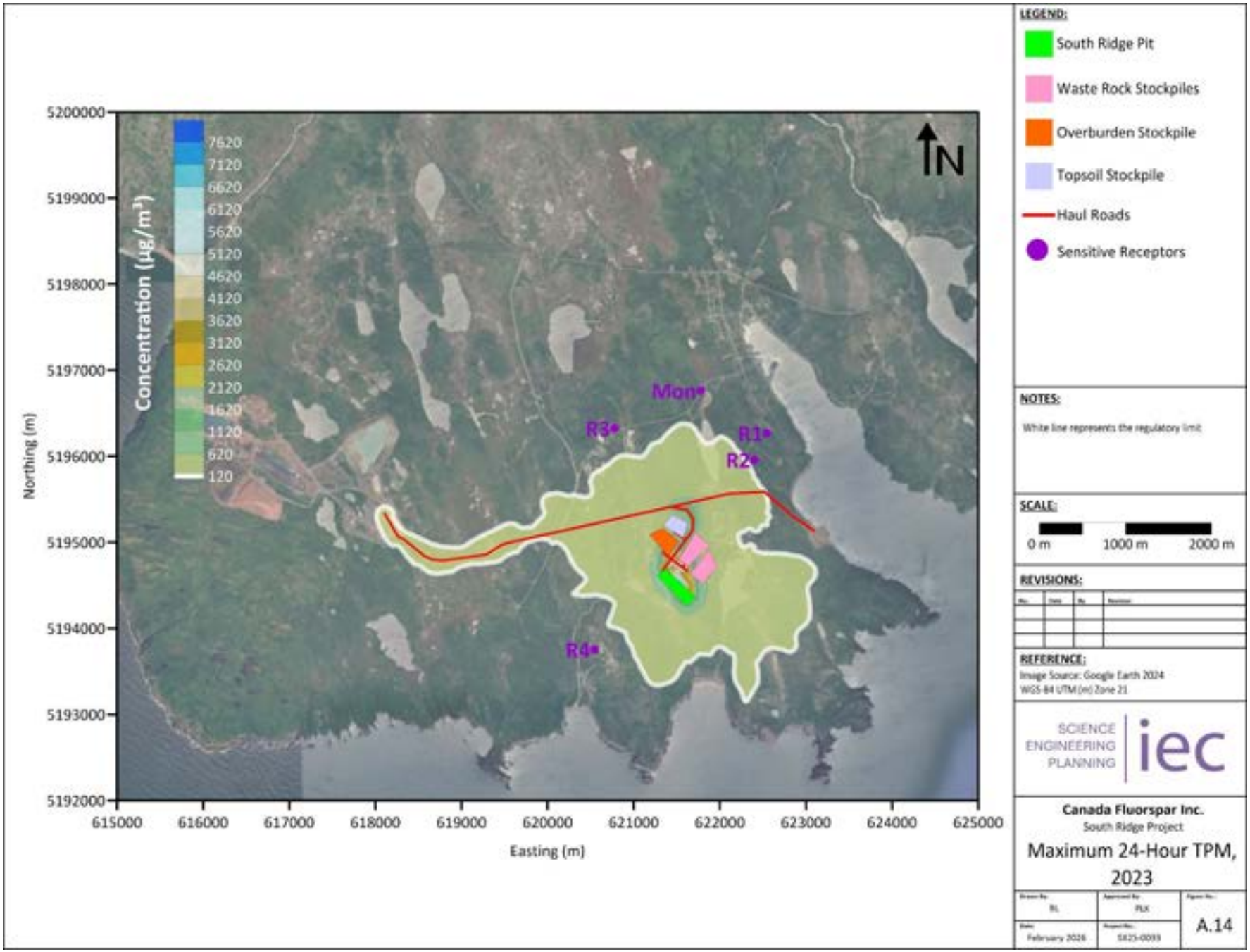
A.13


Concentration (µg/m³)
7620
7120
6620
6120
5620
5120
4620
4120
3620
3120
2620
2120
1620
1120
620
120
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
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South Ridge Project
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PLK
February 2026
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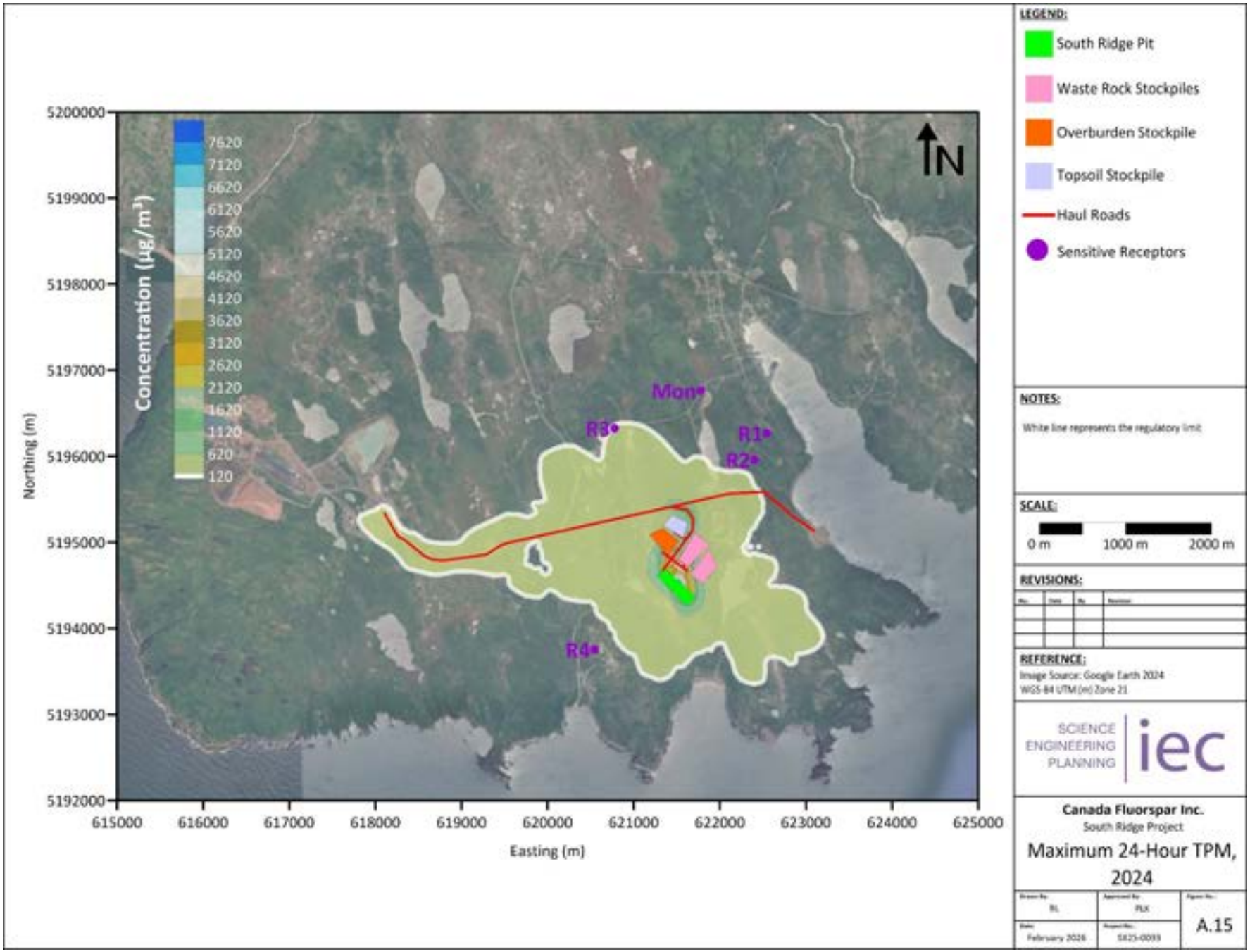
Concentration (µg/m³)
7620
7120
6620
6120
5620
5120
4620
4120
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2620
2120
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1120
620
120
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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South Ridge Project
Maximum 24-Hour TPM, 2024
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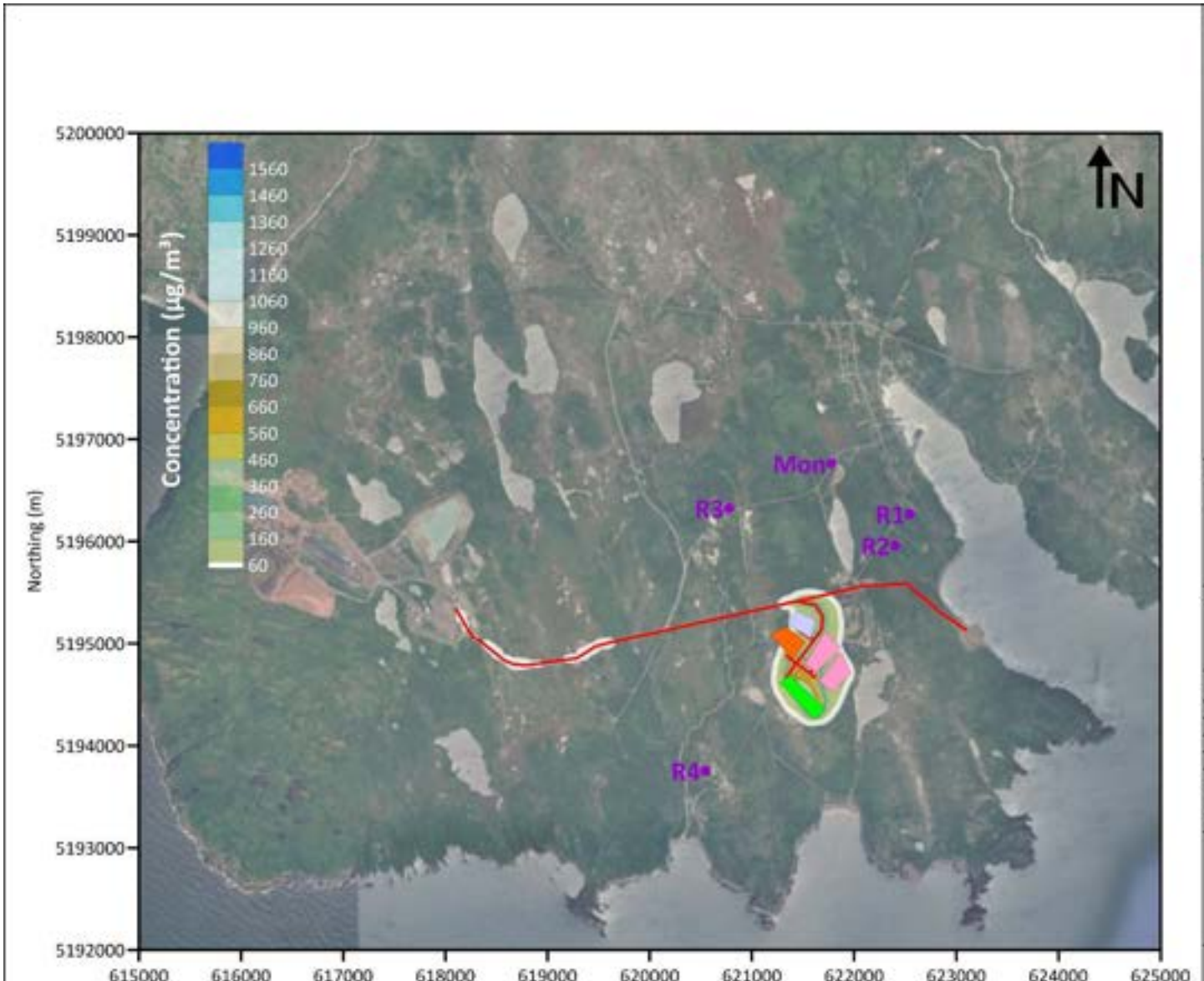


**LEGEND:**

- South Ridge Pit
- Waste Rock Stockpiles
- Overburden Stockpile
- Topsoil Stockpile
- Haul Roads
- Sensitive Receptors

**NOTES:**

White line represents the regulatory limit

**SCALE:**

0 m 1000 m 2000 m

**REVISIONS:**

| No. | Date | By | Revision |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**REFERENCE:**

Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21

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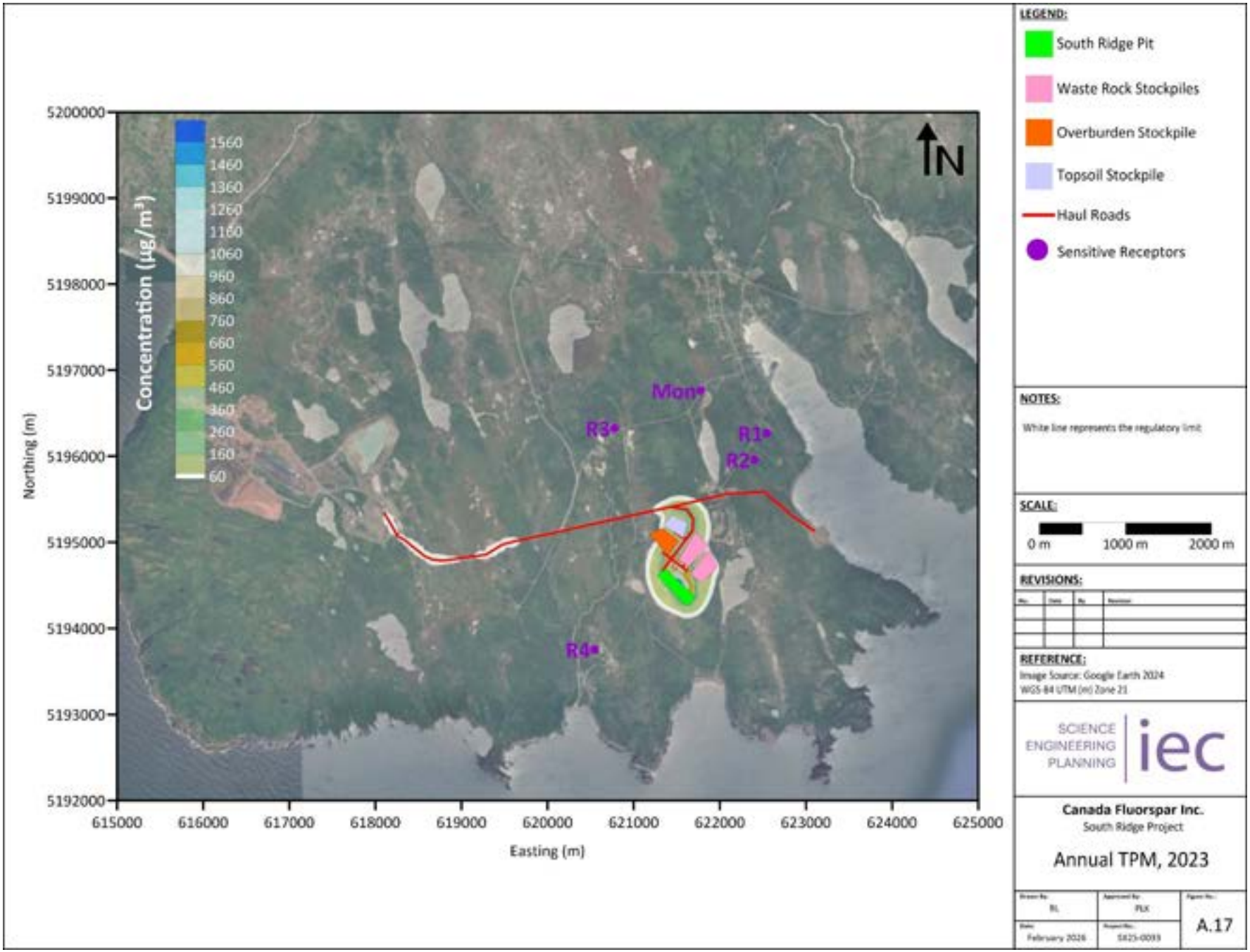
**Canada Fluorspar Inc.**
South Ridge Project

Annual TPM, 2022

| Drawn By: | Approved By: | Figure No.: |
|---|---|---|
| BL | PLK | A.16 |
| Date: February 2026 | Project No.: 1825-0033 | |


Concentration (µg/m³)
1560
1460
1360
1260
1160
1060
960
860
760
660
560
460
360
260
160
60
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
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616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
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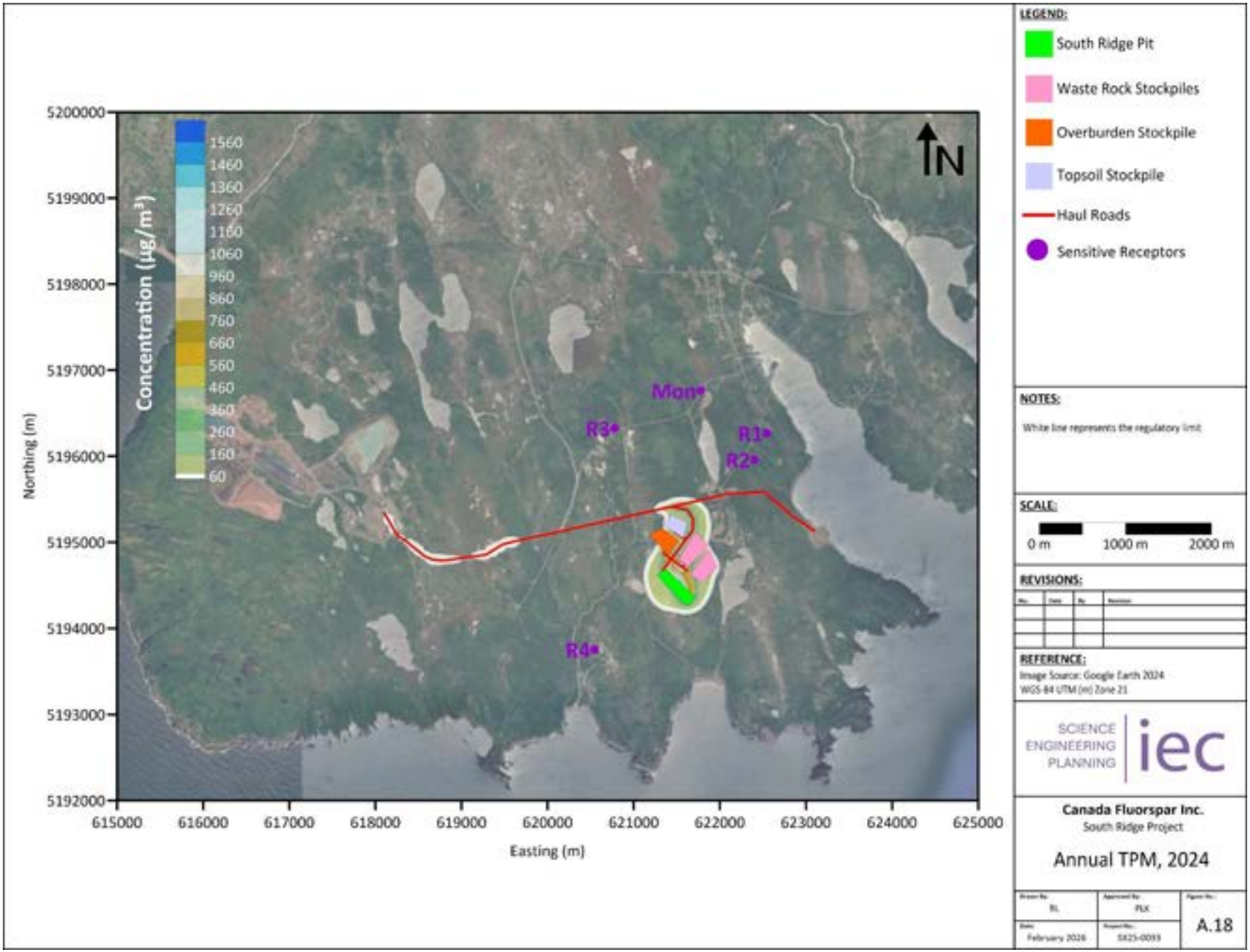
Canada Fluorspar Inc.
South Ridge Project
Annual TPM, 2023
BL
PLK
February 2026
A.17


Concentration (µg/m³)
1560
1460
1360
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1160
1060
960
860
760
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560
460
360
260
160
60
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
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Canada Fluorspar Inc.
South Ridge Project
Annual TPM, 2024
BL
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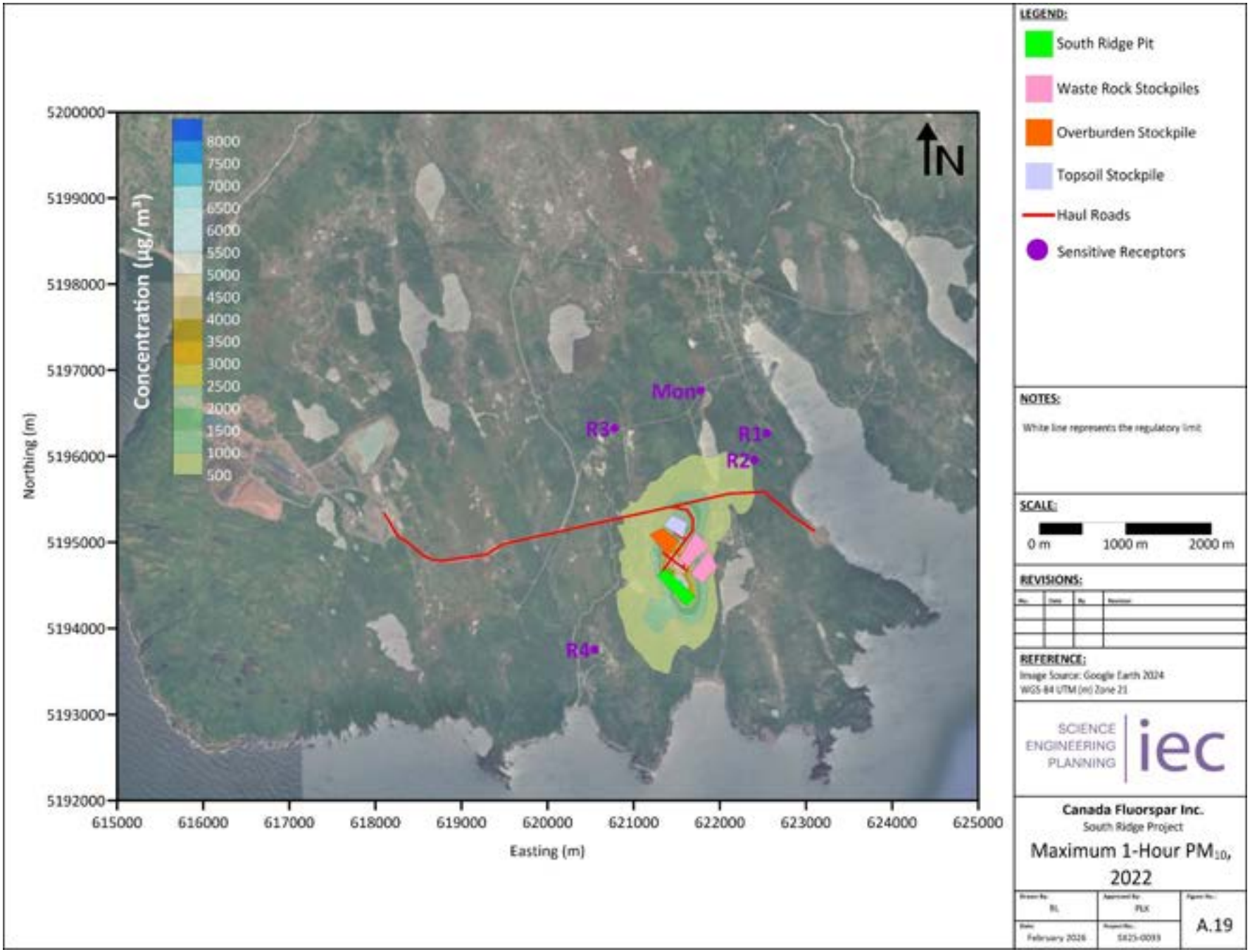
February 2026
A.18


Concentration (µg/m³)
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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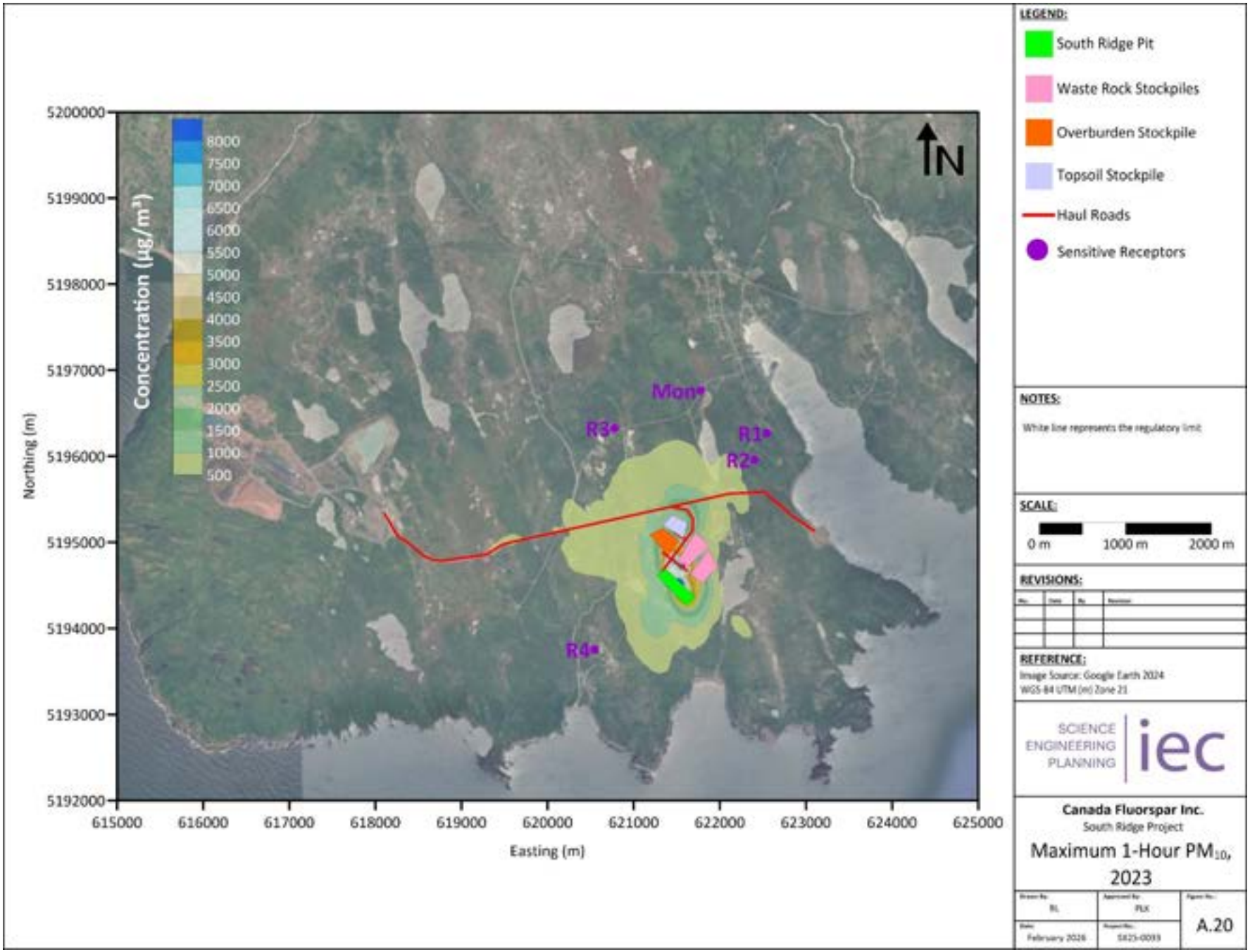
Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour PM10, 2022
BL
PLK
February 2026
A.19


Concentration (µg/m³)
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour PM10, 2023
BL
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February 2026
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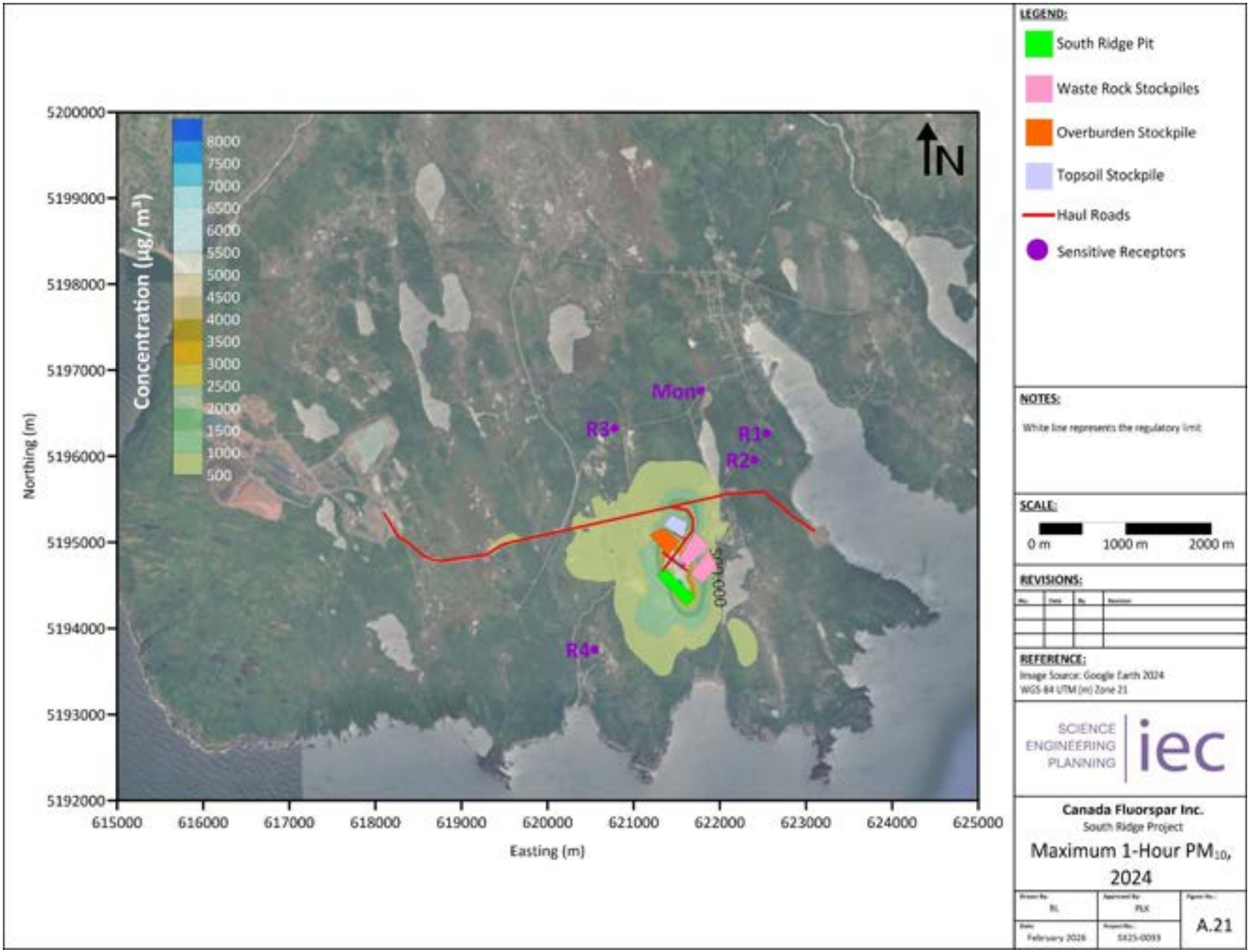
Concentration (µg/m³)
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
N
Mon
R3
R1
R2
R4
SPT-000
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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PLANNING
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Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour PM10, 2024
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PLK
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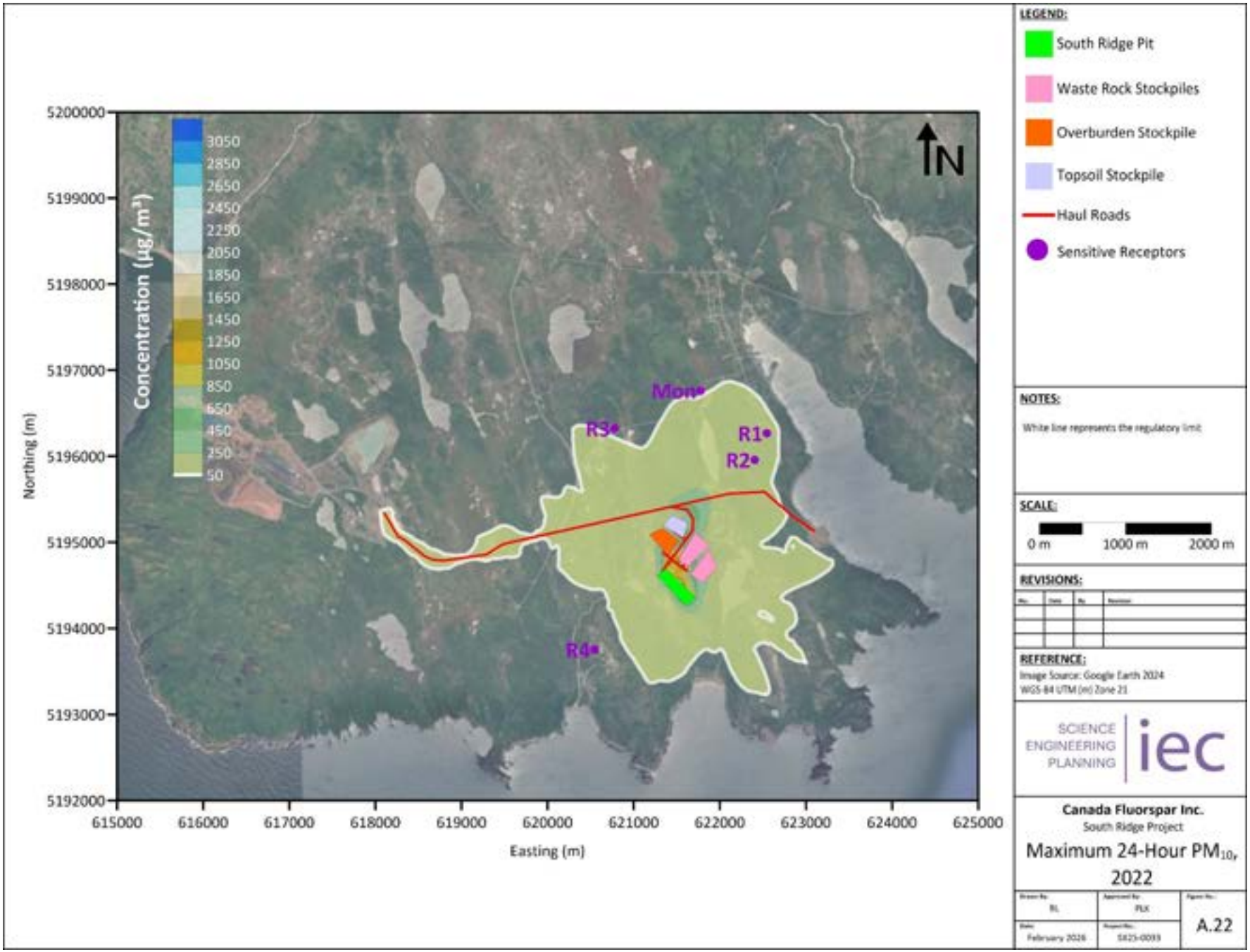
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2850
2650
2450
2250
2050
1850
1650
1450
1250
1050
850
650
450
250
50
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Maximum 24-Hour PM10, 2022
BL
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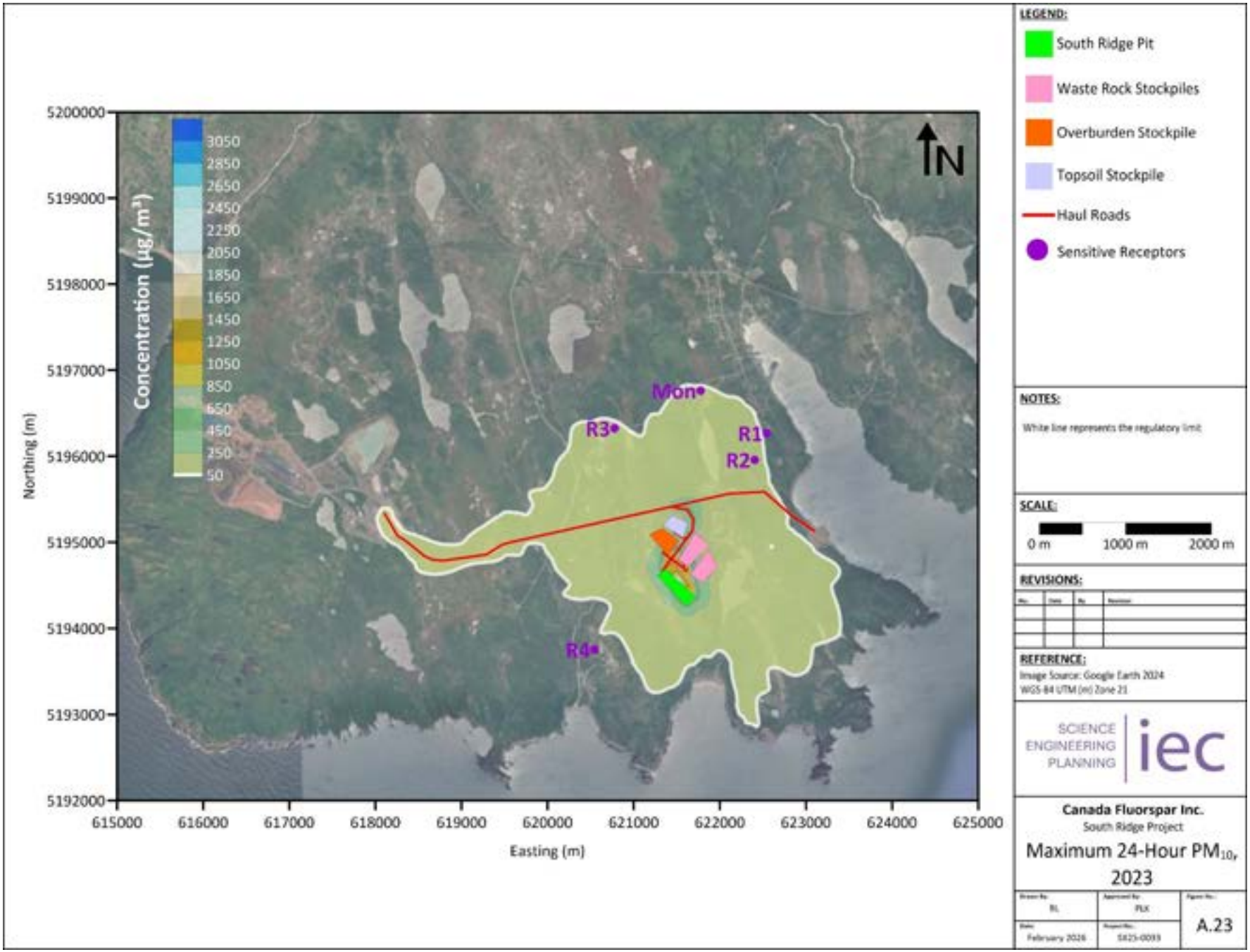
February 2026
A.22


Concentration (µg/m³)
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2650
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2250
2050
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1650
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1250
1050
850
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450
250
50
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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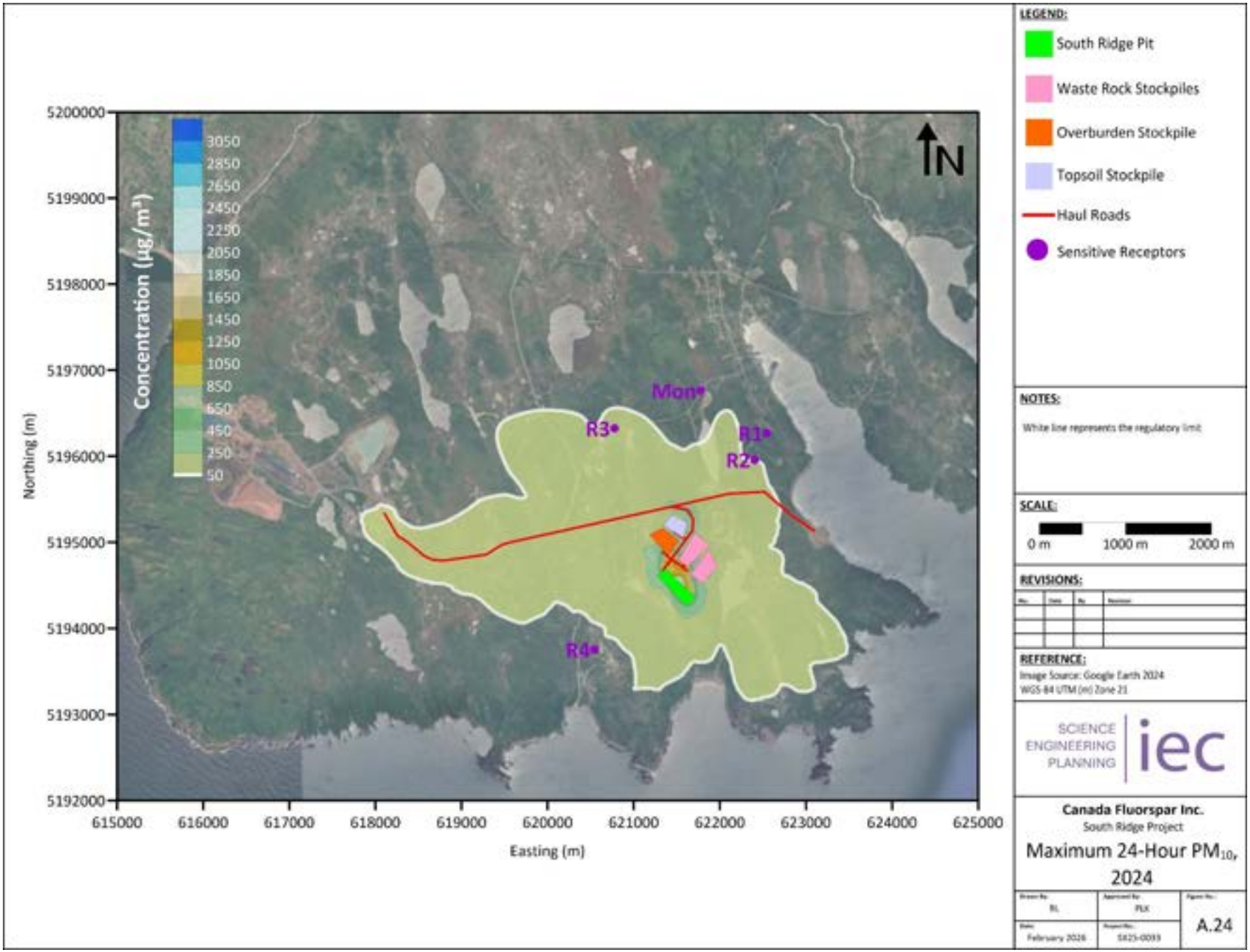
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Maximum 24-Hour PM10, 2023
BL
PLK
February 2026
A.23


Concentration (µg/m³)
3050
2850
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2450
2250
2050
1850
1650
1450
1250
1050
850
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450
250
50
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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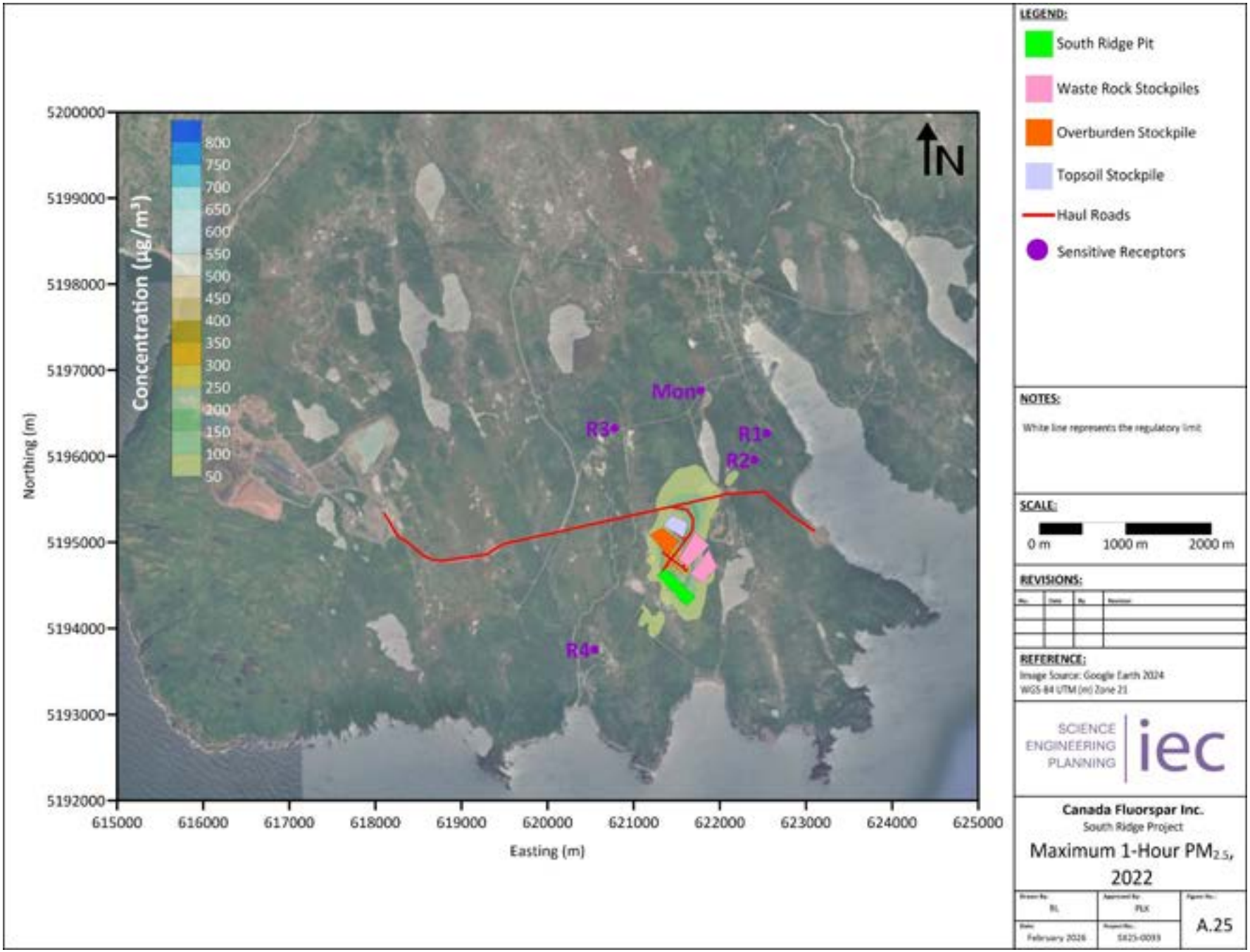
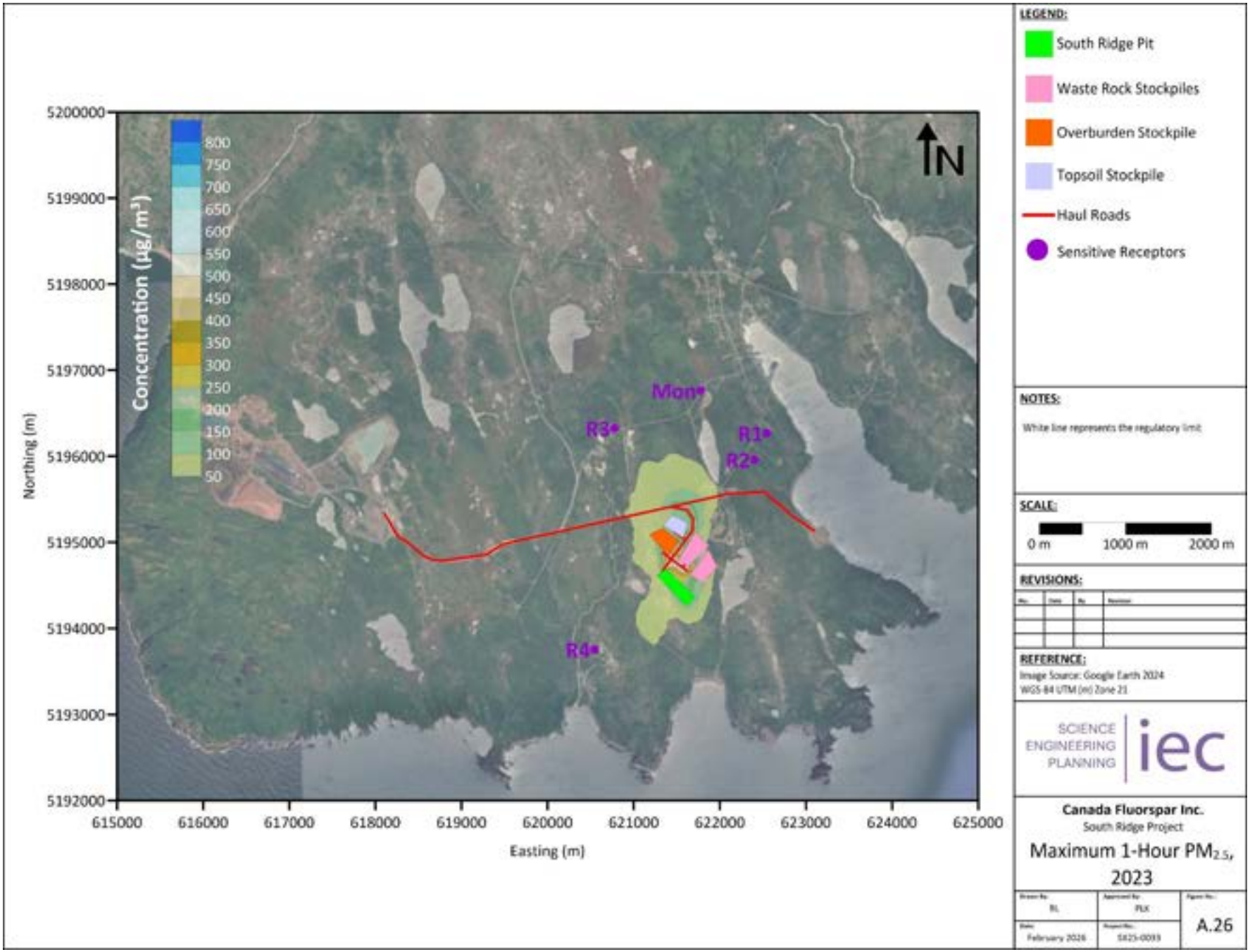
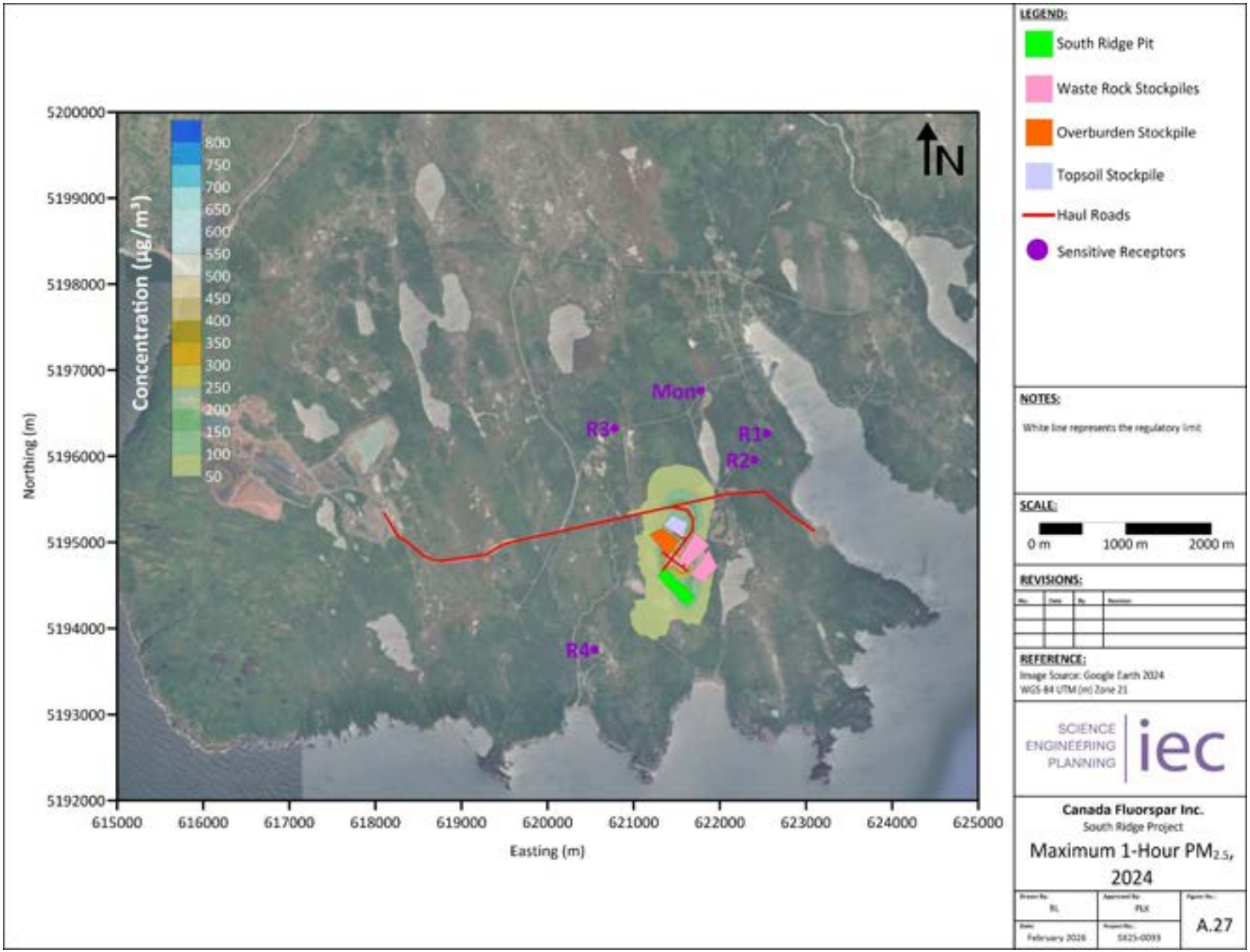
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Maximum 24-Hour PM10, 2024
BL
PLK
February 2026
A.24


Concentration (µg/m³)
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour PM2.5, 2022
BL
PLK
February 2026
A.25


Concentration (µg/m³)
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour PM2.5, 2023
BL
PLK
February 2026
A.26


Concentration (µg/m³)
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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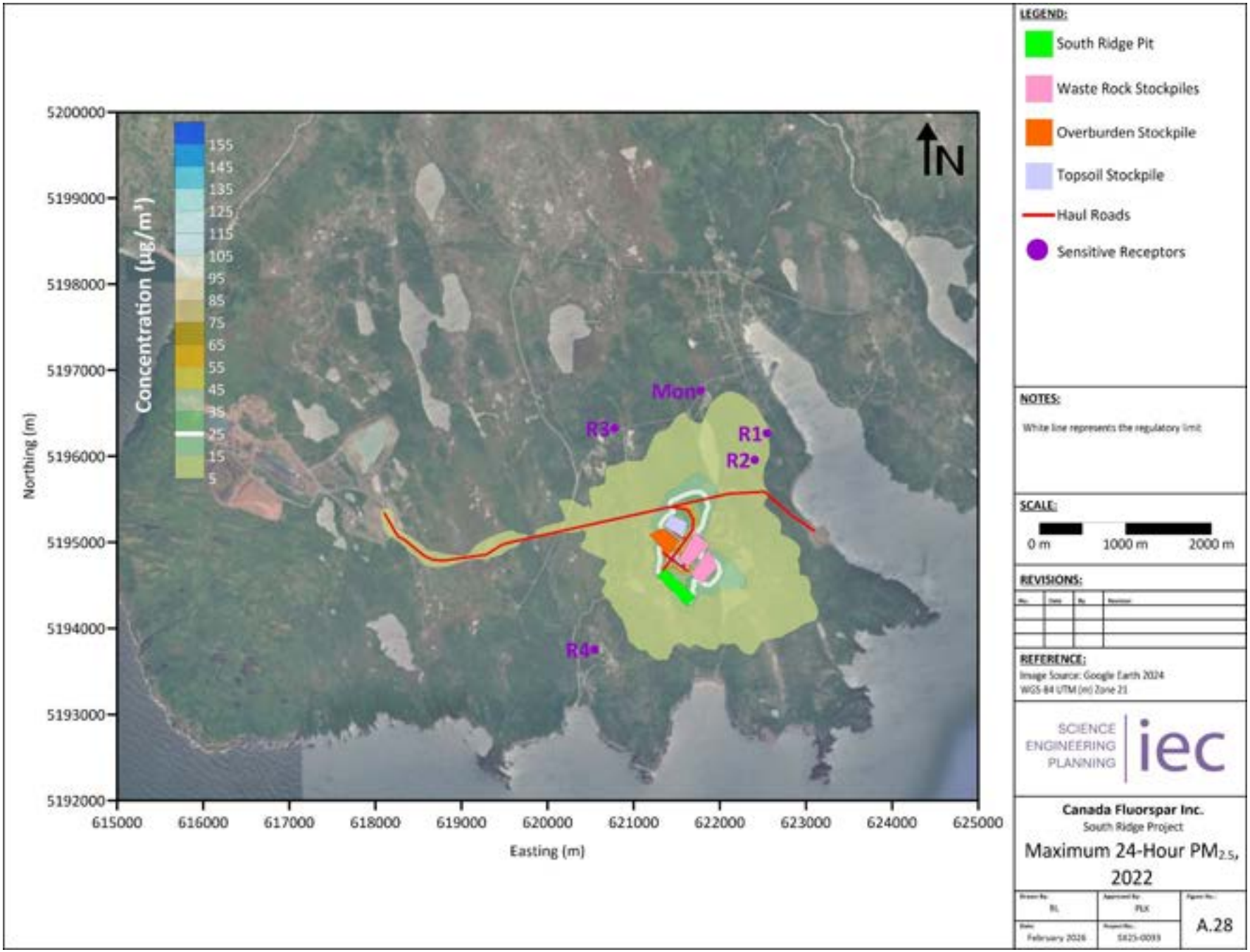
Canada Fluorspar Inc.
South Ridge Project
Maximum 1-Hour PM2.5, 2024
BL
PLK
February 2026
A.27


Concentration (µg/m³)
155
145
135
125
115
105
95
85
75
65
55
45
35
25
15
5
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
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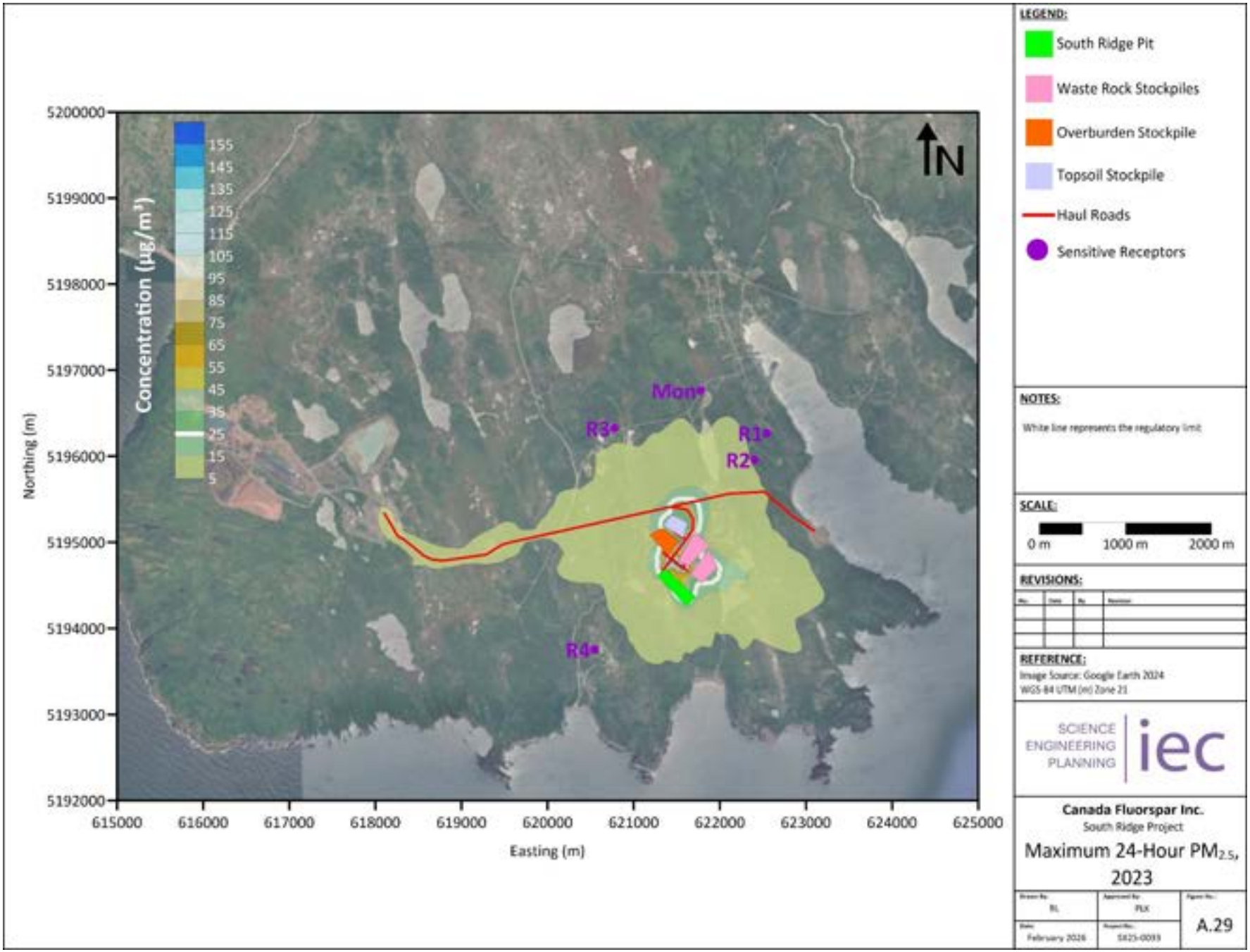
Canada Fluorspar Inc.
South Ridge Project
Maximum 24-Hour PM2.5, 2022
BL
PLK
February 2026
A.28


Concentration (µg/m³)
155
145
135
125
115
105
95
85
75
65
55
45
35
25
15
5
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
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SCIENCE
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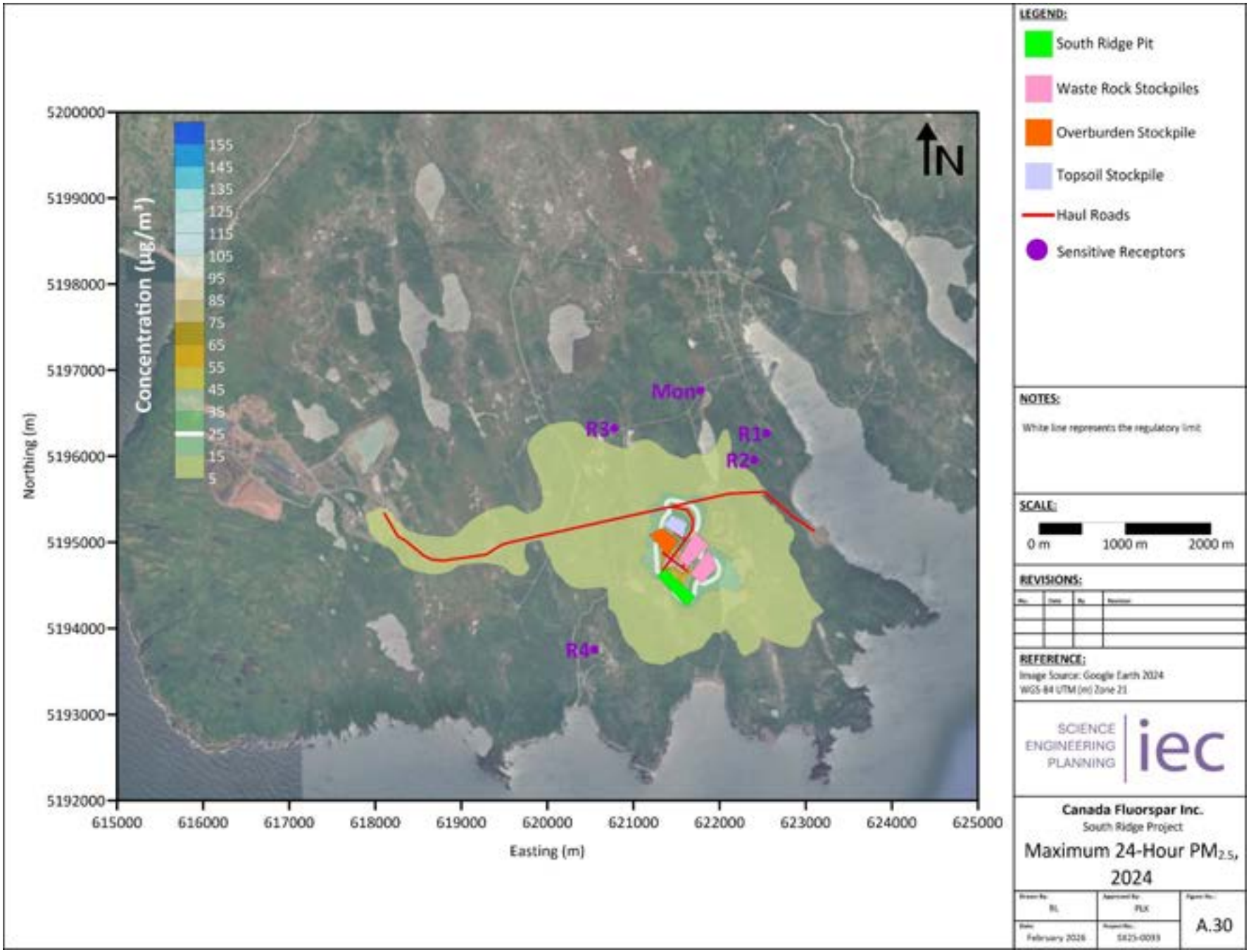
Canada Fluorspar Inc.
South Ridge Project
Maximum 24-Hour PM2.5, 2023
BL
PLK
February 2026
A.29


Concentration (µg/m³)
155
145
135
125
115
105
95
85
75
65
55
45
35
25
15
5
N
Mon
R3
R1
R2
R4
Northing (m)
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5199000
5198000
5197000
5196000
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5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
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Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
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South Ridge Project
Maximum 24-Hour PM2.5, 2024
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PLK
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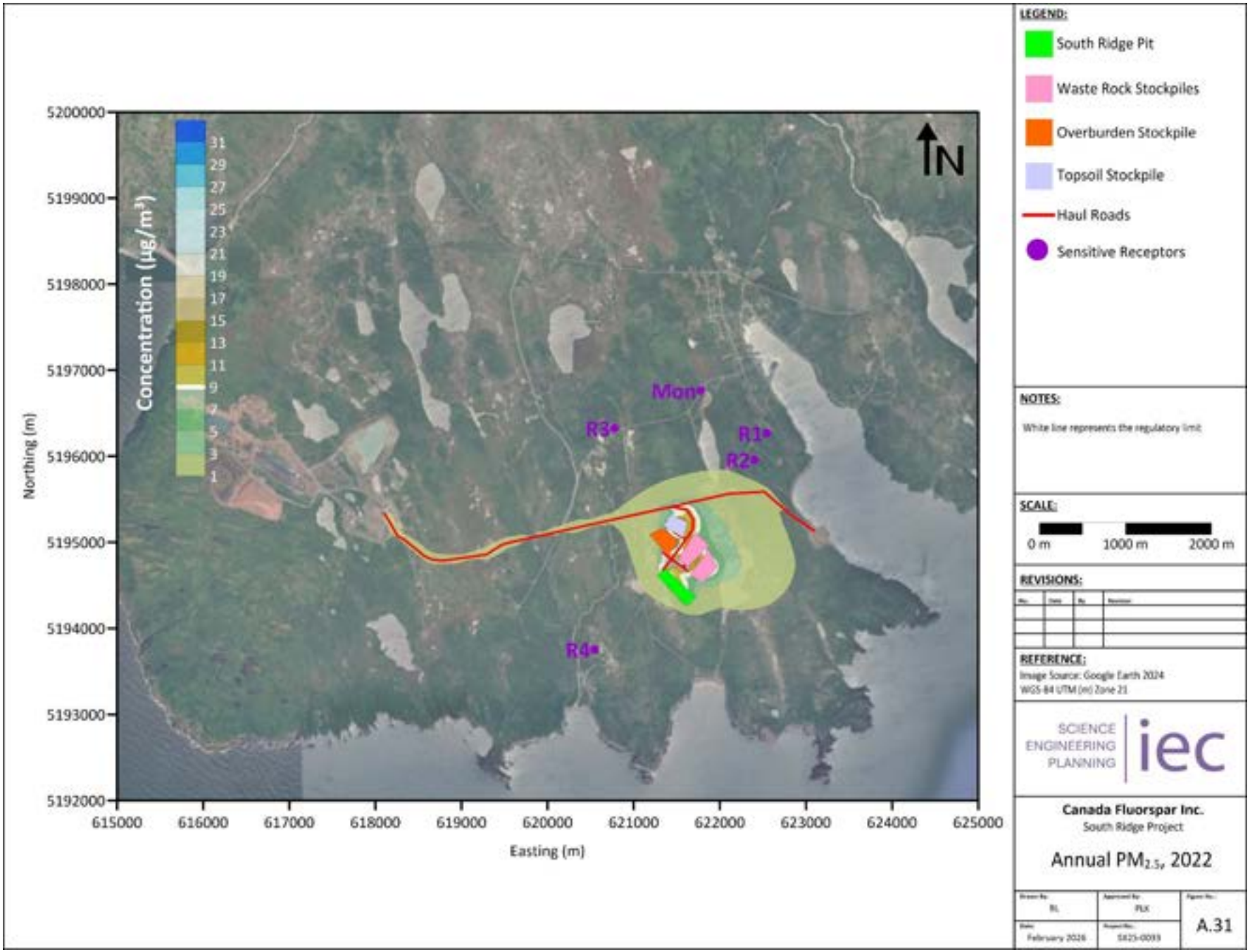
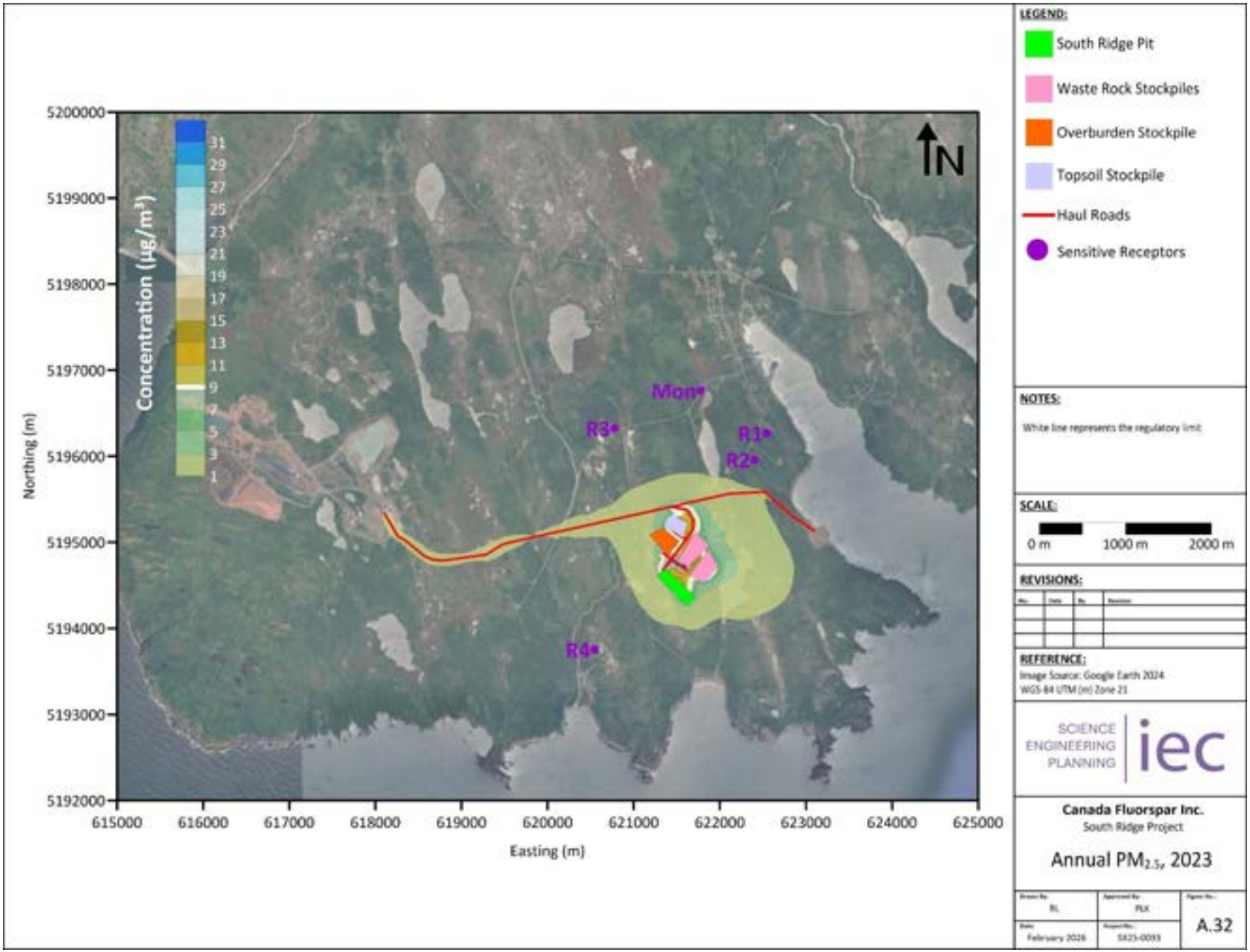
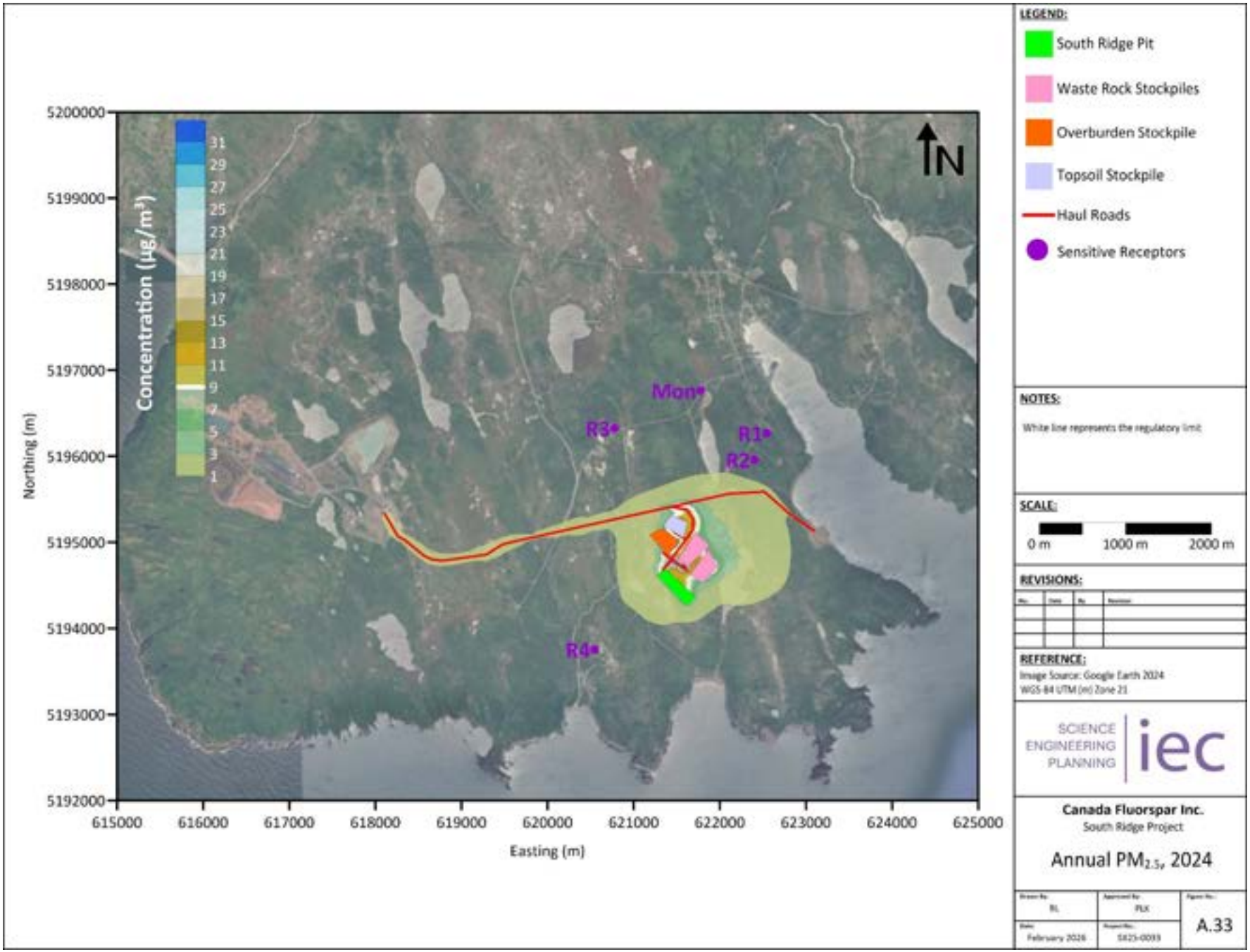
A.30


Concentration (µg/m³)
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Annual PM2.5, 2022
BL
PLK
February 2026
A.31


Concentration (µg/m³)
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
N
Mon
R3
R1
R2
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
5195000
5194000
5193000
5192000
Easting (m)
615000
616000
617000
618000
619000
620000
621000
622000
623000
624000
625000
LEGEND:
South Ridge Pit
Waste Rock Stockpiles
Overburden Stockpile
Topsoil Stockpile
Haul Roads
Sensitive Receptors
NOTES:
White line represents the regulatory limit
SCALE:
0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
WGS-84 UTM (m) Zone 21
SCIENCE
ENGINEERING
PLANNING
iec
Canada Fluorspar Inc.
South Ridge Project
Annual PM2.5, 2023
BL
PLK
February 2026
A.32


Concentration (µg/m³)
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
N
Mon
R1
R2
R3
R4
Northing (m)
5200000
5199000
5198000
5197000
5196000
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615000
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LEGEND:
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NOTES:
White line represents the regulatory limit
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0 m
1000 m
2000 m
REVISIONS:
REFERENCE:
Image Source: Google Earth 2024
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Canada Fluorspar Inc.
South Ridge Project
Annual PM2.5, 2024
BL
PLK
February 2026
A.33

# Appendix B

**Sample CALMET and CALPUFF Input Files**

```
                      CALMET MODEL CONTROL FILE
--------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

Subgroup (a)
------------
Default Name  Type          File Name
------------  ----          ---------
GEO.DAT       input    ! GEODAT=e:\cfi\makegeo\makegeosnowwinternotfrozen.DAT       !
SURF.DAT      input    ! SRFDAT=e:\cfi\calmet\surface.DAT      !
CLOUD.DAT     input    * CLDDAT=            *
PRECIP.DAT    input    ! PRCDAT=e:\cfi\calmet\precipitation.DAT !
WT.DAT        input    * WTDAT=             *
CALMET.LST    output   ! METLST=e:\cfi\calmet\2022\calmetjan1_feb15_2022.LST     !
CALMET.DAT    output   ! METDAT=e:\cfi\calmet\2022\calmetjan1_feb15_2022.DAT    !
PACOUT.DAT    output   * PACDAT=            *

All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = T !
         F = UPPER CASE

NUMBER OF UPPER AIR & OVERWATER STATIONS:

    Number of upper air stations (NUSTA)  No default     ! NUSTA =  17 !
    Number of overwater met stations
                                (NOWSTA) No default     ! NOWSTA =  1  !

NUMBER OF PROGNOSTIC and IGF-CALMET FILEs:

    Number of MM4/MM5/3D.DAT files
                                (NM3D) No default       ! NM3D =  0  !

    Number of IGF-CALMET.DAT files
                                (NIGF)   No default     ! NIGF =  0  !

                       !END!
--------------------------------------------------------------------------------
Subgroup (b)
---------------------------------
Upper air files (one per station)
---------------------------------
Default Name  Type       File Name
------------  ----       ---------
UP1.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_01!    !END!
UP2.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_02!    !END!
UP3.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_03!    !END!
UP4.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_04!    !END!
UP5.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_05!    !END!
UP6.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_06!    !END!
UP7.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_07!    !END!
UP8.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_08!    !END!
```

```
UP9.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_09!    !END!
UP10.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_10!    !END!
UP11.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_11!    !END!
UP12.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_12!    !END!
UP13.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_13!    !END!
UP14.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_14!    !END!
UP15.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_15!    !END!
UP16.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_16!    !END!
UP17.DAT       input     1  ! UPDAT=e:\cfi\calmet\2022\UPPAIR.DAT_17!    !END!
-------------------------------------------------------------------------------
Subgroup (c)
----------------------------------------
Overwater station files (one per station)
----------------------------------------
Default Name  Type       File Name
------------  ----       ---------
SEA1.DAT       input     1  !  SEADAT=e:\cfi\calmet\sea.DAT !  !END!
-------------------------------------------------------------------------------
Subgroup (d)
------------------------------------------------
MM4/MM5/3D.DAT files (consecutive or overlapping)
------------------------------------------------
Default Name  Type       File Name
------------  ----       ---------
MM51.DAT       input     1  * M3DDAT=MM4.DAT*    *END*
-------------------------------------------------------------------------------
Subgroup (e)
------------------------------------------------
IGF-CALMET.DAT files (consecutive or overlapping)
------------------------------------------------
Default Name  Type       File Name
------------  ----       ---------
IGFn.DAT       input     1  * IGFDAT=CALMET0.DAT *    *END*
-------------------------------------------------------------------------------
Subgroup (f)
----------------
Other file names
----------------
Default Name  Type       File Name
------------  ----       ---------
DIAG.DAT      input      * DIADAT=                  *
PROG.DAT      input      * PRGDAT=                  *
TEST.PRT      output     * TSTPRT=                  *
TEST.OUT      output     * TSTOUT=                  *
TEST.KIN      output     * TSTKIN=                  *
TEST.FRD      output     * TSTFRD=                  *
TEST.SLP      output     * TSTSLP=                  *
DCST.GRD      output     * DCSTGD=                  *

-------------------------------------------------------------------------------
NOTES: (1) File/path names can be up to 70 characters in length
       (2) Subgroups (a) and (f) must have ONE 'END' (surrounded by
           delimiters) at the end of the group
```

```
       (3) Subgroups (b) through (e) are included ONLY if the corresponding
           number of files (NUSTA, NOWSTA, NM3D, NIGF) is not 0, and each must have
           an 'END' (surround by delimiters) at the end of EACH LINE

                        !END!
------------------------------------------------------------------------------
INPUT GROUP: 1 -- General run control parameters
--------------
     Starting date:    Year   (IBYR)  --    No default   ! IBYR  =  2022  !
                       Month  (IBMO)  --    No default   ! IBMO  =  1  !
                       Day    (IBDY)  --    No default   ! IBDY  =  1  !
     Starting time:    Hour   (IBHR)  --    No default   ! IBHR  =  0  !
                       Second (IBSEC) --    No default   ! IBSEC =  0  !

     Ending date:      Year   (IEYR)  --    No default   ! IEYR  =  2022  !
                       Month  (IEMO)  --    No default   ! IEMO  =  2  !
                       Day    (IEDY)  --    No default   ! IEDY  =  16  !
     Ending time:      Hour   (IEHR)  --    No default   ! IEHR  =  0  !
                       Second (IESEC) --    No default   ! IESEC =  0  !

      UTC time zone         (ABTZ) -- No default       ! ABTZ= UTC-0400 !
         (character*8)
         PST = UTC-0800, MST = UTC-0700 , GMT = UTC-0000
         CST = UTC-0600, EST = UTC-05007

     Length of modeling time-step (seconds)
     Must divide evenly into 3600 (1 hour)
     (NSECDT)                        Default:3600     ! NSECDT =  3600  !
                                     Units: seconds

     Run type            (IRTYPE) -- Default: 1       ! IRTYPE=  1  !

        0 = Computes wind fields only
        1 = Computes wind fields and micrometeorological variables
            (u*, w*, L, zi, etc.)
        (IRTYPE must be 1 to run CALPUFF or CALGRID)

     Compute special data fields required
     by CALGRID (i.e., 3-D fields of W wind
     components and temperature)
     in additional to regular            Default: T    ! LCALGRD = T !
     fields ? (LCALGRD)
     (LCALGRD must be T to run CALGRID)

      Flag to stop run after
      SETUP phase (ITEST)             Default: 2       ! ITEST=  2   !
      (Used to allow checking
      of the model inputs, files, etc.)
      ITEST = 1 - STOPS program after SETUP phase
      ITEST = 2 - Continues with execution of
                  COMPUTATIONAL phase after SETUP

     Test options specified to see if
```

```
     they conform to regulatory
     values? (MREG)                    No Default       ! MREG =   0   !

        0 = NO checks are made
        1 = Technical options must conform to USEPA guidance
                  IMIXH    -1       Maul-Carson convective mixing height
                                    over land; OCD mixing height overwater
                  ICOARE   0        OCD deltaT method for overwater fluxes
                  THRESHL  0.0      Threshold buoyancy flux over land needed
                                    to sustain convective mixing height growth
                  ISURFT   > 0      Pick one representative station, OR
                           -2       in NOOBS mode (ITPROG=2) average all
                                    surface prognostic temperatures to get
                                    a single representative surface temp.
                  IUPT     > 0      Pick one representative station, OR
                           -2       in NOOBS mode (ITPROG>0) average all surface
                                    prognostic temperatures to get a single
                                    representative surface temp.
                  IZICRLX  0        Do NOT use convective mixing height
                                    relaxation to equilibrium value
!END!
------------------------------------------------------------------------------

INPUT GROUP: 2 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------
     Map projection
     (PMAP)                      Default: UTM    ! PMAP = UTM  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                     Default=0.0     ! FEAST  = 0.000  !
     (FNORTH)                    Default=0.0     ! FNORTH = 0.000  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                    No Default      ! IUTMZN =  21   !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                    Default: N      ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection
```

```
Latitude and Longitude (decimal degrees) of projection origin
(Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
(RLAT0)                   No Default      ! RLAT0 = 40N  !
(RLON0)                   No Default      ! RLON0 = 90W  !

    TTM :  RLON0 identifies central (true N/S) meridian of projection
           RLAT0 selected for convenience
    LCC :  RLON0 identifies central (true N/S) meridian of projection
           RLAT0 selected for convenience
    PS  :  RLON0 identifies central (grid N/S) meridian of projection
           RLAT0 selected for convenience
    EM  :  RLON0 identifies central meridian of projection
           RLAT0 is REPLACED by 0.0N (Equator)
    LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
           RLAT0 identifies latitude of tangent-point of mapping plane

Matching parallel(s) of latitude (decimal degrees) for projection
(Used only if PMAP= LCC or PS)
(XLAT1)                   No Default      ! XLAT1 = 30N  !
(XLAT2)                   No Default      ! XLAT2 = 60N  !

    LCC :  Projection cone slices through Earth's surface at XLAT1 and XLAT2
    PS  :  Projection plane slices through Earth at XLAT1
           (XLAT2 is not used)

----------
Note:  Latitudes and longitudes should be positive, and include a
       letter N,S,E, or W indicating north or south latitude, and
       east or west longitude.  For example,
       35.9  N Latitude  =  35.9N
       118.7 E Longitude = 118.7E

Datum-region
------------
The Datum-Region for the coordinates is identified by a character
string.  Many mapping products currently available use the model of the
Earth known as the World Geodetic System 1984 (WGS-84).  Other local
models may be in use, and their selection in CALMET will make its output
consistent with local mapping products.  The list of Datum-Regions with
official transformation parameters is provided by the National Imagery and
Mapping Agency (NIMA).

NIMA Datum - Regions(Examples)
-------------------------------------------------------------------------------
WGS-84    WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
NAS-C     NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
NAR-C     NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
NWS-84    NWS 6370KM Radius, Sphere
ESR-S     ESRI REFERENCE 6371KM Radius, Sphere

Datum-region for output coordinates
(DATUM)                   Default: WGS-84    ! DATUM = WGS-84  !
```

```
     Horizontal grid definition:
     ---------------------------
     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX =   100  !
            No. Y grid cells (NY)      No default     ! NY =   100  !

     Grid spacing (DGRIDKM)            No default     ! DGRIDKM = 0.2 !
                                       Units: km

     Reference grid coordinate of
     SOUTHWEST corner of grid cell (1,1)

        X coordinate (XORIGKM)         No default     ! XORIGKM = 610.000 !
        Y coordinate (YORIGKM)         No default     ! YORIGKM = 5185.000 !
                                       Units: km

     Vertical grid definition:
     -------------------------
        No. of vertical layers (NZ)    No default     ! NZ =  10  !

        Cell face heights in arbitrary
        vertical grid (ZFACE(NZ+1))    No defaults
                                       Units: m
        ! ZFACE = 0.,20.,40.,80.,160.,300.,600.,1000.,1500.,2200.,3000. !

!END!
--------------------------------------------------------------------------------
INPUT GROUP: 3 -- Output Options
--------------

    DISK OUTPUT OPTION

       Save met. fields in an unformatted
       output file ?              (LSAVE)  Default: T     ! LSAVE = T !
       (F = Do not save, T = Save)

       Type of unformatted output file:
       (IFORMO)                            Default: 1    ! IFORMO =  1  !

            1 = CALPUFF/CALGRID type file (CALMET.DAT)
            2 = MESOPUFF-II type file     (PACOUT.DAT)

    LINE PRINTER OUTPUT OPTIONS:

       Print met. fields ?  (LPRINT)       Default: F     ! LPRINT = F !
       (F = Do not print, T = Print)
       (NOTE: parameters below control which
              met. variables are printed)

       Print interval
       (IPRINF) in hours                   Default: 1     ! IPRINF =  1  !
```

```
(Meteorological fields are printed
 every  1  hours)

Specify which layers of U, V wind component
to print (IUVOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=Print)
(used only if LPRINT=T)        Defaults: NZ*0
! IUVOUT =  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0  !
-----------------------

Specify which levels of the W wind component to print
(NOTE: W defined at TOP cell face --  10  values)
(IWOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=Print)
(used only if LPRINT=T & LCALGRD=T)
-----------------------------------
                                    Defaults: NZ*0
 ! IWOUT =  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0  !

Specify which levels of the 3-D temperature field to print
(ITOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=Print)
(used only if LPRINT=T & LCALGRD=T)
-----------------------------------
                                    Defaults: NZ*0
 ! ITOUT =  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0  !

Specify which meteorological fields
to print
(used only if LPRINT=T)            Defaults: 0 (all variables)
-----------------------

  Variable           Print ?
                  (0 = do not print,
                   1 = print)
  --------        ------------------
!  STABILITY  =          0          ! - PGT stability class
!  USTAR      =          0          ! - Friction velocity
!  MONIN      =          0          ! - Monin-Obukhov length
!  MIXHT      =          0          ! - Mixing height
!  WSTAR      =          0          ! - Convective velocity scale
!  PRECIP     =          0          ! - Precipitation rate
!  SENSHEAT   =          0          ! - Sensible heat flux
!  CONVZI     =          0          ! - Convective mixing ht.

Testing and debug print options for micrometeorological module

   Print input meteorological data and
   internal variables (LDB)        Default: F       ! LDB = F !
   (F = Do not print, T = print)
   (NOTE: this option produces large amounts of output)

   First time step for which debug data
```

```
   are printed (NN1)                Default: 1       ! NN1 =  1  !

   Last time step for which debug data
   are printed (NN2)                Default: 1       ! NN2 =  1  !

   Print distance to land
   internal variables (LDBCST)      Default: F       ! LDBCST = F !
   (F = Do not print, T = print)
   (Output in .GRD file DCST.GRD, defined in input group 0)

Testing and debug print options for wind field module
(all of the following print options control output to
 wind field module's output files: TEST.PRT, TEST.OUT,
 TEST.KIN, TEST.FRD, and TEST.SLP)

   Control variable for writing the test/debug
   wind fields to disk files (IOUTD)
   (0=Do not write, 1=write)        Default: 0       ! IOUTD =  0  !

   Number of levels, starting at the surface,
   to print (NZPRN2)                Default: 1       ! NZPRN2 =  0  !

   Print the INTERPOLATED wind components ?
   (IPR0) (0=no, 1=yes)             Default: 0       !  IPR0 =  0  !

   Print the TERRAIN ADJUSTED surface wind
   components ?
   (IPR1) (0=no, 1=yes)             Default: 0       !  IPR1 =  0  !

   Print the SMOOTHED wind components and
   the INITIAL DIVERGENCE fields ?
   (IPR2) (0=no, 1=yes)             Default: 0       !  IPR2 =  0  !

   Print the FINAL wind speed and direction
   fields ?
   (IPR3) (0=no, 1=yes)             Default: 0       !  IPR3 =  0  !

   Print the FINAL DIVERGENCE fields ?
   (IPR4) (0=no, 1=yes)             Default: 0       !  IPR4 =  0  !

   Print the winds after KINEMATIC effects
   are added ?
   (IPR5) (0=no, 1=yes)             Default: 0       !  IPR5 =  0  !

   Print the winds after the FROUDE NUMBER
   adjustment is made ?
   (IPR6) (0=no, 1=yes)             Default: 0       !  IPR6 =  0  !

   Print the winds after SLOPE FLOWS
   are added ?
   (IPR7) (0=no, 1=yes)             Default: 0       !  IPR7 =  0  !

   Print the FINAL wind field components ?
```

```
          (IPR8) (0=no, 1=yes)             Default: 0       !  IPR8 =  0  !

!END!
------------------------------------------------------------------------------
INPUT GROUP: 4 -- Meteorological data options
--------------

    NO OBSERVATION MODE             (NOOBS)  Default: 0     ! NOOBS =  0   !
          0 = Use surface, overwater, and upper air stations
          1 = Use surface and overwater stations (no upper air observations)
              Use MM4/MM5/3D.DAT for upper air data
          2 = No surface, overwater, or upper air observations
              Use MM4/MM5/3D.DAT for surface, overwater, and upper air data

    NUMBER OF SURFACE & PRECIP. METEOROLOGICAL STATIONS

       Number of surface stations   (NSSTA)  No default     ! NSSTA =  17  !

       Number of precipitation stations
       (NPSTA=-1: flag for use of MM5/3D.DAT precip data)
                                    (NPSTA)  No default     ! NPSTA =  1  !

    CLOUD DATA OPTIONS
       Gridded cloud fields:
                                   (ICLOUD)  Default: 0     ! ICLOUD =  0  !
       ICLOUD = 0 - Gridded clouds not used
       ICLOUD = 1 - Gridded CLOUD.DAT generated as OUTPUT
       ICLOUD = 2 - Gridded CLOUD.DAT read as INPUT
       ICLOUD = 3 - Gridded cloud cover from Prognostic Rel. Humidity
                    at 850mb (Teixera)
       ICLOUD = 4 - Gridded cloud cover from Prognostic Rel. Humidity
                    at all levels (MM5toGrads algorithm)

    FILE FORMATS

       Surface meteorological data file format
                                   (IFORMS)  Default: 2     ! IFORMS =  2  !
       (1 = unformatted (e.g., SMERGE output))
       (2 = formatted   (free-formatted user input))

       Precipitation data file format
                                   (IFORMP)  Default: 2     ! IFORMP =  2  !
       (1 = unformatted (e.g., PMERGE output))
       (2 = formatted   (free-formatted user input))

       Cloud data file format
                                   (IFORMC)  Default: 2     ! IFORMC =  2  !
       (1 = unformatted - CALMET unformatted output)
       (2 = formatted   - free-formatted CALMET output or user input)

!END!
------------------------------------------------------------------------------
INPUT GROUP: 5 -- Wind Field Options and Parameters
```

```
--------------

    WIND FIELD MODEL OPTIONS
       Model selection variable (IWFCOD)     Default: 1      ! IWFCOD =  1  !
          0 = Objective analysis only
          1 = Diagnostic wind module

       Compute Froude number adjustment
       effects ? (IFRADJ)                    Default: 1      ! IFRADJ =  1  !
       (0 = NO, 1 = YES)

       Compute kinematic effects ? (IKINE)   Default: 0      ! IKINE  =  0  !
       (0 = NO, 1 = YES)

       Use O'Brien procedure for adjustment
       of the vertical velocity ? (IOBR)     Default: 0      ! IOBR =  0  !
       (0 = NO, 1 = YES)

       Compute slope flow effects ? (ISLOPE) Default: 1      ! ISLOPE  =  1  !
       (0 = NO, 1 = YES)

       Extrapolate surface wind observations
       to upper layers ? (IEXTRP)            Default: -4     ! IEXTRP = -4  !
       (1 = no extrapolation is done,
        2 = power law extrapolation used,
        3 = user input multiplicative factors
            for layers 2 - NZ used (see FEXTRP array)
        4 = similarity theory used
        -1, -2, -3, -4 = same as above except layer 1 data
            at upper air stations are ignored

       Extrapolate surface winds even
       if calm? (ICALM)                      Default: 0      ! ICALM  =  0  !
       (0 = NO, 1 = YES)

       Layer-dependent biases modifying the weights of
       surface and upper air stations (BIAS(NZ))
         -1<=BIAS<=1
       Negative BIAS reduces the weight of upper air stations
         (e.g. BIAS=-0.1 reduces the weight of upper air stations
       by 10%; BIAS= -1, reduces their weight by 100 %)
       Positive BIAS reduces the weight of surface stations
         (e.g. BIAS= 0.2 reduces the weight of surface stations
       by 20%; BIAS=1 reduces their weight by 100%)
       Zero BIAS leaves weights unchanged (1/R**2 interpolation)
       Default: NZ*0

         ! BIAS = -1.0 ,  -0.9 ,  -0.7 ,  -0.4 , -0.2 ,  0.0 ,  0.3 ,  0.6 ,  0.9 ,  1.0  !

       Minimum distance from nearest upper air station
       to surface station for which extrapolation
       of surface winds at surface station will be allowed
       (RMIN2: Set to -1 for IEXTRP = 4 or other situations
```

```
     where all surface stations should be extrapolated)
                                        Default: 4.     ! RMIN2 = 10.0 !

   Use gridded prognostic wind field model
   output fields as input to the diagnostic
   wind field model (IPROG)             Default: 0      ! IPROG =  0  !
   (0 = No, [IWFCOD = 0 or 1]
    1 = Yes, use CSUMM prog. winds as Step 1 field, [IWFCOD = 0]
    2 = Yes, use CSUMM prog. winds as initial guess field [IWFCOD = 1]
    3 = Yes, use winds from MM4.DAT file as Step 1 field [IWFCOD = 0]
    4 = Yes, use winds from MM4.DAT file as initial guess field [IWFCOD = 1]
    5 = Yes, use winds from MM4.DAT file as observations [IWFCOD = 1]
    13 = Yes, use winds from MM5/3D.DAT file as Step 1 field [IWFCOD = 0]
    14 = Yes, use winds from MM5/3D.DAT file as initial guess field [IWFCOD = 1]
    15 = Yes, use winds from MM5/3D.DAT file as observations [IWFCOD = 1]

   Timestep (seconds) of the prognostic
   model input data   (ISTEPPGS)        Default: 3600   ! ISTEPPGS =  3600   !

   Use coarse CALMET fields as initial guess fields (IGFMET)
   (overwrites IGF based on prognostic wind fields if any)
                                        Default: 0      ! IGFMET =  0  !

RADIUS OF INFLUENCE PARAMETERS

   Use varying radius of influence      Default: F      ! LVARY =  T!
   (if no stations are found within RMAX1,RMAX2,
    or RMAX3, then the closest station will be used)

   Maximum radius of influence over land
   in the surface layer (RMAX1)         No default      ! RMAX1 = 8. !
                                        Units: km
   Maximum radius of influence over land
   aloft (RMAX2)                        No default      ! RMAX2 = 8. !
                                        Units: km
   Maximum radius of influence over water
   (RMAX3)                              No default      ! RMAX3 = 10. !
                                        Units: km

OTHER WIND FIELD INPUT PARAMETERS

   Minimum radius of influence used in
   the wind field interpolation (RMIN)  Default: 0.1    ! RMIN = 0.1 !
                                        Units: km
   Radius of influence of terrain
   features (TERRAD)                    No default      ! TERRAD = 4. !

                                        Units: km
   Relative weighting of the first
   guess field and observations in the
   SURFACE layer (R1)                   No default      ! R1 = 1. !
   (R1 is the distance from an          Units: km
   observational station at which the
```

```
      observation and first guess field are
      equally weighted)

      Relative weighting of the first
      guess field and observations in the
      layers ALOFT (R2)                   No default      ! R2 = 1. !
      (R2 is applied in the upper layers  Units: km
      in the same manner as R1 is used in
      the surface layer).

      Relative weighting parameter of the
      prognostic wind field data (RPROG)  No default      ! RPROG = 0. !
      (Used only if IPROG = 1)            Units: km
      ------------------------
      Maximum acceptable divergence in the
      divergence minimization procedure
      (DIVLIM)                            Default: 5.E-6  ! DIVLIM= 5.0E-06 !

      Maximum number of iterations in the
      divergence min. procedure (NITER)   Default: 50     ! NITER =  50  !

      Number of passes in the smoothing
      procedure (NSMTH(NZ))
      NOTE: NZ values must be entered
           Default: 2,(mxnz-1)*4 ! NSMTH =
2 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4  !

      Maximum number of stations used in
      each layer for the interpolation of
      data to a grid point (NINTR2(NZ))
      NOTE: NZ values must be entered     Default: 99.    ! NINTR2 =
5 ,  5 ,  5 ,  5 ,  5 ,  5 ,  5 ,  5 ,  5 ,  5  !

      Critical Froude number (CRITFN)     Default: 1.0    ! CRITFN = 1. !

      Empirical factor controlling the
      influence of kinematic effects
      (ALPHA)                             Default: 0.1    ! ALPHA = 0.1 !

      Multiplicative scaling factor for
      extrapolation of surface observations
      to upper layers (FEXTR2(NZ))        Default: NZ*0.0
      ! FEXTR2 = 0., 0., 0., 0., 0., 0., 0., 0., 0., 0. !
      (Used only if IEXTRP = 3 or -3)

   BARRIER INFORMATION

      Number of barriers to interpolation
      of the wind fields (NBAR)           Default: 0      ! NBAR =  0  !

      Level (1 to NZ) up to which barriers
      apply (KBAR)                        Default: NZ     ! KBAR =  10  !
```

```
    THE FOLLOWING 4 VARIABLES ARE INCLUDED
    ONLY IF NBAR > 0
    NOTE: NBAR values must be entered     No defaults
          for each variable               Units: km

       X coordinate of BEGINNING
       of each barrier (XBBAR(NBAR))      ! XBBAR = 0. !
       Y coordinate of BEGINNING
       of each barrier (YBBAR(NBAR))      ! YBBAR = 0. !

       X coordinate of ENDING
       of each barrier (XEBAR(NBAR))      ! XEBAR = 0. !
       Y coordinate of ENDING
       of each barrier (YEBAR(NBAR))      ! YEBAR = 0. !

DIAGNOSTIC MODULE DATA INPUT OPTIONS

   Surface temperature (IDIOPT1)         Default: 0      ! IDIOPT1 =  0  !
      0 = Compute internally from
          hourly surface observations or prognostic fields
      1 = Read preprocessed values from
          a data file (DIAG.DAT)

      Surface met. station to use for
      the surface temperature (ISURFT)   Default: -1    ! ISURFT =  -1  !
      (Must be a value from 1 to NSSTA,
       or -1 to use 2-D spatially varying
          surface temperatures,
       or -2 to use a domain-average prognostic
          surface temperatures (only with ITPROG=2))
      (Used only if IDIOPT1 = 0)
      -------------------------
   Temperature lapse rate used in the    Default: 0     ! IDIOPT2 =  0  !
      computation of terrain-induced
      circulations (IDIOPT2)
      0 = Compute internally from (at least) twice-daily
          upper air observations or prognostic fields
      1 = Read hourly preprocessed values
          from a data file (DIAG.DAT)

      Upper air station to use for
      the domain-scale lapse rate (IUPT) Default: -1    ! IUPT   =  -1 !
      (Must be a value from 1 to NUSTA,
       or -1 to use 2-D spatially varying lapse rate,
       or -2 to use a domain-average prognostic
          lapse rate (only with ITPROG>0))
      (Used only if IDIOPT2 = 0)
      -------------------------
      Depth through which the domain-scale
      lapse rate is computed (ZUPT)      Default: 200.  ! ZUPT = 200. !
      (Used only if IDIOPT2 = 0)         Units: meters
      -------------------------
```

```
Initial Guess Field Winds
(IDIOPT3)                              Default: 0     ! IDIOPT3 =  0  !
   0 = Compute internally from
       observations or prognostic wind fields
   1 = Read hourly preprocessed domain-average wind values
       from a data file (DIAG.DAT)

   Upper air station to use for
   the initial guess winds (IUPWND)   Default: -1    ! IUPWND = -1  !
   (Must be a value from -1 to NUSTA, with
   -1 indicating 3-D initial guess fields,
   and IUPWND>1 domain-scaled (i.e. constant) IGF)
   (Used only if IDIOPT3 = 0 and noobs=0)
   ------------------------------------

   Bottom and top of layer through
   which the domain-scale winds
   are computed
   (ZUPWND(1), ZUPWND(2))        Defaults: 1., 1000. ! ZUPWND= 1., 1000. !
   (Used only if IDIOPT3 = 0, NOOBS>0 and IUPWND>0)    Units: meters
   -------------------------
Observed surface wind components
for wind field module (IDIOPT4)  Default: 0     ! IDIOPT4 =  0  !
   0 = Read WS, WD from a surface
       data file (SURF.DAT)
   1 = Read hourly preprocessed U, V from
       a data file (DIAG.DAT)

Observed upper air wind components
for wind field module (IDIOPT5)  Default: 0     ! IDIOPT5 =  0  !
   0 = Read WS, WD from an upper
       air data file (UP1.DAT, UP2.DAT, etc.)
   1 = Read hourly preprocessed U, V from
       a data file (DIAG.DAT)

LAKE BREEZE INFORMATION

   Use Lake Breeze Module  (LLBREZE)
                                    Default: F      ! LLBREZE = F !

    Number of lake breeze regions (NBOX)           ! NBOX =  1  !

 X Grid line 1 defining the region of interest
                                                   ! XG1 = 40. !
 X Grid line 2 defining the region of interest
                                                   ! XG2 = 80. !
 Y Grid line 1 defining the region of interest
                                                   ! YG1 = 40. !
 Y Grid line 2 defining the region of interest
                                                   ! YG2 = 68. !

  X Point defining the coastline (Straight line)
           (XBCST)  (KM)   Default: none    ! XBCST = 430.155 !
```

```
         Y Point defining the coastline (Straight line)
                   (YBCST)  (KM)   Default: none    ! YBCST = 5422.939 !

         X Point defining the coastline (Straight line)
                   (XECST)  (KM)   Default: none    ! XECST = 431.158 !

         Y Point defining the coastline (Straight line)
                   (YECST)  (KM)   Default: none    ! YECST = 5423.627 !


       Number of stations in the region     Default: none ! NLB =  0 !
       (Surface stations + upper air stations)

       Station ID's  in the region   (METBXID(NLB))
       (Surface stations first, then upper air stations)
         * METBXID =  88888 *

!END!
------------------------------------------------------------------------------
INPUT GROUP: 6 -- Mixing Height, Temperature and Precipitation Parameters
--------------
    EMPIRICAL MIXING HEIGHT CONSTANTS

       Neutral, mechanical equation
       (CONSTB)                          Default: 1.41   ! CONSTB = 1.41 !
       Convective mixing ht. equation
       (CONSTE)                          Default: 0.15   ! CONSTE = 0.15 !
       Stable mixing ht. equation
       (CONSTN)                          Default: 2400.  ! CONSTN = 2400.!
       Overwater mixing ht. equation
       (CONSTW)                          Default: 0.16   ! CONSTW = 0.16 !
       Absolute value of Coriolis
       parameter (FCORIOL)               Default: 1.E-4  ! FCORIOL = 1.0E-04!
                                         Units: (1/s)

    SPATIAL AVERAGING OF MIXING HEIGHTS

       Conduct spatial averaging
       (IAVEZI)  (0=no, 1=yes)           Default: 1      ! IAVEZI =  1  !

       Max. search radius in averaging
       process (MNMDAV)                  Default: 1      ! MNMDAV =  10  !
                                         Units: Grid
                                                cells
       Half-angle of upwind looking cone
       for averaging (HAFANG)            Default: 30.    ! HAFANG = 30. !
                                         Units: deg.
       Layer of winds used in upwind
       averaging (ILEVZI)                Default: 1      ! ILEVZI =  1  !
       (must be between 1 and NZ)

    CONVECTIVE MIXING HEIGHT OPTIONS:
```

```
   Method to compute the convective
   mixing height(IMIHXH)                Default: 1      ! IMIXH =  1  !
       1: Maul-Carson for land and water cells
      -1: Maul-Carson for land cells only -
          OCD mixing height overwater
       2: Batchvarova and Gryning for land and water cells
      -2: Batchvarova and Gryning for land cells only
          OCD mixing height overwater

   Threshold buoyancy flux required to
   sustain convective mixing height growth
   overland (THRESHL)                   Default: 0.0    ! THRESHL = 0. !
   (expressed as a heat flux            units: W/m3
    per meter of boundary layer)

   Threshold buoyancy flux required to
   sustain convective mixing height growth
   overwater (THRESHW)                  Default: 0.05   ! THRESHW = 0.05 !
   (expressed as a heat flux            units: W/m3
    per meter of boundary layer)

   Flag to allow relaxation of convective mixing height
   to equilibrium value when  0<QH<THRESHL (overland)
                          or  0<QH<THRESHW (overwater)
   (IZICRLX)                            Default: 1      ! IZICRLX =  1  !
      0 : do NOT use convective mixing height relaxation
          to equilibrium value (treatment identical to CALMET v5.8)
      1 : use convective mixing height relaxation
          to equilibrium value

   Relaxation time of convective mixing height to
   equilibrium value when  0<QH<THRESHL (overland)
                       or  0<QH<THRESHW (overwater)
   (Used only if IZICRLX = 1 and  TZICRLX must be >= 1.)
   (TZICRLX)                            Default: 800.   ! TZICRLX = 800. !
                                        Units: seconds

   Option for overwater lapse rates used
   in convective mixing height growth
   (ITWPROG)                            Default: 0      ! ITWPROG =  0  !
   0 : use SEA.DAT lapse rates and deltaT (or assume neutral
       conditions if missing)
   1 : use prognostic lapse rates (only if IPROG>2)
       and SEA.DAT deltaT (or neutral if missing)
   2 : use prognostic lapse rates and prognostic delta T
       (only if iprog>12 and 3D.DAT version# 2.0 or higher)

   Land Use category ocean in 3D.DAT datasets
   (ILUOC3D)                            Default: 16     ! ILUOC3D =  16  !
   Note: if 3D.DAT from MM5 version 3.0, iluoc3d = 16
         if MM4.DAT,           typically iluoc3d = 7

OTHER MIXING HEIGHT VARIABLES
```

```
   Minimum potential temperature lapse
   rate in the stable layer above the
   current convective mixing ht.          Default: 0.001  ! DPTMIN = 0.001 !
   (DPTMIN)                               Units: deg. K/m
   Depth of layer above current conv.
   mixing height through which lapse      Default: 200.   ! DZZI = 200. !
   rate is computed (DZZI)                Units: meters

   Minimum overland mixing height         Default:  50.   ! ZIMIN = 50. !
   (ZIMIN)                                Units: meters
   Maximum overland mixing height         Default: 3000.  ! ZIMAX = 2600. !
   (ZIMAX)                                Units: meters
   Minimum overwater mixing height        Default:   50.  ! ZIMINW = 50. !
   (ZIMINW) -- (Not used if observed      Units: meters
   overwater mixing hts. are used)
   Maximum overwater mixing height        Default: 3000.  ! ZIMAXW = 2600. !
   (ZIMAXW) -- (Not used if observed      Units: meters
   overwater mixing hts. are used)

OVERWATER SURFACE FLUXES METHOD and PARAMETERS
      (ICOARE)                            Default: 10      ! ICOARE =  10   !
       0: original deltaT method (OCD)
      10: COARE with no wave parameterization (jwave=0, Charnock)
      11: COARE with wave option jwave=1 (Oost et al.)
          and default wave properties
     -11: COARE with wave option jwave=1 (Oost et al.)
          and observed wave properties (must be in SEA.DAT files)
      12: COARE with wave option 2 (Taylor and Yelland)
           and default wave properties
     -12: COARE with wave option 2 (Taylor and Yelland)
          and observed wave properties (must be in SEA.DAT files)

      Note:  When ICOARE=0, similarity wind profile stability PSI functions
             based on Van Ulden and Holtslag (1985) are substituted for
             later formulations used with the COARE module, and temperatures
             used for surface layer parameters are obtained from either the
             nearest surface station temperature or prognostic model 2D
             temperatures (if ITPROG=2).

      Coastal/Shallow water length scale (DSHELF)
      (for modified z0 in shallow water)
      ( COARE fluxes only)
                                    Default : 0.        ! DSHELF = 0. !
                                    units: km

       COARE warm layer computation (IWARM)              ! IWARM =  0   !
       1: on - 0: off (must be off if SST measured with
       IR radiometer)               Default: 0

       COARE cool skin layer computation (ICOOL)         ! ICOOL =  0   !
       1: on - 0: off (must be off if SST measured with
       IR radiometer)               Default: 0
```

```
RELATIVE HUMIDITY PARAMETERS

   3D relative humidity from observations or
   from prognostic data? (IRHPROG)       Default:0        ! IRHPROG =  0   !

      0 = Use RH from SURF.DAT file
          (only if NOOBS = 0,1)
      1 = Use prognostic RH
          (only if NOOBS = 0,1,2)

TEMPERATURE PARAMETERS

   3D temperature from observations or
   from prognostic data? (ITPROG)        Default:0        ! ITPROG =  0   !

      0 = Use Surface and upper air stations
          (only if NOOBS = 0)
      1 = Use Surface stations (no upper air observations)
          Use MM5/3D.DAT for upper air data
          (only if NOOBS = 0,1)
      2 = No surface or upper air observations
          Use MM5/3D.DAT for surface and upper air data
          (only if NOOBS = 0,1,2)

   Interpolation type
   (1 = 1/R ; 2 = 1/R**2)                Default:1         ! IRAD =  1  !

   Radius of influence for temperature
   interpolation (TRADKM)                Default: 500.     ! TRADKM = 20. !
                                         Units: km

   Maximum Number of stations to include
   in temperature interpolation (NUMTS)  Default: 5        ! NUMTS = 5  !

   Conduct spatial averaging of temp-
   eratures (IAVET)  (0=no, 1=yes)       Default: 1        ! IAVET =  1  !
   (will use mixing ht MNMDAV,HAFANG
    so make sure they are correct)

   Default temperature gradient          Default: -.0098   ! TGDEFB = -0.0098 !
   below the mixing height over          Units: K/m
   water (TGDEFB)

   Default temperature gradient          Default: -.0045   ! TGDEFA = -0.0045 !
   above the mixing height over          Units: K/m
   water (TGDEFA)

   Beginning (JWAT1) and ending (JWAT2)
   land use categories for temperature                     ! JWAT1 =  55  !
   interpolation over water -- Make                        ! JWAT2 =  55 !
   bigger than largest land use to disable
```

```
   PRECIP INTERPOLATION PARAMETERS

       Method of interpolation (NFLAGP)      Default: 2       ! NFLAGP =  2  !
        (1=1/R,2=1/R**2,3=EXP/R**2)
       Radius of Influence  (SIGMAP)         Default: 100.0   ! SIGMAP = 50. !
        (0.0 => use half dist. btwn          Units: km
         nearest stns w & w/out
         precip when NFLAGP = 3)
       Minimum Precip. Rate Cutoff (CUTP)    Default: 0.01    ! CUTP = 0.01 !
        (values < CUTP = 0.0 mm/hr)          Units: mm/hr
!END!
------------------------------------------------------------------------------
INPUT GROUP: 7 -- Surface meteorological station parameters
--------------
     SURFACE STATION VARIABLES
     (One record per station --  5  records in all)

             1     2
         Name   ID            X coord.   Y coord.   Time   Anem.
                               (km)       (km)      zone   Ht.(m)
       ---------------------------------------------------------
! SS1  ='1 '    10001       612.000 5203.000        4    10  !
! SS2  ='2 '    10002       620.000 5203.000        4    10  !
! SS3  ='3 '    10003       628.000 5203.000        4    10  !
! SS4  ='4 '    10004       612.000 5195.000        4    10  !
! SS5  ='5 '    10005       620.000 5195.000        4    10  !
! SS6  ='6 '    10006       628.000 5195.000        4    10  !
! SS7  ='7 '    10007       612.000 5187.000        4    10  !
! SS8  ='8 '    10008       620.000 5187.000        4    10  !
! SS9  ='9 '    10009       628.000 5187.000        4    10  !
! SS10 ='10'    10010       618.000 5197.000        4    10  !
! SS11 ='11'    10011       620.000 5197.000        4    10  !
! SS12 ='12'    10012       622.000 5197.000        4    10  !
! SS13 ='13'    10013       618.000 5195.000        4    10  !
! SS14 ='14'    10014       622.000 5195.000        4    10  !
! SS15 ='15'    10015       620.000 5193.000        4    10  !
! SS16 ='16'    10016       622.000 5193.000        4    10  !
! SS17 ='17'    10017       618.000 5193.000        4    10  !

-------------------
      1
        Four character string for station name
        (MUST START IN COLUMN 9)
      2
        Six digit integer for station ID

!END!
------------------------------------------------------------------------------
INPUT GROUP: 8 -- Upper air meteorological station parameters
--------------
     UPPER AIR STATION VARIABLES
     (One record per station --  3  records in all)
```

```
            1     2
         Name    ID      X coord.   Y coord.  Time zone
                           (km)       (km)
        ------------------------------------------------
! US1  ='1 '    10001       612.000 5203.000        4  !
! US2  ='2 '    10002       620.000 5203.000        4  !
! US3  ='3 '    10003       628.000 5203.000        4  !
! US4  ='4 '    10004       612.000 5195.000        4  !
! US5  ='5 '    10005       620.000 5195.000        4  !
! US6  ='6 '    10006       628.000 5195.000        4  !
! US7  ='7 '    10007       612.000 5187.000        4  !
! US8  ='8 '    10008       620.000 5187.000        4  !
! US9  ='9 '    10009       628.000 5187.000        4  !
! US10 ='10'    10010       618.000 5197.000        4  !
! US11 ='11'    10011       620.000 5197.000        4  !
! US12 ='12'    10012       622.000 5197.000        4  !
! US13 ='13'    10013       618.000 5195.000        4  !
! US14 ='14'    10014       622.000 5195.000        4  !
! US15 ='15'    10015       620.000 5193.000        4  !
! US16 ='16'    10016       622.000 5193.000        4  !
! US17 ='17'    10017       618.000 5193.000        4  !
 -------------------
      1
        Four character string for station name
        (MUST START IN COLUMN 9)
      2
        Five digit integer for station ID

!END!
--------------------------------------------------------------------------------
INPUT GROUP: 9 -- Precipitation station parameters
--------------
     PRECIPITATION STATION VARIABLES
     (One record per station --  16  records in all)
     (NOT INCLUDED IF NPSTA = 0)

            1          2
         Name   Station    X coord.  Y coord.
                  Code       (km)      (km)
         ------------------------------------

! PS1  ='1 '    000001       620.000 5195.000       !

-------------------
      1
        Four character string for station name
        (MUST START IN COLUMN 9)
      2
        Six digit station code composed of state
        code (first 2 digits) and station ID (last
        4 digits)

!END!
```

```
                    CALPUFF MODEL CONTROL FILE
                    --------------------------

--------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names
--------------

Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    * METDAT =   *
    or
ISCMET.DAT    input    * ISCDAT =             *
    or
PLMMET.DAT    input    * PLMDAT =             *
    or
PROFILE.DAT   input    * PRFDAT =             *
SURFACE.DAT   input    * SFCDAT =             *
RESTARTB.DAT  input    * RSTARTB=             *
--------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST =roadfuel1_2022.LST  !
CONC.DAT      output   ! CONDAT =roadfuel1_2022.CON     !
DFLX.DAT      output   ! DFDAT  =roadfuel1_2022.DRY     !
WFLX.DAT      output   ! WFDAT  =roadfuel1_2022.WET     !

VISB.DAT      output   * VISDAT =CALPUFF.VIS     *
TK2D.DAT      output   * T2DDAT =             *
RHO2D.DAT     output   * RHODAT =             *
RESTARTE.DAT  output   * RSTARTE=             *
--------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input    ! OZDAT  = e:\cfi\calpuff\OZONE.DAT    !
VD.DAT        input    * VDDAT  =             *
CHEM.DAT      input    * CHEMDAT=             *
AUX           input    * AUXEXT =aux     *
(Extension added to METDAT filename(s) for files
 with auxiliary 2D and 3D data)
H2O2.DAT      input    * H2O2DAT=             *
NH3Z.DAT      input    * NH3ZDAT=             *
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   * DEBUG =             *
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
RISE.DAT      output   * RISDAT=             *
PFTRAK.DAT    output   * TRKDAT=             *
--------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
```

```
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = F !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 132 characters in length

Provision for multiple CALMET Domains and files
----------------------------------------------------

     Number of CALMET.DAT Domains (NMETDOM)
                                   Default: 1       ! NMETDOM =   1   !

     Number of CALMET.DAT files (NMETDAT)
     (Total for ALL Domains)
                                   Default: 1       ! NMETDAT =   22   !

Variable point/area/volume/flare emissions input files
----------------------------------------------------------

     Number of POINT source files (PTEMARB.DAT)
     with time-varying data (NPTDAT)
                                   Default: 0       ! NPTDAT =  0   !

     Number of BUOYANT AREA source files (BAEMARB.DAT)
     with time-varying data (NARDAT)
                                   Default: 0       ! NARDAT =  0   !

     Number of VOLUME source files (VOLEMARB.DAT)
     with time-varying data (NVOLDAT)
                                   Default: 0       ! NVOLDAT =  0  !

     Number of FLARE source files (FLEMARB.DAT)
     with time-varying data (NFLDAT)
                                   Default: 0       ! NFLDAT   =  0 !

     Number of ROAD source files (RDEMARB.DAT)
     with time-varying data (NRDDAT)
                                   Default: 0       ! NRDDAT   =  0 !

     Number of BUOYANT LINE source files (LNEMARB.DAT)
     with time-varying data (NLNDAT)
                                   Default: 0       ! NLNDAT   =  0 !
     Note:  Only 1 BUOYANT LINE source file is allowed
     -----

!END!
-------------
Subgroup (0a)
-------------

  Provide a name for each CALMET domain if NMETDOM > 1
  Enter NMETDOM lines.
                                  a,b
Default Name             Domain Name
```

```
------------              ------------
 none                   * DOMAIN1=     *   *END*
 none                   * DOMAIN2=     *   *END*
 none                   * DOMAIN3=     *   *END*


  The following CALMET.DAT filenames are processed in sequence
  if NMETDAT > 1

  Enter NMETDAT lines, 1 line for each file name.

                                    a,c,d
Default Name  Type          File Name
------------  ----          ---------
1 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2022\calmetjan1_feb15_2022.dat   ! !END!
2 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2022\calmetfeb16_mar27_2022.dat   ! !END!
3 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2022\calmetmar28_mar30_2022.dat   ! !END!
4 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2022\calmetmar31_may15_2022.dat   ! !END!
5 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2022\calmetmay16_oct31_2022.dat   ! !END!
6 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2022\calmetnov1_dec14_2022.dat   ! !END!
7 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2022\calmetdec15_dec31_2022.dat   ! !END!
8 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2023\calmetjan1_feb7_2023.dat   ! !END!
9 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2023\calmetfeb8_apr12_2023.dat   ! !END!
10 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2023\calmetapr13_apr30_2023.dat  ! !END!
11 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2023\calmetmay1_may15_2023.dat   ! !END!
12 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2023\calmetmay16_oct31_2023.dat  ! !END!
13 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2023\calmetnov1_dec28_2023.dat   ! !END!
14 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2023\calmetdec29_dec31_2023.dat  ! !END!
15 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetjan1_jan19_2024.dat   ! !END!
16 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetjan20_mar28_2024.dat  ! !END!
17 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetmar29_apr30_2024.dat  ! !END!
18 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetmay1_may15_2024.dat   ! !END!
19 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetmay16_oct31_2024.dat  ! !END!
20 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetnov1_dec3_2024.dat   ! !END!
21 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetdec4_dec11_2024.dat   ! !END!
22 CALMET.DAT    input    ! METDAT = e:\cfi\calmet\2024\calmetdec12_dec31_2024.dat  ! !END!

-------------
    a
     The name for each CALMET domain and each CALMET.DAT file is treated
     as a separate input subgroup and therefore must end with an input
     group terminator.
    b
     Use DOMAIN1= to assign the name for the outermost CALMET domain.
     Use DOMAIN2= to assign the name for the next inner CALMET domain.
     Use DOMAIN3= to assign the name for the next inner CALMET domain, etc.
      ---------------------------------------------------------------------
      |   When inner domains with equal resolution (grid-cell size)      |
      |   overlap, the data from the FIRST such domain in the list will  |
      |   be used if all other criteria for choosing the controlling     |
      |   grid domain are inconclusive.                                   |
      ---------------------------------------------------------------------
    c
```

```
     Use METDAT1= to assign the file names for the outermost CALMET domain.
     Use METDAT2= to assign the file names for the next inner CALMET domain.
     Use METDAT3= to assign the file names for the next inner CALMET domain, etc.
    d
     The filenames for each domain must be provided in sequential order

-------------
Subgroup (0b) – PTEMARB.DAT files
-------------

  POINT Source File Names
  The following PTEMARB.DAT filenames are processed if NPTDAT>0
  A total of NPTDAT lines is expected with one file name assigned per line
  Each line is treated as an input group and must terminate with END
  (surrounded by delimiters)
  (Each file contains emissions parameters for the entire period modeled
   for 1 or more sources)

Default Name  Type          File Name
------------  ----          ---------
PTEMARB.DAT   input    * PTDAT  = PTEMARB_2108.prn   * *END*

-------------
Subgroup (0c) – BAEMARB.DAT files
-------------

  BUOYANT AREA Source File Names
  The following BAEMARB.DAT filenames are processed if NARDAT>0
  A total of NARDAT lines is expected with one file name assigned per line
  Each line is treated as an input group and must terminate with END
  (surrounded by delimiters)
  (Each file contains emissions parameters for the entire period modeled
   for 1 or more sources)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * ARDAT=     *   *END*

-------------
Subgroup (0d) – VOLEMARB.DAT files
-------------

  VOLUME Source File Names
  The following VOLEMARB.DAT filenames are processed if NVOLDAT>0
  A total of NVOLDAT lines is expected with one file name assigned per line
  Each line is treated as an input group and must terminate with END
  (surrounded by delimiters)
  (Each file contains emissions parameters for the entire period modeled
   for 1 or more sources)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * VOLDAT=     *   *END*
```

```
-------------
Subgroup (0e) - FLEMARB.DAT files
-------------

  FLARE Source File Names
  The following FLEMARB.DAT filenames are processed if NFLDAT>0
  A total of NFLDAT lines is expected with one file name assigned per line
  Each line is treated as an input group and must terminate with END
  (surrounded by delimiters)
  (Each file contains emissions parameters for the entire period modeled
   for 1 or more sources)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * FLDAT=     *   *END*

-------------
Subgroup (0f) - RDEMARB.DAT files
-------------

  ROAD Source File Names
  The following RDEMARB.DAT filenames are processed if NRDDAT>0
  A total of NRDDAT lines is expected with one file name assigned per line
  Each line is treated as an input group and must terminate with END
  (surrounded by delimiters)
  (Each file contains emissions parameters for the entire period modeled
   for 1 or more sources)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * RDDAT=     *   *END*

-------------
Subgroup (0g) - LNEMARB.DAT file
-------------

  BUOYANT LINE Source File Name  (not more than 1)
  The following LNEMARB.DAT filename is processed if NLNDAT>0
  The assignment is treated as an input group and must terminate with END
  (surrounded by delimiters)

Default Name  Type          File Name
------------  ----          ---------
LNEMARB.DAT   input       * LNDAT=     *   *END*

------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   0  !
```

```
    METRUN = 0 - Run period explicitly defined below
    METRUN = 1 - Run all periods in met. file

Starting date:    Year   (IBYR)  --    No default   ! IBYR  =  2022  !
                  Month  (IBMO)  --    No default   ! IBMO  =  1   !
                  Day    (IBDY)  --    No default   ! IBDY  =  1   !
Starting time:    Hour   (IBHR)  --    No default   ! IBHR  =  0   !
                  Minute (IBMIN) --    No default   ! IBMIN =  0   !
                  Second (IBSEC) --    No default   ! IBSEC =  0   !

Ending date:      Year   (IEYR)  --    No default   ! IEYR  =  2023  !
                  Month  (IEMO)  --    No default   ! IEMO  =  1   !
                  Day    (IEDY)  --    No default   ! IEDY  =  1   !
Ending time:      Hour   (IEHR)  --    No default   ! IEHR  =  0   !
                  Minute (IEMIN) --    No default   ! IEMIN =  0   !
                  Second (IESEC) --    No default   ! IESEC =  3600  !

(These are only used if METRUN = 0)

Base time zone:          (ABTZ)  --    No default   ! ABTZ= UTC-0400 !
 (character*8)
The modeling domain may span multiple time zones.  ABTZ defines the
base time zone used for the entire simulation.  This must match the
base time zone of the meteorological data.
Examples:
    Greenwich Mean Time (GMT) = UTC+0000
    EST                       = UTC-0500
    CST                       = UTC-0600
    MST                       = UTC-0700
    PST                       = UTC-0800
    Los Angeles, USA          = UTC-0800
    New York, USA             = UTC-0500
    Santiago, Chile           = UTC-0400
    UK                        = UTC+0000
    Western Europe            = UTC+0100
    Rome, Italy               = UTC+0100
    Cape Town, S.Africa       = UTC+0200
    Sydney, Australia         = UTC+1000

Length of modeling time-step (seconds)
Equal to update period in the primary
meteorological data files, or an
integer fraction of it (1/2, 1/3 ...)
Must be no larger than 1 hour
(NSECDT)                        Default:3600     ! NSECDT =  3600  !
                                Units: seconds

Number of chemical species (NSPEC)
                                Default: 5       ! NSPEC =  10   !

Number of chemical species
to be emitted  (NSE)            Default: 3       ! NSE =  7   !
```

```
Flag to stop run after
SETUP phase (ITEST)             Default: 2       ! ITEST =  2   !
(Used to allow checking
of the model inputs, files, etc.)
      ITEST = 1 - STOPS program after SETUP phase
      ITEST = 2 - Continues with execution of program
                  after SETUP

Restart Configuration:

   Control flag (MRESTART)      Default: 0       ! MRESTART =  0   !

      0 = Do not read or write a restart file
      1 = Read a restart file at the beginning of
          the run
      2 = Write a restart file during run
      3 = Read a restart file at beginning of run
          and write a restart file during run

   Number of periods in Restart
   output cycle (NRESPD)        Default: 0       ! NRESPD =  0   !

      0 = File written only at last period
     >0 = File updated every NRESPD periods

Meteorological Data Format (METFM)
                                Default: 1       ! METFM =  1   !

      METFM = 1 - CALMET binary file (CALMET.MET)
      METFM = 2 - ISC ASCII file (ISCMET.MET)
      METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
      METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                  surface parameters file (SURFACE.DAT)
      METFM = 5 - AERMET tower file (PROFILE.DAT) and
                  surface parameters file (SURFACE.DAT)

Meteorological Profile Data Format (MPRFFM)
       (used only for METFM = 1, 2, 3)
                                Default: 1       ! MPRFFM =  1   !

      MPRFFM = 1 - CTDM plus tower file (PROFILE.DAT)
      MPRFFM = 2 - AERMET tower file (PROFILE.DAT)

Sigma-y is adjusted by the factor (AVET/PGTIME)**0.2 to either
decrease it if the averaging time selected is less than the base
averaging time, or increase it if the averaging time is greater.
The base averaging time is denoted as PGTIME due to historical
reasons as this adjustment was originally applied to the PG sigma
option.  It is now applied to all dispersion options.
The factor is applied to the ambient turbulence sigma-v (m/s) and
does not alter buoyancy enhancement or far-field Heffter growth.
```

```
     Averaging Time (minutes) (AVET)
                                  Default: 60.0    ! AVET = 60. !
     Base Averaging Time (minutes) (PGTIME)
                                  Default: 60.0    ! PGTIME = 60. !

     Output units for binary concentration and flux files
     written in Dataset v2.2 or later formats
     (IOUTU)                      Default: 1       ! IOUTU = 1 !
         1 = mass      -  g/m3 (conc) or g/m2/s (dep)
         2 = odour     -  odour_units (conc)
         3 = radiation -  Bq/m3 (conc) or Bq/m2/s (dep)


!END!
------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------

     Vertical distribution used in the
     near field (MGAUSS)                  Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                             Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                         Default: 0     ! MCTSG =  0   !
        0 = not modeled
        1 = modeled

     Near-field puffs modeled as
     elongated slugs? (MSLUG)             Default: 0     ! MSLUG =  0   !
        0 = no
        1 = yes (slug model used)

     Transitional plume rise modeled?
     (MTRANS)                             Default: 1     ! MTRANS =  1   !
        0 = no  (i.e., final rise only)
        1 = yes (i.e., transitional rise computed)

     Stack tip downwash? (MTIP)           Default: 1     ! MTIP =  1  !
        0 = no  (i.e., no stack tip downwash)
        1 = yes (i.e., use stack tip downwash)

     Method used to compute plume rise for
     point sources not subject to building
```

```
downwash? (MRISE)                    Default: 1     ! MRISE =   1  !
   1 = Briggs plume rise
   2 = Numerical plume rise

Apply stack-tip downwash to FLARE sources?
(MTIP_FL)                            Default: 0     ! MTIP_FL  =  0 !
   0 = no  (no stack-tip downwash)
   1 = yes (apply stack-tip downwash)

Plume rise module for FLARE sources
(MRISE_FL)                           Default: 2     ! MRISE_FL =  2 !
   1 = Briggs module
   2 = Numerical rise module

Method used to simulate building
downwash? (MBDW)                     Default: 1     ! MBDW =   2  !
   1 = ISC method
   2 = PRIME method

Vertical wind shear modeled above
stack top (modified Briggs plume rise)?
(MSHEAR)                             Default: 0     ! MSHEAR =  0  !
   0 = no  (i.e., vertical wind shear not modeled)
   1 = yes (i.e., vertical wind shear modeled)

Puff splitting allowed? (MSPLIT)     Default: 0     ! MSPLIT =  1  !
   0 = no (i.e., puffs not split)
   1 = yes (i.e., puffs are split)

Chemical mechanism flag (MCHEM)      Default: 1     ! MCHEM =  6  !
   0 = chemical transformation not
       modeled
   1 = transformation rates computed
       internally (MESOPUFF II scheme)
   2 = user-specified transformation
       rates used
   3 = transformation rates computed
       internally (RIVAD/ARM3 scheme)
   4 = secondary organic aerosol formation
       computed (MESOPUFF II scheme for OH)
   5 = user-specified half-life with or
       without transfer to child species
   6 = transformation rates computed
       internally (Updated RIVAD scheme with
       ISORROPIA equilibrium)
   7 = transformation rates computed
       internally (Updated RIVAD scheme with
       ISORROPIA equilibrium and CalTech SOA)

Aqueous phase transformation flag (MAQCHEM)
(Used only if MCHEM = 6, or 7)       Default: 0     ! MAQCHEM =  0   !
   0 = aqueous phase transformation
       not modeled
```

```
   1 = transformation rates and wet
       scavenging coefficients adjusted
       for in-cloud aqueous phase reactions
       (adapted from RADM cloud model
        implementation in CMAQ/SCICHEM)

Liquid Water Content flag (MLWC)
(Used only if MAQCHEM = 1)            Default: 1     ! MLWC =  0   !
   0 = water content estimated from cloud cover
       and presence of precipitation
   1 = gridded cloud water data read from CALMET
       water content output files (filenames are
       the CALMET.DAT names PLUS the extension
       AUXEXT provided in Input Group 0)

Wet removal modeled ? (MWET)          Default: 1     ! MWET =  1   !
   0 = no
   1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY =  1   !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)


Gravitational settling (plume tilt)
modeled ? (MTILT)                     Default: 0     ! MTILT =  0   !
   0 = no
   1 = yes
   (puff center falls at the gravitational
    settling velocity for 1 particle species)

Restrictions:
    - MDRY  = 1
    - NSPEC = 1  (must be particle species as well)
    - sg    = 0  GEOMETRIC STANDARD DEVIATION in Group 8 is
                 set to zero for a single particle diameter

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP =  2  !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
```

```
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW =  3  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4, 5)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
when measured turbulence data are
missing (MDISP2)                      Default: 3     ! MDISP2 =  3  !
(used only if MDISP = 1 or 5)
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.

[DIAGNOSTIC FEATURE]
Method used for Lagrangian timescale for Sigma-y
(used only if MDISP=1,2 or MDISP2=1,2)
(MTAULY)                              Default: 0     ! MTAULY =  0  !
   0 = Draxler default 617.284 (s)
   1 = Computed as Lag. Length / (.75 q) -- after SCIPUFF
  10 < Direct user input (s)             -- e.g., 306.9


[DIAGNOSTIC FEATURE]
Method used for Advective-Decay timescale for Turbulence
(used only if MDISP=2 or MDISP2=2)
(MTAUADV)                             Default: 0     ! MTAUADV =  0  !
   0 = No turbulence advection
   1 = Computed (OPTION NOT IMPLEMENTED)
  10 < Direct user input (s)   -- e.g., 800

Method used to compute turbulence sigma-v &
sigma-w using micrometeorological variables
(Used only if MDISP = 2 or MDISP2 = 2)
(MCTURB)                              Default: 1     ! MCTURB =  1  !
```

```
   1 = Standard CALPUFF subroutines
   2 = AERMOD subroutines

PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
(MROUGH)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTL =  1  !
elevated inversion modeled for
point sources?
(MPARTL)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTLBA =  1  !
elevated inversion modeled for
buoyant area sources?
(MPARTLBA)
   0 = no
   1 = yes

Strength of temperature inversion     Default: 0     ! MTINV =  0  !
provided in PROFILE.DAT extended records?
(MTINV)
   0 = no (computed from measured/default gradients)
   1 = yes

PDF used for dispersion under convective conditions?
                                      Default: 0     ! MPDF =  1  !
(MPDF)
   0 = no
   1 = yes

Sub-Grid TIBL module used for shore line?
                                      Default: 0     ! MSGTIBL = 0  !
(MSGTIBL)
   0 = no
   1 = yes

Boundary conditions (concentration) modeled?
                                      Default: 0     ! MBCON = 0  !
(MBCON)
   0 = no
   1 = yes, using formatted BCON.DAT file
   2 = yes, using unformatted CONC.DAT file

Note:  MBCON > 0 requires that the last species modeled
       be 'BCON'.  Mass is placed in species BCON when
       generating boundary condition puffs so that clean
       air entering the modeling domain can be simulated
       in the same way as polluted air.  Specify zero
       emission of species BCON for all regular sources.
```

```
Individual source contributions saved?
                                    Default: 0     ! MSOURCE = 0  !
(MSOURCE)
   0 = no
   1 = yes

Analyses of fogging and icing impacts due to emissions from
arrays of mechanically-forced cooling towers can be performed
using CALPUFF in conjunction with a cooling tower emissions
processor (CTEMISS) and its associated postprocessors.  Hourly
emissions of water vapor and temperature from each cooling tower
cell are computed for the current cell configuration and ambient
conditions by CTEMISS. CALPUFF models the dispersion of these
emissions and provides cloud information in a specialized format
for further analysis. Output to FOG.DAT is provided in either
'plume mode' or 'receptor mode' format.

Configure for FOG Model output?
                                    Default: 0     ! MFOG =  0   !
(MFOG)
   0 = no
   1 = yes  - report results in PLUME Mode format
   2 = yes  - report results in RECEPTOR Mode format


Test options specified to see if
they conform to regulatory
values? (MREG)                      Default: 1     ! MREG =  0   !

   0 = NO checks are made
   1 = Technical options must conform to USEPA
       Long Range Transport (LRT) guidance
                 METFM    1 or 2
                 AVET     60. (min)
                 PGTIME   60. (min)
                 MGAUSS   1
                 MCTADJ   3
                 MTRANS   1
                 MTIP     1
                 MRISE    1
                 MCHEM    1 or 3 (if modeling SOx, NOx)
                 MWET     1
                 MDRY     1
                 MDISP    2 or 3
                 MPDF     0 if MDISP=3
                          1 if MDISP=2
                 MROUGH   0
                 MPARTL   1
                 MPARTLBA 0
                 SYTDEP   550. (m)
                 MHFTSZ   0
                 SVMIN    0.5 (m/s)
```

```
!END!
------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------
------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =          SO2 !         !END!
! CSPEC =          SO4 !         !END!
! CSPEC =          NO  !         !END!
! CSPEC =          NO2 !         !END!
! CSPEC =          HNO3 !        !END!
! CSPEC =          NO3 !         !END!
! CSPEC =          CO !         !END!
! CSPEC =        PM25 !         !END!
! CSPEC =          P2 !         !END!
! CSPEC =          P3 !         !END!
                                                      Dry                 OUTPUT GROUP
    SPECIES          MODELED          EMITTED       DEPOSITED               NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,                (0=NONE,
   (Limit: 12                                         1=COMPUTED-GAS        1=1st CGRUP,
    Characters                                        2=COMPUTED-PARTICLE   2=2nd CGRUP,
    in length)                                        3=USER-SPECIFIED)     3= etc.)

!          SO2  =         1,               1,           1,                 0   !
!          SO4  =         1,               1,           2,                 0   !
!           NO  =         1,               1,           1,                 0   !
!          NO2  =         1,               1,           1,                 0   !
!         HNO3  =         1,               1,           1,                 0   !
!          NO3  =         1,               1,           2,                 0   !
!           CO  =         1,               1,           1,                 0   !
!         PM25  =         1,               1,           2,                 0   !
!           P2  =         1,               1,           2,                 0   !
!           P3  =         1,               1,           2,                 0   !

!END!

  Note:  The last species in (3a) must be 'BCON' when using the
         boundary condition option (MBCON > 0).  Species BCON should
         typically be modeled as inert (no chem transformation or
         removal).

-------------
Subgroup (3b)
-------------
  The following names are used for Species-Groups in which results
  for certain species are combined (added) prior to output.  The
```

```
  CGRUP name will be used as the species name in output files.
  Use this feature to model specific particle-size distributions
  by treating each size-range as a separate species.
  Order must be consistent with 3(a) above.

------------------------------------------------------------------------------

INPUT GROUP: 4 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                    Default: UTM    ! PMAP = UTM  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                   Default=0.0     ! FEAST  = 0.000  !
     (FNORTH)                  Default=0.0     ! FNORTH = 0.000  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                  No Default      ! IUTMZN =  21  !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                  Default: N      ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection

     Latitude and Longitude (decimal degrees) of projection origin
     (Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
     (RLAT0)                   No Default      ! RLAT0 = 0N  !
     (RLON0)                   No Default      ! RLON0 = 0E  !

         TTM :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         LCC :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         PS  :  RLON0 identifies central (grid N/S) meridian of projection
                RLAT0 selected for convenience
         EM  :  RLON0 identifies central meridian of projection
                RLAT0 is REPLACED by 0.0N (Equator)
         LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
                RLAT0 identifies latitude of tangent-point of mapping plane
```

```
     Matching parallel(s) of latitude (decimal degrees) for projection
     (Used only if PMAP= LCC or PS)
     (XLAT1)                   No Default      ! XLAT1 = 0N  !
     (XLAT2)                   No Default      ! XLAT2 = 0N  !

         LCC :  Projection cone slices through Earth's surface at XLAT1 and XLAT2
         PS  :  Projection plane slices through Earth at XLAT1
                (XLAT2 is not used)

     ----------
     Note:  Latitudes and longitudes should be positive, and include a
            letter N,S,E, or W indicating north or south latitude, and
            east or west longitude.  For example,
            35.9  N Latitude  =  35.9N
            118.7 E Longitude = 118.7E


     Datum-region
     ------------

     The Datum-Region for the coordinates is identified by a character
     string.  Many mapping products currently available use the model of the
     Earth known as the World Geodetic System 1984 (WGS-84).  Other local
     models may be in use, and their selection in CALMET will make its output
     consistent with local mapping products.  The list of Datum-Regions with
     official transformation parameters is provided by the National Imagery and
     Mapping Agency (NIMA).

     NIMA Datum - Regions(Examples)
     ------------------------------------------------------------------------------
     WGS-84    WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
     NAS-C     NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
     NAR-C     NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
     NWS-84    NWS 6370KM Radius, Sphere
     ESR-S     ESRI REFERENCE 6371KM Radius, Sphere

     Datum-region for output coordinates
     (DATUM)                   Default: WGS-84    ! DATUM = WGS-84 !


METEOROLOGICAL Grid (outermost if nested CALMET grids are used):

     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX =  100   !
            No. Y grid cells (NY)      No default     ! NY =  100   !
         No. vertical layers (NZ)      No default     ! NZ =  10   !

           Grid spacing (DGRIDKM)      No default     ! DGRIDKM = 0.2 !
                                       Units: km
```

```
               Cell face heights
                   (ZFACE(nz+1))      No defaults
                                      Units: m
  ! ZFACE = 0.,20.,40.,80.,160.,300.,600.,1000.,1500.,2200.,3000. !

            Reference Coordinates
           of SOUTHWEST corner of
                grid cell(1, 1):

            X coordinate (XORIGKM)     No default     ! XORIGKM = 610.000 !
            Y coordinate (YORIGKM)     No default     ! YORIGKM = 5185.000  !
                                     Units: km

COMPUTATIONAL Grid:

     The computational grid is identical to or a subset of the MET. grid.
     The lower left (LL) corner of the computational grid is at grid point
     (IBCOMP, JBCOMP) of the MET. grid.  The upper right (UR) corner of the
     computational grid is at grid point (IECOMP, JECOMP) of the MET. grid.
     The grid spacing of the computational grid is the same as the MET. grid.

        X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
                  (1 <= IBCOMP <= NX)

        Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
                  (1 <= JBCOMP <= NY)


        X index of UR corner (IECOMP)      No default     ! IECOMP =  100  !
                  (1 <= IECOMP <= NX)

        Y index of UR corner (JECOMP)      No default     ! JECOMP =  100  !
                  (1 <= JECOMP <= NY)


SAMPLING Grid (GRIDDED RECEPTORS):

     The lower left (LL) corner of the sampling grid is at grid point
     (IBSAMP, JBSAMP) of the MET. grid.  The upper right (UR) corner of the
     sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid.
     The sampling grid must be identical to or a subset of the computational
     grid.  It may be a nested grid inside the computational grid.
     The grid spacing of the sampling grid is DGRIDKM/MESHDN.

        Logical flag indicating if gridded
        receptors are used (LSAMP)         Default: T     ! LSAMP = F !
        (T=yes, F=no)

        X index of LL corner (IBSAMP)      No default     ! IBSAMP =  10   !
         (IBCOMP <= IBSAMP <= IECOMP)

        Y index of LL corner (JBSAMP)      No default     ! JBSAMP =  10   !
         (JBCOMP <= JBSAMP <= JECOMP)
```

```
        X index of UR corner (IESAMP)      No default     ! IESAMP =  80   !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP =  70   !
         (JBCOMP <= JESAMP <= JECOMP)

       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN =  1  !
        (MESHDN is an integer >= 1)

!END!
------------------------------------------------------------------------------

INPUT GROUP: 5 -- Output Options
--------------
                                          *                          *
     FILE                         DEFAULT VALUE             VALUE THIS RUN
     ----                         -------------             --------------

   Concentrations (ICON)               1                   !  ICON =  1   !
   Dry Fluxes (IDRY)                   1                   !  IDRY =  1   !
   Wet Fluxes (IWET)                   1                   !  IWET =  1   !
   2D Temperature (IT2D)               0                   !  IT2D =  0   !
   2D Density (IRHO)                   0                   !  IRHO =  0   !
   Relative Humidity (IVIS)            1                   !  IVIS =  0   !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                            Default: T         ! LCOMPRS = T !

   *
    0 = Do not create file, 1 = create file


    QA PLOT FILE OUTPUT OPTION:

       Create a standard series of output files (e.g.
       locations of sources, receptors, grids ...)
       suitable for plotting?
       (IQAPLOT)                        Default: 1         ! IQAPLOT =  1   !
         0 = no
         1 = yes

    DIAGNOSTIC PUFF-TRACKING OUTPUT OPTION:

       Puff locations and properties reported to
       PFTRAK.DAT file for postprocessing?
       (IPFTRAK)                        Default: 0         ! IPFTRAK =  0   !
         0 = no
         1 = yes, update puff output at end of each timestep
```

```
     2 = yes, update puff output at end of each sampling step

DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

   Mass flux across specified boundaries
   for selected species reported?
   (IMFLX)                        Default: 0         ! IMFLX =  0  !
     0 = no
     1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
              are specified in Input Group 0)

   Mass balance for each species
   reported?
   (IMBAL)                        Default: 0         ! IMBAL =  0  !
     0 = no
     1 = yes (MASSBAL.DAT filename is
          specified in Input Group 0)

NUMERICAL RISE OUTPUT OPTION:

   Create a file with plume properties for each rise
   increment, for each model timestep?
   This applies to sources modeled with numerical rise
   and is limited to ONE source in the run.
   (INRISE)                       Default: 0         ! INRISE =  0   !
     0 = no
     1 = yes (RISE.DAT filename is
              specified in Input Group 0)

LINE PRINTER OUTPUT OPTIONS:

   Print concentrations (ICPRT)    Default: 0         ! ICPRT =  1   !
   Print dry fluxes (IDPRT)        Default: 0         ! IDPRT =  0   !
   Print wet fluxes (IWPRT)        Default: 0         ! IWPRT =  0   !
   (0 = Do not print, 1 = Print)

   Concentration print interval
   (ICFRQ) in timesteps            Default: 1         ! ICFRQ =  1   !
   Dry flux print interval
   (IDFRQ) in timesteps            Default: 1         ! IDFRQ =  1   !
   Wet flux print interval
   (IWFRQ) in timesteps            Default: 1         ! IWFRQ =  1   !

   Units for Line Printer Output
   (IPRTU)                         Default: 1         ! IPRTU =  3   !
                  for              for
              Concentration    Deposition
       1 =       g/m**3          g/m**2/s
       2 =      mg/m**3         mg/m**2/s
       3 =      ug/m**3         ug/m**2/s
       4 =      ng/m**3         ng/m**2/s
       5 =     Odour Units
       6 =      TBq/m**3        TBq/m**2/s    TBq=terabecquerel
```

```
          7 =      GBq/m**3       GBq/m**2/s    GBq=gigabecquerel
          8 =       Bq/m**3        Bq/m**2/s    Bq=becquerel (disintegrations/s)

       Messages tracking progress of run
       written to the screen ?
       (IMESG)                         Default: 2         ! IMESG =  2   !
         0 = no
         1 = yes (advection step, puff ID)
         2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


     SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                 ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------ WET FLUXES ------   --
MASS FLUX --
   SPECIES
   /GROUP        PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?
SAVED ON DISK?
   -------       ------------------------   ------------------------   ------------------------   ---
------------
!          SO2 =     0,        1,         0,         1,         0,         1,         0   !
!          SO4 =     0,        1,         0,         1,         0,         1,         0   !
!           NO =     0,        1,         0,         1,         0,         1,         0   !
!          NO2 =     0,        1,         0,         1,         0,         1,         0   !
!         HNO3 =     0,        1,         0,         1,         0,         1,         0   !
!          NO3 =     0,        1,         0,         1,         0,         1,         0   !
!           CO =     0,        1,         0,         1,         0,         1,         0   !
!         PM25 =     0,        1,         0,         1,         0,         1,         0   !
!           P2 =     0,        1,         0,         1,         0,         1,         0   !
!           P3 =     0,        1,         0,         1,         0,         1,         0   !

  Note:  Species BCON (for MBCON > 0) does not need to be saved on disk.

     OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

       Logical for debug output
       (LDEBUG)                                Default: F     ! LDEBUG = F !

       First puff to track
       (IPFDEB)                                Default: 1     ! IPFDEB =  1  !

       Number of puffs to track
       (NPFDEB)                                Default: 1     ! NPFDEB =  1  !

       Met. period to start output
       (NN1)                                   Default: 1     ! NN1 =  1   !

       Met. period to end output
       (NN2)                                   Default: 10    ! NN2 =  10  !

!END!
------------------------------------------------------------------------------
```

```
INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
-------------------------
---------------
Subgroup (6a)
---------------
       Number of terrain features (NHILL)       Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                      Default: 0     ! NCTREC =  0   !

       Terrain and CTSG Receptor data for
       CTSG hills input in CTDM format ?
       (MHILL)                                  No Default     ! MHILL =  2   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1.0 !
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1.0 !
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

---------------
Subgroup (6b)
---------------

                     1 **
     HILL information


HILL           XC        YC       THETAH  ZGRID  RELIEF    EXPO 1    EXPO 2   SCALE 1    SCALE 2
AMAX1     AMAX2
 NO.          (km)      (km)      (deg.)   (m)     (m)       (m)       (m)       (m)        (m)
(m)       (m)
----          ----      ----      ------  -----  ------    ------    ------   -------    -------    -
----     -----

---------------
Subgroup (6c)
---------------
```

```
    COMPLEX TERRAIN RECEPTOR INFORMATION

                     XRCT         YRCT        ZRCT          XHH
                     (km)         (km)         (m)
                    ------       -----      ------         ----

------------------
1
     Description of Complex Terrain Variables:
          XC, YC  = Coordinates of center of hill
          THETAH  = Orientation of major axis of hill (clockwise from
                    North)
          ZGRID   = Height of the  0  of the grid above mean sea
                    level
          RELIEF  = Height of the crest of the hill above the grid elevation
          EXPO 1  = Hill-shape exponent for the major axis
          EXPO 2  = Hill-shape exponent for the major axis
          SCALE 1 = Horizontal length scale along the major axis
          SCALE 2 = Horizontal length scale along the minor axis
          AMAX    = Maximum allowed axis length for the major axis
          BMAX    = Maximum allowed axis length for the major axis

          XRCT, YRCT = Coordinates of the complex terrain receptors
          ZRCT    = Height of the ground (MSL) at the complex terrain
                    Receptor
          XHH     = Hill number associated with each complex terrain receptor
                    (NOTE: MUST BE ENTERED AS A REAL NUMBER)

   **
     NOTE: DATA for each hill and CTSG receptor are treated as a separate
           input subgroup and therefore must end with an input group terminator.

-------------------------------------------------------------------------------

INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
--------------

      SPECIES     DIFFUSIVITY      ALPHA STAR      REACTIVITY    MESOPHYLL RESISTANCE     HENRY'S LAW
COEFFICIENT
       NAME        (cm**2/s)          (s/cm)                (dimensionless)
      -------     -----------      ----------      ----------    --------------------     -----------
------------
!          SO2 =    .1509,      1000.0,         8.0,              .0,                 .04 !
!           NO =    .1345,         1.0,         2.0,            25.0,                18.0 !
!          NO2 =    .1656,         1.0,         8.0,             5.0,                 3.5 !
!         HNO3 =    .1628,         1.0,        18.0,              .0,           .00000008 !
!           CO =    .1860,         1.0,         2.0,            61.0,                44.0 !
!END!

-------------------------------------------------------------------------------

INPUT GROUP: 8 -- Size parameters for dry deposition of particles
```

```
-------------

     For SINGLE SPECIES, the mean and standard deviation are used to
     compute a deposition velocity for NINT (see group 9) size-ranges,
     and these are then averaged to obtain a mean deposition velocity.

     For GROUPED SPECIES, the size distribution should be explicitly
     specified (by the 'species' in the group), and the standard deviation
     for each should be entered as 0.  The model will then use the
     deposition velocity for the stated mean diameter.

      SPECIES      GEOMETRIC MASS MEAN        GEOMETRIC STANDARD
       NAME             DIAMETER                  DEVIATION
                        (microns)                 (microns)
      -------      ------------------        ------------------
!          SO4 =           .48,                    2.0   !
!          NO3 =           .48,                    2.0   !
!         PM25 =          1.25,                    1.2418578   !
!           P2 =          5.00,                    1.2418578   !
!           P3 =         20.00,                    1.2418578   !

!END!

------------------------------------------------------------------------------

INPUT GROUP: 9 -- Miscellaneous dry deposition parameters
-------------

     Reference cuticle resistance (s/cm)
     (RCUTR)                         Default: 30    !  RCUTR = 30.0 !
     Reference ground resistance  (s/cm)
     (RGR)                           Default: 10    !    RGR = 10.0 !
     Reference pollutant reactivity
     (REACTR)                        Default: 8     ! REACTR = 8.0 !

     Number of particle-size intervals used to
     evaluate effective particle deposition velocity
     (NINT)                          Default: 9     !   NINT =  5  !

     Vegetation state in unirrigated areas
     (IVEG)                          Default: 1     !   IVEG =  1   !
        IVEG=1 for active and unstressed vegetation
        IVEG=2 for active and stressed vegetation
        IVEG=3 for inactive vegetation

!END!

------------------------------------------------------------------------------

INPUT GROUP: 10 -- Wet Deposition Parameters
---------------

                    Scavenging Coefficient -- Units: (sec)**(-1)
```

```
       Pollutant      Liquid Precip.       Frozen Precip.
       ---------      --------------       --------------
!          SO2 =         3.0E-05,             0.0E00 !
!          SO4 =         1.0E-04,            3.0E-05 !
!          NO  =         0.0E00,              0.0E00 !
!          NO2 =         0.0E00,              0.0E00 !
!         HNO3 =         6.0E-05,             0.0E00 !
!          NO3 =         1.0E-04,            3.0E-05 !
!          CO  =         0.0E00,              0.0E00 !
!         PM25 =         1.0E-04,            3.0E-05 !
!           P2 =         1.0E-04,            3.0E-05 !
!           P3 =         1.0E-04,            3.0E-05 !

!END!

------------------------------------------------------------------------------

INPUT GROUP: 11a, 11b -- Chemistry Parameters
---------------------

---------------
Subgroup (11a)
---------------

     Several parameters are needed for one or more of the chemical transformation
     mechanisms.  Those used for each mechanism are:
```

| Mechanism (MCHEM) | MOZ | BCKO3 | MMAVGNH3 | BCKNH3 | RNITE1 | RNITE2 | RNITE3 | MH2O2 | BCKH2O2 | RSOPRP | SO4-IRSPMF | BCKIRSPMF | OFRCAN | VCNX | NDEPAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 None | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 1 MESOPUFF II | X | X | . | . | X | X | X | X | . | . | . | . | . | . | . |
| 2 User Rates | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 3 RIVAD | X | X | . | . | X | . | . | . | . | . | . | . | . | . | . |
| 4 SOA | X | X | . | . | . | . | . | . | . | . | . | . | X | X | X |
| 5 Radioactive Decay | . | . | . | . | . | . | . | . | . | . | . | . | . | . | X |
| 6 RIVAD/ISORRPIA | X | X | X | X | X | X | . | . | X | X | X | X | . | . | . |
| 7 RIVAD/ISORRPIA/SOA | X | X | X | X | X | X | . | . | X | X | X | X | X | X | . |

```
     Ozone data input option (MOZ)     Default: 1            ! MOZ =  1   !
     (Used only if MCHEM = 1,3,4,6, or 7)
        0 = use a monthly background ozone value
        1 = read hourly ozone concentrations from
            the OZONE.DAT data file

     Monthly ozone concentrations in ppb (BCKO3)
```

```
    (Used only if MCHEM = 1,3,4,6, or 7 and either
       MOZ = 0, or
       MOZ = 1 and all hourly O3 data missing)
                                    Default: 12*80.
    *  BCKO3 = 30.0, 31.0, 34.0, 36.0, 28.0, 21.0, 15.0, 14.0, 16.0, 20.0, 27.0, 29.0 *

    Ammonia data option (MNH3)        Default: 0            ! MNH3 =  0   !
    (Used only if MCHEM = 6 or 7)
       0 = use monthly background ammonia values (BCKNH3) - no vertical variation
       1 = read monthly background ammonia values for each layer from
           the NH3Z.DAT data file

    Ammonia vertical averaging option (MAVGNH3)
    (Used only if MCHEM = 6 or 7, and MNH3 = 1)
       0 = use NH3 at puff center height (no averaging is done)
       1 = average NH3 values over vertical extent of puff
                                    Default: 1            ! MAVGNH3 =  1   !

    Monthly ammonia concentrations in ppb (BCKNH3)
    (Used only if MCHEM = 1 or 3, or
              if MCHEM = 6 or 7, and MNH3 = 0)
                                    Default: 12*10.
    !  BCKNH3 = 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50 !

    Nighttime SO2 loss rate in %/hour (RNITE1)
    (Used only if MCHEM = 1, 6 or 7)
    This rate is used only at night for MCHEM=1
    and is added to the computed rate both day
    and night for MCHEM=6,7 (heterogeneous reactions)
                                    Default: 0.2          ! RNITE1 = .2 !

    Nighttime NOx loss rate in %/hour (RNITE2)
    (Used only if MCHEM = 1)
                                    Default: 2.0          ! RNITE2 = 2.0 !

    Nighttime HNO3 formation rate in %/hour (RNITE3)
    (Used only if MCHEM = 1)
                                    Default: 2.0          ! RNITE3 = 2.0 !

    H2O2 data input option (MH2O2)    Default: 1            ! MH2O2 =  0   !
    (Used only if MCHEM = 6 or 7, and MAQCHEM = 1)
       0 = use a monthly background H2O2 value
       1 = read hourly H2O2 concentrations from
           the H2O2.DAT data file

    Monthly H2O2 concentrations in ppb (BCKH2O2)
    (Used only if MQACHEM = 1 and either
       MH2O2 = 0 or
       MH2O2 = 1 and all hourly H2O2 data missing)
                                    Default: 12*1.
    !  BCKH2O2 = 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20 !

--- Data for ISORROPIA Option
```

```
    (used only if MCHEM = 6 or 7)

    Minimum relative humidity used in ISORROPIA computations (RH_ISRP)
                                    Default: 50.          ! RH_ISRP = 50.0 !
                                    Units: %

    Minimum SO4 used in ISORROPIA computations (SO4_ISRP)
                                    Default: 0.4          ! SO4_ISRP = .4 !
                                    Units: ug/m3


--- Data for SECONDARY ORGANIC AEROSOL (SOA) Options
    (used only if MCHEM = 4 or 7)

    The MCHEM = 4 SOA module uses monthly values of:
         Fine particulate concentration in ug/m^3 (BCKPMF)
         Organic fraction of fine particulate     (OFRAC)
         VOC / NOX ratio (after reaction)         (VCNX)

    The MCHEM = 7 SOA module uses monthly values of:
         Fine particulate concentration in ug/m^3 (BCKPMF)
         Organic fraction of fine particulate     (OFRAC)

    These characterize the air mass when computing
    the formation of SOA from VOC emissions.
    Typical values for several distinct air mass types are:

       Month    1    2    3    4    5    6    7    8    9   10   11   12
                Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

    Clean Continental
       BCKPMF   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.
       OFRAC  .15  .15  .20  .20  .20  .20  .20  .20  .20  .20  .20  .15
       VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

    Clean Marine (surface)
       BCKPMF  .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5
       OFRAC  .25  .25  .30  .30  .30  .30  .30  .30  .30  .30  .30  .25
       VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

    Urban - low biogenic (controls present)
       BCKPMF  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.
       OFRAC  .20  .20  .25  .25  .25  .25  .25  .25  .20  .20  .20  .20
       VCNX     4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.

    Urban - high biogenic (controls present)
       BCKPMF  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.
       OFRAC  .25  .25  .30  .30  .30  .55  .55  .55  .35  .35  .35  .25
       VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

    Regional Plume
       BCKPMF  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.
       OFRAC  .20  .20  .25  .35  .25  .40  .40  .40  .30  .30  .30  .20
```

```
        VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

     Urban - no controls present
        BCKPMF 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100.
        OFRAC  .30  .30  .35  .35  .35  .55  .55  .55  .35  .35  .35  .30
        VCNX     2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

     Default: Clean Continental
     !  BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
     !  OFRAC  = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
     !  VCNX   = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00 !

 --- End Data for SECONDARY ORGANIC AEROSOL (SOA) Options


     Number of half-life decay specification blocks provided in Subgroup 11b
     (Used only if MCHEM = 5)
     (NDECAY)                                    Default: 0      ! NDECAY =  0   !

!END!

--------------
Subgroup (11b)
--------------

     Each species modeled may be assigned a decay half-life (sec), and the associated
     mass lost may be assigned to one or more other modeled species using a mass yield
     factor. This information is used only for MCHEM=5.

     Provide NDECAY blocks assigning the half-life for a parent species and mass yield
     factors for each child species (if any) produced by the decay.
     Set HALF_LIFE=0.0 for NO decay (infinite half-life).

                              a            b
        SPECIES      Half-Life   Mass Yield
         NAME          (sec)       Factor
        -------      ---------   ----------

     *   SPEC1   =    3600.,        -1.0   *    (Parent)
     *   SPEC2   =     -1.0,         0.0   *    (Child)
   *END*

--------
    a
     Specify a half life that is greater than or equal to zero for 1 parent species
     in each block, and set the yield factor for this species to -1
    b
     Specify a yield factor that is greater than or equal to zero for 1 or more child
     species in each block, and set the half-life for each of these species to -1

     NOTE: Assignments in each block are treated as a separate input
           subgroup and therefore must end with an input group terminator.
           If NDECAY=0, no assignments and input group terminators should appear.
```

```
------------------------------------------------------------------------------

INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                          Default: 550.   ! SYTDEP = 5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                  Default: 0      ! MHFTSZ =  0   !

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                              Default: 5      ! JSUP =  5   !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01   ! CONK1 = .01 !

     Vertical dispersion constant for neutral/
     unstable conditions (k2 in Eqn. 2.7-4)
     (CONK2)                                   Default: 0.1    ! CONK2 = .1 !

     Factor for determining Transition-point from
     Schulman-Scire to Huber-Snyder Building Downwash
     scheme (SS used for Hs < Hb + TBD * HL)
     (TBD)                                     Default: 0.5    ! TBD = .5 !
        TBD < 0   ==> always use Huber-Snyder
        TBD = 1.5 ==> always use Schulman-Scire
        TBD = 0.5 ==> ISC Transition-point

     Range of land use categories for which
     urban dispersion is assumed
     (IURB1, IURB2)                            Default: 10     ! IURB1 =  10  !
                                                        19     ! IURB2 =  19  !

     Site characterization parameters for single-point Met data files ---------
     (needed for METFM = 2,3,4,5)

        Land use category for modeling domain
        (ILANDUIN)                             Default: 20     ! ILANDUIN =  20  !

        Roughness length (m) for modeling domain
        (Z0IN)                                 Default: 0.25   ! Z0IN = .25 !

        Leaf area index for modeling domain
        (XLAIIN)                               Default: 3.0    ! XLAIIN = 3.0 !

        Elevation above sea level (m)
        (ELEVIN)                               Default: 0.0    ! ELEVIN = .0 !
```

```
   Latitude (degrees) for met location
   (XLATIN)                              Default: -999.  ! XLATIN = -999.0 !

   Longitude (degrees) for met location
   (XLONIN)                              Default: -999.  ! XLONIN = -999.0 !

Specialized information for interpreting single-point Met data files -----

   Anemometer height (m) (Used only if METFM = 2,3)
   (ANEMHT)                              Default: 10.    ! ANEMHT = 10.0 !

   Form of lateral turbulance data in PROFILE.DAT file
   (Used only if METFM = 4,5 or MTURBVW = 1 or 3)
   (ISIGMAV)                             Default: 1      ! ISIGMAV =  1  !
       0 = read sigma-theta
       1 = read sigma-v

   Choice of mixing heights (Used only if METFM = 4)
   (IMIXCTDM)                            Default: 0      ! IMIXCTDM =  0  !
       0 = read PREDICTED mixing heights
       1 = read OBSERVED mixing heights

Maximum length of a slug (met. grid units)
(XMXLEN)                                 Default: 1.0    ! XMXLEN = 1.0 !

Maximum travel distance of a puff/slug (in
grid units) during one sampling step
(XSAMLEN)                                Default: 1.0    ! XSAMLEN = 1.0 !

Maximum Number of slugs/puffs release from
one source during one time step
(MXNEW)                                  Default: 99     ! MXNEW =  99   !

Maximum Number of sampling steps for
one puff/slug during one time step
(MXSAM)                                  Default: 99     ! MXSAM =  99   !

Number of iterations used when computing
the transport wind for a sampling step
that includes gradual rise (for CALMET
and PROFILE winds)
(NCOUNT)                                 Default: 2      ! NCOUNT =  2   !

Minimum sigma y for a new puff/slug (m)
(SYMIN)                                  Default: 1.0    ! SYMIN = 1.0  !

Minimum sigma z for a new puff/slug (m)
(SZMIN)                                  Default: 1.0    ! SZMIN = 1.0  !

Maximum sigma z (m) allowed to avoid
numerical problem in calculating virtual
time or distance.  Cap should be large
```

```
     enough to have no influence on normal events.
     Enter a negative cap to disable.
     (SZCAP_M)                                  Default: 5.0e06 ! SZCAP_M = 5.0E06 !

     Default minimum turbulence velocities sigma-v and sigma-w
     for each stability class over land and over water (m/s)
     (SVMIN(12) and SWMIN(12))

                    ----------  LAND  ----------       ---------  WATER  ----------
        Stab Class :  A    B    C    D    E    F         A    B    C    D    E    F
                    ---  ---  ---  ---  ---  ---       ---  ---  ---  ---  ---  ---
     Default SVMIN : .50, .50, .50, .50, .50, .50,      .37, .37, .37, .37, .37, .37
     Default SWMIN : .20, .12, .08, .06, .03, .016,     .20, .12, .08, .06, .03, .016

          ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.370, 0.370, 0.370, 0.370, 0.370,
0.370!
          ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016, 0.200, 0.120, 0.080, 0.060, 0.030,
0.016!

     Divergence criterion for dw/dz across puff
     used to initiate adjustment for horizontal
     convergence (1/s)
     Partial adjustment starts at CDIV(1), and
     full adjustment is reached at CDIV(2)
     (CDIV(2))                                  Default: 0.0,0.0  ! CDIV = .0, .0 !

     Search radius (number of cells) for nearest
     land and water cells used in the subgrid
     TIBL module
     (NLUTIBL)                                  Default: 4      ! NLUTIBL = 4  !

     Minimum wind speed (m/s) allowed for
     non-calm conditions. Also used as minimum
     speed returned when using power-law
     extrapolation toward surface
     (WSCALM)                                   Default: 0.5    ! WSCALM = .5 !

     Maximum mixing height (m)
     (XMAXZI)                                   Default: 3000.  ! XMAXZI = 3000.0 !

     Minimum mixing height (m)
     (XMINZI)                                   Default: 50.    ! XMINZI = 50.0 !

     Temperatures (K) used for defining upper bound of
     categories for emissions scale-factors
     11 upper bounds (K) are entered; the 12th class has no upper limit
     (TKCAT(11))
      Default   : 265., 270., 275., 280., 285., 290., 295., 300., 305., 310., 315.  (315.+)
                     <     <     <     <     <     <     <     <     <     <     <
Temperature Class :  1     2     3     4     5     6     7     8     9     10    11    (12)
                    ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----
          ! TKCAT  = 265., 270., 275., 280., 285., 290., 295., 300., 305., 310., 315. !
```

```
Wind Speeds (m/s) used for defining upper bound of
categories for emissions scale-factors
5 upper bounds (m/s) are entered; the 6th class has no upper limit
(WSCAT(5))                      Default   :
                                ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8 (10.8+)

                         Wind Speed Class :  1     2     3     4     5
                                            ---   ---   ---   ---   ---
                                  ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

Default wind speed profile power-law
exponents for stabilities 1-6
(PLX0(6))                       Default   : ISC RURAL values
                                ISC RURAL : .07, .07, .10, .15, .35, .55
                                ISC URBAN : .15, .15, .20, .25, .30, .30

                          Stability Class :  A     B     C     D     E     F
                                            ---   ---   ---   ---   ---   ---
                                     ! PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55 !

Default potential temperature gradient
for stable classes E, F (degK/m)
(PTG0(2))                       Default: 0.020, 0.035
                                   ! PTG0 = 0.020,   0.035 !

Default plume path coefficients for
each stability class (used when option
for partial plume height terrain adjustment
is selected -- MCTADJ=3)
(PPC(6))                   Stability Class :  A     B     C     D     E     F
                              Default  PPC : .50,  .50,  .50,  .50,  .35,  .35
                                            ---   ---   ---   ---   ---   ---
                                   !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35, 0.35 !

Slug-to-puff transition criterion factor
equal to sigma-y/length of slug
(SL2PF)                              Default: 10.        ! SL2PF = 10.0 !

Receptor-specific puff/slug properties (e.g., sigmas and height above
ground at the time when the trajectory is nearest the receptor) may be
extrapolated forward or backward in time along the current step using
the current dispersion, for receptors that lie upwind of the puff/slug
position at the start of a step, or downwind at the end of a step.
Specify the upwind/downwind extrapolation zone in sigma-y units.
Using FCLIP=1.0 clips the the upwind zone at one sigma-y at the start
of the step and the downwind zone at one sigma-y at the end of the step.
This is consistent with the sampling done in CALPUFF versions through
v6.42 prior to the introduction of the FCLIP option.
The default is No Extrapolation, FCLIP=0.0.
(FCLIP)                              Default: 0.0        ! FCLIP = 0.0 !

Puff-splitting control variables ------------------------
```

```
  VERTICAL SPLIT
  --------------

  Number of puffs that result every time a puff
  is split - nsplit=2 means that 1 puff splits
  into 2
  (NSPLIT)                          Default:   3        ! NSPLIT =  3  !

  Time(s) of a day when split puffs are eligible to
  be split once again; this is typically set once
  per day, around sunset before nocturnal shear develops.
  24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
  0=do not re-split    1=eligible for re-split
  (IRESPLIT(24))                    Default:  Hour 17 = 1
  !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

  Split is allowed only if last hour's mixing
  height (m) exceeds a minimum value
  (ZISPLIT)                         Default: 100.       ! ZISPLIT = 100.0 !

  Split is allowed only if ratio of last hour's
  mixing ht to the maximum mixing ht experienced
  by the puff is less than a maximum value (this
  postpones a split until a nocturnal layer develops)
  (ROLDMAX)                         Default: 0.25       ! ROLDMAX = 0.25 !


  HORIZONTAL SPLIT
  ----------------

  Number of puffs that result every time a puff
  is split - nsplith=5 means that 1 puff splits
  into 5
  (NSPLITH)                         Default:   5        ! NSPLITH =  5  !

  Minimum sigma-y (Grid Cells Units) of puff
  before it may be split
  (SYSPLITH)                        Default:  1.0       ! SYSPLITH = 1.0 !

  Minimum puff elongation rate (SYSPLITH/hr) due to
  wind shear, before it may be split
  (SHSPLITH)                        Default:  2.        ! SHSPLITH = 2.0 !

  Minimum concentration (g/m^3) of each
  species in puff before it may be split
  Enter array of NSPEC values; if a single value is
  entered, it will be used for ALL species
  (CNSPLITH)                        Default:  1.0E-07   ! CNSPLITH = 1.0E-07 !

Integration control variables ------------------------

  Fractional convergence criterion for numerical SLUG
  sampling integration
```

```
       (EPSSLUG)                          Default:   1.0e-04  ! EPSSLUG = 1.0E-04 !

       Fractional convergence criterion for numerical AREA
       source integration
       (EPSAREA)                          Default:   1.0e-06  ! EPSAREA = 1.0E-06 !

       Trajectory step-length (m) used for numerical rise
       integration
       (DSRISE)                           Default:   1.0      ! DSRISE = 1.0 !

       Boundary Condition (BC) Puff control variables ------------------------

       Minimum height (m) to which BC puffs are mixed as they are emitted
       (MBCON=2 ONLY).  Actual height is reset to the current mixing height
       at the release point if greater than this minimum.
       (HTMINBC)                          Default:   500.     ! HTMINBC = 500.0 !

       Search radius (km) about a receptor for sampling nearest BC puff.
       BC puffs are typically emitted with a spacing of one grid cell
       length, so the search radius should be greater than DGRIDKM.
       (RSAMPBC)                          Default:   10.      ! RSAMPBC = 10.0 !

       Near-Surface depletion adjustment to concentration profile used when
       sampling BC puffs?
       (MDEPBC)                           Default:   1        ! MDEPBC =  1  !
          0 = Concentration is NOT adjusted for depletion
          1 = Adjust Concentration for depletion

!END!


--------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
-------------------------------

---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  0  !

     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
```

```
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 =  0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                    a
          POINT SOURCE: CONSTANT DATA
          ---------------------------
                                                                          b          c
  Source       X         Y       Stack    Base     Stack    Exit  Exit    Bldg.  Emission
   No.     Coordinate Coordinate Height Elevation Diameter  Vel.  Temp.   Dwash   Rates
              (km)      (km)       (m)      (m)       (m)  (m/s) (deg. K)
  ------   ---------- ---------- ------  ------   -------- ----- -------- ----- --------

--------

    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

     SRCNAM  is a 12-character name for a source
             (No default)
     X       is an array holding the source data listed by the column headings
             (No default)
     SIGYZI  is an array holding the initial sigma-y and sigma-z (m)
             (Default: 0.,0.)
     FMFAC   is a vertical momentum flux factor (0. or 1.0) used to represent
             the effect of rain-caps or other physical configurations that
             reduce momentum rise associated with the actual exit velocity.
             (Default: 1.0  -- full momentum used)
     ZPLTFM  is the platform height (m) for sources influenced by an isolated
             structure that has a significant open area between the surface
             and the bulk of the structure, such as an offshore oil platform.
             The Base Elevation is that of the surface (ground or ocean),
             and the Stack Height is the release height above the Base (not
             above the platform).  Building heights entered in Subgroup 13c
             must be those of the buildings on the platform, measured from
```

```
             the platform deck.  ZPLTFM is used only with MBDW=1 (ISC
             downwash method) for sources with building downwash.
             (Default: 0.0)

    b
     0. = No building downwash modeled
     1. = Downwash modeled for buildings resting on the surface
     2. = Downwash modeled for buildings raised above the surface (ZPLTFM > 0.)
     NOTE: must be entered as a REAL number (i.e., with decimal point)

    c
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled,but not emitted.  Units are specified by IPTU
     (e.g. 1 for g/s).

---------------
Subgroup (13c)
---------------

           BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH
           -------------------------------------------------------
Source                                                                  a
 No.       Effective building height, width, length and X/Y offset (in meters)
           every 10 degrees.  LENGTH, XBADJ, and YBADJ are only needed for
           MBDW=2 (PRIME downwash option)
------     ------------------------------------------------------------------

--------

    a
     Building height, width, length, and X/Y offset from the source are treated
     as a separate input subgroup for each source and therefore must end with
     an input group terminator.  The X/Y offset is the position, relative to the
     stack, of the center of the upwind face of the projected building, with the
     x-axis pointing along the flow direction.

---------------
Subgroup (13d)
---------------
                                                      a
          POINT SOURCE: EMISSION-RATE SCALING FACTORS
          -------------------------------------------

      Use this subgroup to identify temporal variations in the emission
      rates given in 13b.  Factors assigned multiply the rates in 13b.
      Skip sources here that have constant emissions.  For more elaborate
      variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

      Sets of emission-rate scale factors are defined in Input Group 19, and
      are referenced by the FACTORNAME.  Provide NSPT1 lines that identify the
      emission-rate scale factor table for each source-species combination that
      uses the scaling option.  Note that a scale-factor table can be used with
```

```
      more than one source-species combination so a FACTORNAME can be repeated.


  Source-              Source      Species      Scale-factor table
  Species              Name   b    Name   c     Name        d
   No.                (SRCNAM)     (CSPEC)      (FACTORNAME)
  ------              ------------ ------------ ---------------------


--------
    a
     Assignment for each source-specie is treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     Source name must match one of the SRCNAM names defined in Input Group 13b
    c
     Species name must match one of the CSPEC names of emitted species defined in Input Group 3
    d
     Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

-------------------------------------------------------------------------------


INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters
---------------------------------

---------------
Subgroup (14a)
---------------

     Number of polygon area sources with
     parameters specified below (NAR1)       No default  !  NAR1 =  0   !

     Units used for area source
     emissions below            (IARU)       Default: 1  !  IARU =   1  !
           1 =        g/m**2/s
           2 =       kg/m**2/hr
           3 =       lb/m**2/hr
           4 =     tons/m**2/yr
           5 =     Odour Unit * m/s  (vol. flux/m**2 of odour compound)
           6 =     Odour Unit * m/min
           7 =     metric tons/m**2/yr
           8 =     Bq/m**2/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/m**2/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (14d)        (NSAR1) Default: 0  !  NSAR1 =  0  !

     Number of buoyant polygon area sources
     with variable location and emission
     parameters (NAR2)                     No default  !  NAR2 =  0   !
```

```
     (If NAR2 > 0, ALL parameter data for
     these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                    a
          AREA SOURCE: CONSTANT DATA
          --------------------------
                                                          b
Source           Effect.    Base      Initial    Emission
 No.             Height   Elevation   Sigma z     Rates
                   (m)       (m)        (m)
-------          ------    ------     --------   ---------

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IARU
     (e.g. 1 for g/m**2/s).

---------------
Subgroup (14c)
---------------

           COORDINATES (km) FOR EACH VERTEX(4) OF EACH POLYGON
           ---------------------------------------------------------
Source                                                              a
 No.       Ordered list of X followed by list of Y, grouped by source
------     ------------------------------------------------------------

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.


---------------
Subgroup (14d)
---------------
                                                  a
          AREA SOURCE: EMISSION-RATE SCALING FACTORS
          ------------------------------------------

      Use this subgroup to identify temporal variations in the emission
      rates given in 14b.  Factors assigned multiply the rates in 14b.
      Skip sources here that have constant emissions.  For more elaborate
```

```
      variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

      Sets of emission-rate scale factors are defined in Input Group 19, and
      are referenced by the FACTORNAME.  Provide NSAR1 lines that identify the
      emission-rate scale factor table for each source-species combination that
      uses the scaling option.  Note that a scale-factor table can be used with
      more than one source-species combination so a FACTORNAME can be repeated.


  Source-              Source      Species      Scale-factor table
  Species              Name   b    Name   c     Name        d
   No.                (SRCNAM)    (CSPEC)      (FACTORNAME)
  ------              ------------ ------------ ---------------------

    1  * SCALEFACTOR  =   1,          SO2,       AREAS              *  *END*

--------
    a
     Assignment for each source-specie is treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     Source name must match one of the SRCNAM names defined in Input Group 14b
    c
     Species name must match one of the CSPEC names of emitted species defined in Input Group 3
    d
     Scale-factor name must match one of the FACTORNAME names defined in Input Group 19


------------------------------------------------------------------------------

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters
----------------------------

---------------
Subgroup (15a)
---------------

     Number of buoyant line sources
     with variable location and emission
     parameters (NLN2)                          No default  !  NLN2 =  0   !

     (If NLN2 > 0, ALL parameter data for
      these sources are read from the file: LNEMARB.DAT)

     Number of buoyant line sources (NLINES)       No default   ! NLINES =  0  !

     Units used for line source
     emissions below               (ILNU)          Default: 1  !  ILNU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
```

```
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (15c)        (NSLN1)         Default: 0  !  NSLN1 =  0  !

     Maximum number of segments used to model
     each line (MXNSEG)                             Default: 7   ! MXNSEG =  7  !

     The following variables are required only if NLINES > 0.  They are
     used in the buoyant line source plume rise calculations.

        Number of distances at which                Default: 6   ! NLRISE =  6  !
        transitional rise is computed

        Average building length (XL)                No default   ! XL = .0 !
                                                    (in meters)

        Average building height (HBL)               No default   ! HBL = .0 !
                                                    (in meters)

        Average building width (WBL)                No default   ! WBL = .0 !
                                                    (in meters)

        Average line source width (WML)             No default   ! WML = .0 !
                                                    (in meters)

        Average separation between buildings (DXL)  No default   ! DXL = .0 !
                                                    (in meters)

        Average buoyancy parameter (FPRIMEL)        No default   ! FPRIMEL = .0 !
                                                    (in m**4/s**3)

!END!

---------------
Subgroup (15b)
---------------

          BUOYANT LINE SOURCE: CONSTANT DATA
          ----------------------------------
                                                                                 a
Source     Beg. X      Beg. Y      End. X     End. Y     Release    Base        Emission
 No.     Coordinate  Coordinate  Coordinate Coordinate  Height    Elevation      Rates
            (km)        (km)        (km)       (km)       (m)       (m)
------   ----------  ----------  ---------  ----------  -------   ---------    ---------

--------
```

```
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by ILNTU
     (e.g. 1 for g/s).

---------------
Subgroup (15c)
---------------
                                                                a
          BUOYANT LINE SOURCE: EMISSION-RATE SCALING FACTORS
          --------------------------------------------------

      Use this subgroup to identify temporal variations in the emission
      rates given in 15b.  Factors assigned multiply the rates in 15b.
      Skip sources here that have constant emissions.  For more elaborate
      variation in source parameters, use LNEMARB.DAT and NLN2 > 0.

      Sets of emission-rate scale factors are defined in Input Group 19, and
      are referenced by the FACTORNAME.  Provide NSLN1 lines that identify the
      emission-rate scale factor table for each source-species combination that
      uses the scaling option.  Note that a scale-factor table can be used with
      more than one source-species combination so a FACTORNAME can be repeated.


  Source-              Source      Species      Scale-factor table
  Species              Name   b    Name   c     Name        d
   No.                (SRCNAM)    (CSPEC)      (FACTORNAME)
  ------              ------------ ------------ ---------------------

    1  * SCALEFACTOR  =   1,          SO2,       LINES              *  *END*

--------
    a
     Assignment for each source-specie is treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     Source name must match one of the SRCNAM names defined in Input Group 15b
    c
     Species name must match one of the CSPEC names of emitted species defined in Input Group 3
    d
     Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

-------------------------------------------------------------------------------

INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters
---------------------------

---------------
```

```
Subgroup (16a)
---------------

     Number of volume sources with
     parameters provided in 16b,c (NVL1)     No default  !  NVL1 =  0   !

     Units used for volume source
     emissions below in 16b       (IVLU)     Default: 1  !  IVLU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0  !  NSVL1 =  0  !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)     No default  !  NVL2 =   0   !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!

---------------
Subgroup (16b)
---------------
                                       a
           VOLUME SOURCE: CONSTANT DATA
           ----------------------------
                                                                          b
Source         X           Y        Effect.    Base     Initial    Initial    Emission
 No.       Coordinate  Coordinate   Height   Elevation  Sigma y    Sigma z     Rates
              (km)        (km)        (m)       (m)        (m)       (m)
------     ----------  ----------   ------    ------    --------   --------   --------

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IVLU
```

```
     (e.g. 1 for g/s).

---------------
Subgroup (16c)
---------------
                                                        a
          VOLUME SOURCE: EMISSION-RATE SCALING FACTORS
          -------------------------------------------

       Use this subgroup to identify temporal variations in the emission
       rates given in 16b.  Factors assigned multiply the rates in 16b.
       Skip sources here that have constant emissions.  For more elaborate
       variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

       Sets of emission-rate scale factors are defined in Input Group 19, and
       are referenced by the FACTORNAME.  Provide NSVL1 lines that identify the
       emission-rate scale factor table for each source-species combination that
       uses the scaling option.  Note that a scale-factor table can be used with
       more than one source-species combination so a FACTORNAME can be repeated.


  Source-               Source      Species      Scale-factor table
  Species               Name   b    Name   c     Name        d
   No.                 (SRCNAM)    (CSPEC)      (FACTORNAME)
  ------               ------------ ------------ ---------------------

    1  * SCALEFACTOR  =   1,           SO2,       VOLS_SO2           *  *END*

--------
    a
     Assignment for each source-specie is treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     Source name must match one of the SRCNAM names defined in Input Group 16b
    c
     Species name must match one of the CSPEC names of emitted species defined in Input Group 3
    d
     Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

------------------------------------------------------------------------------

INPUT GROUP: 17  -- FLARE source control parameters (variable emissions file)
---------------

     Number of flare sources defined in FLEMARB.DAT file(s)
     (NFL2)                              Default: 0     !  NFL2    =  0 !

     (At least 1 FLEMARB.DAT file is needed if NFL2 > 0)

!END!

------------------------------------------------------------------------------
```

```
INPUT GROUPS: 18a, 18b, 18c -- Road Emissions parameters
---------------------------

---------------
Subgroup (18a)
---------------

     Emissions from roads are generated from individual line segments defined
     by a sequence of coordinates provided for each road-link.  Each link
     is entered as a discrete source and is defined as a section of the road
     for which emissions are uniform.

     A long, winding isolated road might be characterized by a single link made
     up of many coordinate triples (x,y,z) that describe its pathway.  These
     points should be sufficient to resolve curves, but need not have uniform
     spacing.  For example, a straight flat segment can be defined by 2 points,
     regardless of the distance covered.  Long line segments are automatically
     divided further within the model into segments that are limited by the
     grid-cell boundaries (no segment may extend across multiple cells).
     One emission rate (g/m/s) for each species is used for the entire road.

     Near a congested intersection, many short links may be required to resolve
     the spatial and temporal distribution of emissions.  Each is entered and
     modeled as a discrete source.

     Number of road-links with emission parameters
     provided in Subgroup 18b (NRD1)      No default      !  NRD1 =  1   !

     Number of road-links with arbitrarily time-varying
     emission parameters (NRD2)           No default      !  NRD2 =  0   !
     (If NRD2 > 0, ALL variable road data
     are read from the file: RDEMARB.DAT)


     Emissions from one or more of the roads presented in Subgroup 18b
     may vary over time-based cycles or by meteorology.  This variability
     is modeled by applying an emission-rate scale factor specified for
     particular road links and species in Subgroup 18c.

     Number of road links and species combinations
     with variable emission-rate scale-factors
     (NSFRDS)                             Default: 0      !  NSFRDS =  0   !

!END!

---------------
Subgroup (18b)
---------------
                                                                      a
      DATA FOR ROADS WITH CONSTANT OR SCALED EMISSION PARAMETERS
      ----------------------------------------------------------
                                                                      b
```

```
Road                    Effect.    Initial     Initial     Emission
 No.                    Height     Sigma z     Sigma y      Rates
                        (mAGL)       (m)         (m)       (g/s/m)
-------                 ------     ------     --------    ---------
            c
 1   !SRCNAM   = roadfuel1_2022 !
 1   !     X   =        2.0,       3.0,       9.1,       6.800E-08, 0.0, 2.140E-05, 3.646E-06, 0.0,
0.0, 3.225E-05, 1.717E-06, 0.0, 0.0  !   !END!

--------
    a
     Data for each of the NRD1 roads are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     NSPEC Emission rates must be entered (one for every pollutant modeled).
     Enter emission rate of zero for secondary pollutants.
    c
     Road-source names are entered without spaces, and may be 16 characters long.


---------------
Subgroup (18c)
---------------
                                  a
      EMISSION-RATE SCALING FACTORS
      -----------------------------

      Use this subgroup to identify temporal variations in the emission
      rates given in 18b.  Factors assigned multiply the rates in 18b.
      Skip sources here that have constant emissions.  For more elaborate
      variation in source parameters, use RDEMARB.DAT and NRD2 > 0.

      Sets of emission-rate scale factors are defined in Input Group 19, and
      are referenced by the FACTORNAME.  Provide NSFRDS lines that identify the
      emission-rate scale factor table for each source-species combination that
      uses the scaling option.  Note that a scale-factor table can be used with
      more than one source-species combination so a FACTORNAME can be repeated.


  Source-               Source      Species      Scale-factor table
  Species               Name   b    Name   c     Name        d
   No.                 (SRCNAM)     (CSPEC)      (FACTORNAME)
  ------               ------------ ------------ ---------------------

    1  * SCALEFACTOR  =   1,         PM2.5,      MAJOR_HIGHWAY_004     *  *END*

--------
    a
     Assignment for each source-specie is treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     Source name must match one of the SRCNAM names defined in Input Group 18b
    c
```

```
     Species name must match one of the CSPEC names of emitted species defined in Input Group 3
    d
     Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

---------------
Subgroup (18d)
---------------
                                        a
           COORDINATES FOR EACH NAMED ROAD
           -------------------------------

                    X           Y         Ground
Coordinate      Coordinate  Coordinate   Elevation
 No.               (km)        (km)         (m)
----------      ----------  ----------   ---------

 !SRCNAM    = roadfuel1_2022 !
 !NPTROAD   = 2         !
 !END!

1    ! XYZ = 618.106, 5195.336, 103.75  !   !END!
2    ! XYZ = 618.259, 5195.070, 100.64  !   !END!


--------
    a
     Each line of coordinates is treated as a separate input subgroup
     and therefore must end with an input group terminator.


------------------------------------------------------------------------------


INPUT GROUPS: 19a, 19b -- Emission rate scale-factor tables
----------------------

     Use this group to enter variation factors applied to emission rates for any
     source-specie combinations that use this feature.  The tables of emission-rate
     scale factors are referenced by the name assigned to FACTORNAME.  These names
     do not need to include specific source or species names used in the simulation,
     particularly if one factor table is used for many types of sources and species,
     but should be descriptive.  But if a factor table applies to just one source,
     the reference name for it should generally contain that source-name.
     FACTORNAME must NOT include spaces.

     The FACTORTYPE for each table must be one of the following:

         CONSTANT1          1   scaling factor
         MONTH12            12  scaling factors: months 1-12
         DAY7               7   scaling factors: days 1-7
                            [SUNDAY,MONDAY, ... FRIDAY,SATURDAY]
         HOUR24             24  scaling factors: hours 1-24
         HOUR24_DAY7        168 scaling factors: hours 1-24,
```

```
                          repeated  7 times: SUNDAY, MONDAY, ... SATURDAY
        HOUR24_MONTH12    288 scaling factors: hours 1-24,
                          repeated 12 times: months 1-12
        WSP6              6   scaling factors: wind speed classes 1-6
                          [speed classes (WSCAT) defined in Group 12]
        WSP6_PGCLASS6     36  scaling factors: wind speed classes 1-6
                          repeated  6 times: PG classes A,B,C,D,E,F
                          [speed classes (WSCAT) defined in Group 12]
        TEMPERATURE12     12  scaling factors: temperature classes 1-12
                          [temperature classes (TKCAT) defined in Group 12]

     The number of tables defined may exceed the number of tables referenced in the
     input groups for each source type above (for convenience), but tables for all
     FACTORNAME names referenced must be present here.

---------------
Subgroup (19a)
---------------

     Number of Emission Scale-Factor
     tables                       (NSFTAB) Default: 0  !  NSFTAB =  0  !

     !END!

---------------
Subgroup (19b)
---------------
                                                          a,b,c
     Enter factors for NSFTAB Emission Scale-Factor tables

--------
    a
     Assignments for each table are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     FACTORNAME must be no longer than 40 characters
    c
     Spaces are NOT allowed in any FACTORNAME or FACTORTYPE assignment,
     and the names are NOT case-sensitive

------------------------------------------------------------------------------

INPUT GROUPS: 20a, 20b, 20c -- Non-gridded (discrete) receptor information
---------------------------

---------------
Subgroup (20a)
---------------

     Number of non-gridded receptors (NREC)  No default  !  NREC =  6147   !

     Group names can be used to assign receptor locations in
     Subgroup 20c and thereby provide an identification that
```

```
     can be referenced when postprocessing receptors.  The
     default assignment name X is used when NRGRP = 0.

     Number of receptor group names (NRGRP)  Default: 0  !  NRGRP =  0   !

!END!

---------------
Subgroup (20b)
---------------

     Provide a name for each receptor group if NRGRP>0.
     Enter NRGRP lines.
                    a,b
            Group Name
            ----------

-------------
    a
     Each group name provided is treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     Receptor group names must not include blanks.

---------------
Subgroup (20c)
---------------
                                              a
           NON-GRIDDED (DISCRETE) RECEPTOR DATA
           ------------------------------------

              c           X            Y          Ground        Height   b
Receptor Group        Coordinate   Coordinate    Elevation   Above Ground
  No.    Name            (km)         (km)          (m)           (m)
-------- -----        ----------   ----------    ---------   ------------
1!  X= 615.000,   5192.000,   0.00,   0  !   !END!
2!  X= 615.000,   5192.500,   0.00,   0  !   !END!
3!  X= 615.000,   5193.000,   0.00,   0  !   !END!
4!  X= 615.000,   5193.500,   0.00,   0  !   !END!
5!  X= 615.000,   5194.000,   0.00,   0  !   !END!
6!  X= 615.000,   5194.500,   16.19,   0  !   !END!
7!  X= 615.000,   5195.000,   83.49,   0  !   !END!
8!  X= 615.000,   5195.500,   52.10,   0  !   !END!
9!  X= 615.000,   5196.000,   7.99,   0  !   !END!
10!  X= 615.000,   5196.500,   0.00,   0  !   !END!
11!  X= 615.000,   5197.000,   0.00,   0  !   !END!
12!  X= 615.000,   5197.500,   0.00,   0  !   !END!
13!  X= 615.000,   5198.000,   0.00,   0  !   !END!
14!  X= 615.000,   5198.500,   13.88,   0  !   !END!
15!  X= 615.000,   5199.000,   101.54,   0  !   !END!
16!  X= 615.000,   5199.500,   171.01,   0  !   !END!
17!  X= 615.000,   5200.000,   164.50,   0  !   !END!
18!  X= 615.500,   5192.000,   0.00,   0  !   !END!
```

```
19!  X= 615.500,   5192.500,   0.00,   0  !   !END!
20!  X= 615.500,   5193.000,   0.00,   0  !   !END!
21!  X= 615.500,   5193.500,   52.91,   0  !   !END!
22!  X= 615.500,   5194.000,   54.99,   0  !   !END!
23!  X= 615.500,   5194.500,   102.25,   0  !   !END!
24!  X= 615.500,   5195.000,   135.88,   0  !   !END!
25!  X= 615.500,   5195.500,   131.78,   0  !   !END!
26!  X= 615.500,   5196.000,   116.72,   0  !   !END!
27!  X= 615.500,   5196.500,   84.40,   0  !   !END!
28!  X= 615.500,   5197.000,   38.32,   0  !   !END!
29!  X= 615.500,   5197.500,   0.00,   0  !   !END!
30!  X= 615.500,   5198.000,   0.00,   0  !   !END!
31!  X= 615.500,   5198.500,   1.16,   0  !   !END!
32!  X= 615.500,   5199.000,   95.92,   0  !   !END!
33!  X= 615.500,   5199.500,   166.59,   0  !   !END!
34!  X= 615.500,   5200.000,   194.58,   0  !   !END!
35!  X= 616.000,   5192.000,   0.00,   0  !   !END!
36!  X= 616.000,   5192.500,   0.00,   0  !   !END!
37!  X= 616.000,   5193.000,   63.98,   0  !   !END!
38!  X= 616.000,   5193.500,   103.18,   0  !   !END!
39!  X= 616.000,   5194.000,   91.62,   0  !   !END!
40!  X= 616.000,   5194.500,   92.35,   0  !   !END!
41!  X= 616.000,   5195.000,   145.93,   0  !   !END!
42!  X= 616.000,   5195.500,   173.48,   0  !   !END!
43!  X= 616.000,   5196.000,   157.99,   0  !   !END!
44!  X= 616.000,   5196.500,   73.22,   0  !   !END!
45!  X= 616.000,   5197.000,   91.14,   0  !   !END!
46!  X= 616.000,   5197.500,   66.64,   0  !   !END!
47!  X= 616.000,   5198.000,   41.62,   0  !   !END!
48!  X= 616.000,   5198.500,   0.00,   0  !   !END!
49!  X= 616.000,   5199.000,   13.18,   0  !   !END!
50!  X= 616.000,   5199.500,   91.57,   0  !   !END!
51!  X= 616.000,   5200.000,   114.45,   0  !   !END!
52!  X= 616.200,   5194.700,   117.68,   0  !   !END!
53!  X= 616.200,   5194.800,   130.19,   0  !   !END!
54!  X= 616.200,   5194.900,   142.47,   0  !   !END!
55!  X= 616.200,   5195.000,   146.07,   0  !   !END!
56!  X= 616.200,   5195.100,   146.41,   0  !   !END!
57!  X= 616.200,   5195.200,   164.45,   0  !   !END!
58!  X= 616.200,   5195.300,   164.49,   0  !   !END!
59!  X= 616.200,   5195.400,   165.00,   0  !   !END!
60!  X= 616.200,   5195.500,   172.29,   0  !   !END!
61!  X= 616.200,   5195.600,   189.63,   0  !   !END!
62!  X= 616.200,   5195.700,   190.00,   0  !   !END!
63!  X= 616.200,   5195.800,   191.00,   0  !   !END!
64!  X= 616.200,   5195.900,   191.24,   0  !   !END!
65!  X= 616.200,   5196.000,   166.24,   0  !   !END!
66!  X= 616.200,   5196.100,   127.35,   0  !   !END!
67!  X= 616.200,   5196.200,   119.70,   0  !   !END!
68!  X= 616.200,   5196.300,   96.46,   0  !   !END!
69!  X= 616.200,   5196.400,   71.30,   0  !   !END!
70!  X= 616.200,   5196.500,   97.93,   0  !   !END!
71!  X= 616.200,   5196.600,   112.21,   0  !   !END!
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72!  X= 616.300,   5194.700,   119.47,   0  !   !END!
73!  X= 616.300,   5194.800,   126.41,   0  !   !END!
74!  X= 616.300,   5194.900,   139.19,   0  !   !END!
75!  X= 616.300,   5195.000,   146.83,   0  !   !END!
76!  X= 616.300,   5195.100,   157.78,   0  !   !END!
77!  X= 616.300,   5195.200,   178.93,   0  !   !END!
78!  X= 616.300,   5195.300,   175.85,   0  !   !END!
79!  X= 616.300,   5195.400,   171.40,   0  !   !END!
80!  X= 616.300,   5195.500,   167.37,   0  !   !END!
81!  X= 616.300,   5195.600,   180.73,   0  !   !END!
82!  X= 616.300,   5195.700,   190.05,   0  !   !END!
83!  X= 616.300,   5195.800,   190.74,   0  !   !END!
84!  X= 616.300,   5195.900,   185.30,   0  !   !END!
85!  X= 616.300,   5196.000,   154.27,   0  !   !END!
86!  X= 616.300,   5196.100,   126.13,   0  !   !END!
87!  X= 616.300,   5196.200,   112.00,   0  !   !END!
88!  X= 616.300,   5196.300,   90.50,   0  !   !END!
89!  X= 616.300,   5196.400,   74.36,   0  !   !END!
90!  X= 616.300,   5196.500,   117.14,   0  !   !END!
91!  X= 616.300,   5196.600,   118.00,   0  !   !END!
92!  X= 616.400,   5194.700,   124.26,   0  !   !END!
93!  X= 616.400,   5194.800,   126.68,   0  !   !END!
94!  X= 616.400,   5194.900,   142.46,   0  !   !END!
95!  X= 616.400,   5195.000,   150.12,   0  !   !END!
96!  X= 616.400,   5195.100,   170.96,   0  !   !END!
97!  X= 616.400,   5195.200,   189.51,   0  !   !END!
98!  X= 616.400,   5195.300,   176.00,   0  !   !END!
99!  X= 616.400,   5195.400,   172.56,   0  !   !END!
100!  X= 616.400,   5195.500,   166.97,   0  !   !END!
101!  X= 616.400,   5195.600,   153.20,   0  !   !END!
102!  X= 616.400,   5195.700,   160.04,   0  !   !END!
103!  X= 616.400,   5195.800,   180.00,   0  !   !END!
104!  X= 616.400,   5195.900,   156.16,   0  !   !END!
105!  X= 616.400,   5196.000,   131.30,   0  !   !END!
106!  X= 616.400,   5196.100,   121.33,   0  !   !END!
107!  X= 616.400,   5196.200,   99.01,   0  !   !END!
108!  X= 616.400,   5196.300,   111.49,   0  !   !END!
109!  X= 616.400,   5196.400,   122.91,   0  !   !END!
110!  X= 616.400,   5196.500,   117.91,   0  !   !END!
111!  X= 616.400,   5196.600,   118.59,   0  !   !END!
112!  X= 616.500,   5192.000,   0.00,   0  !   !END!
113!  X= 616.500,   5193.000,   72.34,   0  !   !END!
114!  X= 616.500,   5194.000,   114.11,   0  !   !END!
115!  X= 616.500,   5194.700,   131.35,   0  !   !END!
116!  X= 616.500,   5194.800,   137.95,   0  !   !END!
117!  X= 616.500,   5194.900,   144.62,   0  !   !END!
118!  X= 616.500,   5195.000,   155.81,   0  !   !END!
119!  X= 616.500,   5195.100,   170.11,   0  !   !END!
120!  X= 616.500,   5195.200,   177.77,   0  !   !END!
121!  X= 616.500,   5195.300,   178.00,   0  !   !END!
122!  X= 616.500,   5195.400,   167.22,   0  !   !END!
123!  X= 616.500,   5195.500,   167.79,   0  !   !END!
124!  X= 616.500,   5195.600,   159.00,   0  !   !END!
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125!  X= 616.500,   5195.700,   148.12,   0  !   !END!
126!  X= 616.500,   5195.800,   141.00,   0  !   !END!
127!  X= 616.500,   5195.900,   131.82,   0  !   !END!
128!  X= 616.500,   5196.000,   125.61,   0  !   !END!
129!  X= 616.500,   5196.100,   105.33,   0  !   !END!
130!  X= 616.500,   5196.200,   94.60,   0  !   !END!
131!  X= 616.500,   5196.300,   105.32,   0  !   !END!
132!  X= 616.500,   5196.400,   122.45,   0  !   !END!
133!  X= 616.500,   5196.500,   119.20,   0  !   !END!
134!  X= 616.500,   5196.600,   141.15,   0  !   !END!
135!  X= 616.500,   5197.000,   104.73,   0  !   !END!
136!  X= 616.500,   5197.500,   77.57,   0  !   !END!
137!  X= 616.500,   5198.000,   72.08,   0  !   !END!
138!  X= 616.500,   5198.500,   29.99,   0  !   !END!
139!  X= 616.500,   5199.000,   3.28,   0  !   !END!
140!  X= 616.500,   5199.500,   44.93,   0  !   !END!
141!  X= 616.500,   5200.000,   83.40,   0  !   !END!
142!  X= 616.600,   5194.700,   144.59,   0  !   !END!
143!  X= 616.600,   5194.800,   156.63,   0  !   !END!
144!  X= 616.600,   5194.900,   150.56,   0  !   !END!
145!  X= 616.600,   5195.000,   162.20,   0  !   !END!
146!  X= 616.600,   5195.100,   171.17,   0  !   !END!
147!  X= 616.600,   5195.200,   172.00,   0  !   !END!
148!  X= 616.600,   5195.300,   172.52,   0  !   !END!
149!  X= 616.600,   5195.400,   166.80,   0  !   !END!
150!  X= 616.600,   5195.500,   166.00,   0  !   !END!
151!  X= 616.600,   5195.600,   157.96,   0  !   !END!
152!  X= 616.600,   5195.700,   155.08,   0  !   !END!
153!  X= 616.600,   5195.800,   133.21,   0  !   !END!
154!  X= 616.600,   5195.900,   120.72,   0  !   !END!
155!  X= 616.600,   5196.000,   112.98,   0  !   !END!
156!  X= 616.600,   5196.100,   113.00,   0  !   !END!
157!  X= 616.600,   5196.200,   111.83,   0  !   !END!
158!  X= 616.600,   5196.300,   115.20,   0  !   !END!
159!  X= 616.600,   5196.400,   121.97,   0  !   !END!
160!  X= 616.600,   5196.500,   135.62,   0  !   !END!
161!  X= 616.600,   5196.600,   142.41,   0  !   !END!
162!  X= 616.700,   5194.700,   152.04,   0  !   !END!
163!  X= 616.700,   5194.800,   159.44,   0  !   !END!
164!  X= 616.700,   5194.900,   156.59,   0  !   !END!
165!  X= 616.700,   5195.000,   169.41,   0  !   !END!
166!  X= 616.700,   5195.100,   178.53,   0  !   !END!
167!  X= 616.700,   5195.200,   173.79,   0  !   !END!
168!  X= 616.700,   5195.300,   169.25,   0  !   !END!
169!  X= 616.700,   5195.400,   165.45,   0  !   !END!
170!  X= 616.700,   5195.500,   158.73,   0  !   !END!
171!  X= 616.700,   5195.600,   147.50,   0  !   !END!
172!  X= 616.700,   5195.700,   142.22,   0  !   !END!
173!  X= 616.700,   5195.800,   130.66,   0  !   !END!
174!  X= 616.700,   5195.900,   106.41,   0  !   !END!
175!  X= 616.700,   5196.000,   101.18,   0  !   !END!
176!  X= 616.700,   5196.100,   78.50,   0  !   !END!
177!  X= 616.700,   5196.200,   115.55,   0  !   !END!
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178!  X= 616.700,   5196.300,   124.00,   0  !   !END!
179!  X= 616.700,   5196.400,   134.21,   0  !   !END!
180!  X= 616.700,   5196.500,   141.00,   0  !   !END!
181!  X= 616.700,   5196.600,   137.14,   0  !   !END!
182!  X= 616.800,   5194.700,   138.95,   0  !   !END!
183!  X= 616.800,   5194.800,   150.57,   0  !   !END!
184!  X= 616.800,   5194.900,   155.57,   0  !   !END!
185!  X= 616.800,   5195.000,   170.13,   0  !   !END!
186!  X= 616.800,   5195.100,   181.00,   0  !   !END!
187!  X= 616.800,   5195.200,   175.11,   0  !   !END!
188!  X= 616.800,   5195.300,   159.16,   0  !   !END!
189!  X= 616.800,   5195.400,   164.53,   0  !   !END!
190!  X= 616.800,   5195.500,   149.47,   0  !   !END!
191!  X= 616.800,   5195.600,   144.00,   0  !   !END!
192!  X= 616.800,   5195.700,   138.67,   0  !   !END!
193!  X= 616.800,   5195.800,   115.47,   0  !   !END!
194!  X= 616.800,   5195.900,   100.00,   0  !   !END!
195!  X= 616.800,   5196.000,   76.76,   0  !   !END!
196!  X= 616.800,   5196.100,   103.87,   0  !   !END!
197!  X= 616.800,   5196.200,   114.87,   0  !   !END!
198!  X= 616.800,   5196.300,   122.00,   0  !   !END!
199!  X= 616.800,   5196.400,   126.56,   0  !   !END!
200!  X= 616.800,   5196.500,   129.11,   0  !   !END!
201!  X= 616.800,   5196.600,   118.00,   0  !   !END!
202!  X= 616.900,   5194.700,   127.09,   0  !   !END!
203!  X= 616.900,   5194.800,   137.28,   0  !   !END!
204!  X= 616.900,   5194.900,   150.20,   0  !   !END!
205!  X= 616.900,   5195.000,   166.74,   0  !   !END!
206!  X= 616.900,   5195.100,   173.60,   0  !   !END!
207!  X= 616.900,   5195.200,   168.00,   0  !   !END!
208!  X= 616.900,   5195.300,   149.00,   0  !   !END!
209!  X= 616.900,   5195.400,   154.00,   0  !   !END!
210!  X= 616.900,   5195.500,   145.15,   0  !   !END!
211!  X= 616.900,   5195.600,   133.49,   0  !   !END!
212!  X= 616.900,   5195.700,   125.90,   0  !   !END!
213!  X= 616.900,   5195.800,   100.61,   0  !   !END!
214!  X= 616.900,   5195.900,   79.15,   0  !   !END!
215!  X= 616.900,   5196.000,   79.75,   0  !   !END!
216!  X= 616.900,   5196.100,   107.41,   0  !   !END!
217!  X= 616.900,   5196.200,   118.86,   0  !   !END!
218!  X= 616.900,   5196.300,   119.38,   0  !   !END!
219!  X= 616.900,   5196.400,   120.27,   0  !   !END!
220!  X= 616.900,   5196.500,   118.76,   0  !   !END!
221!  X= 616.900,   5196.600,   118.06,   0  !   !END!
222!  X= 617.000,   5192.000,   0.00,   0  !   !END!
223!  X= 617.000,   5192.500,   0.00,   0  !   !END!
224!  X= 617.000,   5193.000,   56.01,   0  !   !END!
225!  X= 617.000,   5193.500,   76.44,   0  !   !END!
226!  X= 617.000,   5194.000,   107.98,   0  !   !END!
227!  X= 617.000,   5194.500,   126.70,   0  !   !END!
228!  X= 617.000,   5194.700,   125.54,   0  !   !END!
229!  X= 617.000,   5194.800,   126.56,   0  !   !END!
230!  X= 617.000,   5194.900,   142.23,   0  !   !END!
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231!  X= 617.000,   5195.000,   160.01,   0  !   !END!
232!  X= 617.000,   5195.100,   167.17,   0  !   !END!
233!  X= 617.000,   5195.200,   151.00,   0  !   !END!
234!  X= 617.000,   5195.300,   147.13,   0  !   !END!
235!  X= 617.000,   5195.400,   139.44,   0  !   !END!
236!  X= 617.000,   5195.500,   129.94,   0  !   !END!
237!  X= 617.000,   5195.600,   124.26,   0  !   !END!
238!  X= 617.000,   5195.700,   112.18,   0  !   !END!
239!  X= 617.000,   5195.800,   95.18,   0  !   !END!
240!  X= 617.000,   5195.900,   80.44,   0  !   !END!
241!  X= 617.000,   5196.000,   106.74,   0  !   !END!
242!  X= 617.000,   5196.100,   119.32,   0  !   !END!
243!  X= 617.000,   5196.200,   120.00,   0  !   !END!
244!  X= 617.000,   5196.300,   115.63,   0  !   !END!
245!  X= 617.000,   5196.400,   116.00,   0  !   !END!
246!  X= 617.000,   5196.500,   116.00,   0  !   !END!
247!  X= 617.000,   5196.600,   119.00,   0  !   !END!
248!  X= 617.000,   5197.000,   100.40,   0  !   !END!
249!  X= 617.000,   5197.500,   82.99,   0  !   !END!
250!  X= 617.000,   5198.000,   69.01,   0  !   !END!
251!  X= 617.000,   5198.500,   65.61,   0  !   !END!
252!  X= 617.000,   5199.000,   41.13,   0  !   !END!
253!  X= 617.000,   5199.500,   14.26,   0  !   !END!
254!  X= 617.000,   5200.000,   33.51,   0  !   !END!
255!  X= 617.100,   5194.700,   120.78,   0  !   !END!
256!  X= 617.100,   5194.750,   120.81,   0  !   !END!
257!  X= 617.100,   5194.800,   121.85,   0  !   !END!
258!  X= 617.100,   5194.850,   125.44,   0  !   !END!
259!  X= 617.100,   5194.900,   130.69,   0  !   !END!
260!  X= 617.100,   5194.950,   138.03,   0  !   !END!
261!  X= 617.100,   5195.000,   142.56,   0  !   !END!
262!  X= 617.100,   5195.050,   146.63,   0  !   !END!
263!  X= 617.100,   5195.100,   146.00,   0  !   !END!
264!  X= 617.100,   5195.150,   136.84,   0  !   !END!
265!  X= 617.100,   5195.200,   135.16,   0  !   !END!
266!  X= 617.100,   5195.250,   139.74,   0  !   !END!
267!  X= 617.100,   5195.300,   137.00,   0  !   !END!
268!  X= 617.100,   5195.350,   133.18,   0  !   !END!
269!  X= 617.100,   5195.400,   130.84,   0  !   !END!
270!  X= 617.100,   5195.450,   123.96,   0  !   !END!
271!  X= 617.100,   5195.500,   125.00,   0  !   !END!
272!  X= 617.100,   5195.550,   118.10,   0  !   !END!
273!  X= 617.100,   5195.600,   118.56,   0  !   !END!
274!  X= 617.100,   5195.650,   105.00,   0  !   !END!
275!  X= 617.100,   5195.700,   100.87,   0  !   !END!
276!  X= 617.100,   5195.750,   85.78,   0  !   !END!
277!  X= 617.100,   5195.800,   77.11,   0  !   !END!
278!  X= 617.100,   5195.850,   84.34,   0  !   !END!
279!  X= 617.100,   5195.900,   103.51,   0  !   !END!
280!  X= 617.100,   5195.950,   122.84,   0  !   !END!
281!  X= 617.100,   5196.000,   127.62,   0  !   !END!
282!  X= 617.100,   5196.050,   125.24,   0  !   !END!
283!  X= 617.100,   5196.100,   121.80,   0  !   !END!
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284!  X= 617.100,   5196.150,   119.28,   0  !   !END!
285!  X= 617.100,   5196.200,   114.96,   0  !   !END!
286!  X= 617.100,   5196.250,   112.79,   0  !   !END!
287!  X= 617.100,   5196.300,   111.58,   0  !   !END!
288!  X= 617.100,   5196.350,   110.85,   0  !   !END!
289!  X= 617.100,   5196.400,   109.98,   0  !   !END!
290!  X= 617.100,   5196.500,   109.25,   0  !   !END!
291!  X= 617.100,   5196.600,   107.00,   0  !   !END!
292!  X= 617.150,   5194.700,   118.24,   0  !   !END!
293!  X= 617.150,   5194.750,   119.20,   0  !   !END!
294!  X= 617.150,   5194.800,   119.39,   0  !   !END!
295!  X= 617.150,   5194.850,   120.97,   0  !   !END!
296!  X= 617.150,   5194.900,   122.49,   0  !   !END!
297!  X= 617.150,   5194.950,   129.83,   0  !   !END!
298!  X= 617.150,   5195.000,   130.78,   0  !   !END!
299!  X= 617.150,   5195.050,   133.68,   0  !   !END!
300!  X= 617.150,   5195.100,   134.23,   0  !   !END!
301!  X= 617.150,   5195.150,   130.00,   0  !   !END!
302!  X= 617.150,   5195.200,   133.33,   0  !   !END!
303!  X= 617.150,   5195.250,   134.15,   0  !   !END!
304!  X= 617.150,   5195.300,   131.00,   0  !   !END!
305!  X= 617.150,   5195.350,   129.57,   0  !   !END!
306!  X= 617.150,   5195.400,   125.93,   0  !   !END!
307!  X= 617.150,   5195.450,   121.28,   0  !   !END!
308!  X= 617.150,   5195.500,   121.08,   0  !   !END!
309!  X= 617.150,   5195.550,   118.06,   0  !   !END!
310!  X= 617.150,   5195.600,   118.57,   0  !   !END!
311!  X= 617.150,   5195.650,   102.02,   0  !   !END!
312!  X= 617.150,   5195.700,   95.00,   0  !   !END!
313!  X= 617.150,   5195.750,   82.81,   0  !   !END!
314!  X= 617.150,   5195.800,   94.11,   0  !   !END!
315!  X= 617.150,   5195.850,   114.76,   0  !   !END!
316!  X= 617.150,   5195.900,   124.27,   0  !   !END!
317!  X= 617.150,   5195.950,   128.99,   0  !   !END!
318!  X= 617.150,   5196.000,   127.39,   0  !   !END!
319!  X= 617.150,   5196.050,   126.85,   0  !   !END!
320!  X= 617.150,   5196.100,   122.17,   0  !   !END!
321!  X= 617.150,   5196.150,   119.65,   0  !   !END!
322!  X= 617.150,   5196.200,   113.67,   0  !   !END!
323!  X= 617.150,   5196.250,   109.31,   0  !   !END!
324!  X= 617.150,   5196.300,   108.31,   0  !   !END!
325!  X= 617.150,   5196.350,   108.22,   0  !   !END!
326!  X= 617.150,   5196.400,   108.09,   0  !   !END!
327!  X= 617.150,   5196.500,   107.00,   0  !   !END!
328!  X= 617.150,   5196.600,   108.71,   0  !   !END!
329!  X= 617.200,   5194.700,   117.16,   0  !   !END!
330!  X= 617.200,   5194.750,   117.89,   0  !   !END!
331!  X= 617.200,   5194.800,   117.13,   0  !   !END!
332!  X= 617.200,   5194.850,   115.86,   0  !   !END!
333!  X= 617.200,   5194.900,   115.98,   0  !   !END!
334!  X= 617.200,   5194.950,   120.39,   0  !   !END!
335!  X= 617.200,   5195.000,   122.48,   0  !   !END!
336!  X= 617.200,   5195.050,   123.66,   0  !   !END!
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337!  X= 617.200,   5195.100,   124.45,   0  !   !END!
338!  X= 617.200,   5195.150,   125.84,   0  !   !END!
339!  X= 617.200,   5195.200,   128.16,   0  !   !END!
340!  X= 617.200,   5195.250,   126.88,   0  !   !END!
341!  X= 617.200,   5195.300,   126.20,   0  !   !END!
342!  X= 617.200,   5195.350,   125.22,   0  !   !END!
343!  X= 617.200,   5195.400,   121.62,   0  !   !END!
344!  X= 617.200,   5195.450,   119.38,   0  !   !END!
345!  X= 617.200,   5195.500,   119.76,   0  !   !END!
346!  X= 617.200,   5195.550,   119.00,   0  !   !END!
347!  X= 617.200,   5195.600,   117.62,   0  !   !END!
348!  X= 617.200,   5195.650,   115.00,   0  !   !END!
349!  X= 617.200,   5195.700,   115.00,   0  !   !END!
350!  X= 617.200,   5195.750,   116.25,   0  !   !END!
351!  X= 617.200,   5195.800,   119.85,   0  !   !END!
352!  X= 617.200,   5195.850,   122.68,   0  !   !END!
353!  X= 617.200,   5195.900,   125.27,   0  !   !END!
354!  X= 617.200,   5195.950,   129.46,   0  !   !END!
355!  X= 617.200,   5196.000,   129.24,   0  !   !END!
356!  X= 617.200,   5196.050,   125.15,   0  !   !END!
357!  X= 617.200,   5196.100,   122.56,   0  !   !END!
358!  X= 617.200,   5196.150,   117.78,   0  !   !END!
359!  X= 617.200,   5196.200,   111.24,   0  !   !END!
360!  X= 617.200,   5196.250,   108.45,   0  !   !END!
361!  X= 617.200,   5196.300,   107.00,   0  !   !END!
362!  X= 617.200,   5196.350,   107.06,   0  !   !END!
363!  X= 617.200,   5196.400,   107.05,   0  !   !END!
364!  X= 617.200,   5196.500,   107.00,   0  !   !END!
365!  X= 617.200,   5196.600,   109.77,   0  !   !END!
366!  X= 617.250,   5194.700,   116.24,   0  !   !END!
367!  X= 617.250,   5194.750,   116.02,   0  !   !END!
368!  X= 617.250,   5194.800,   114.55,   0  !   !END!
369!  X= 617.250,   5194.850,   112.87,   0  !   !END!
370!  X= 617.250,   5194.900,   111.23,   0  !   !END!
371!  X= 617.250,   5194.950,   114.43,   0  !   !END!
372!  X= 617.250,   5195.000,   116.03,   0  !   !END!
373!  X= 617.250,   5195.050,   115.83,   0  !   !END!
374!  X= 617.250,   5195.100,   116.32,   0  !   !END!
375!  X= 617.250,   5195.150,   119.03,   0  !   !END!
376!  X= 617.250,   5195.200,   120.07,   0  !   !END!
377!  X= 617.250,   5195.250,   119.43,   0  !   !END!
378!  X= 617.250,   5195.300,   119.32,   0  !   !END!
379!  X= 617.250,   5195.350,   118.32,   0  !   !END!
380!  X= 617.250,   5195.400,   116.68,   0  !   !END!
381!  X= 617.250,   5195.450,   116.10,   0  !   !END!
382!  X= 617.250,   5195.500,   121.38,   0  !   !END!
383!  X= 617.250,   5195.550,   117.36,   0  !   !END!
384!  X= 617.250,   5195.600,   127.00,   0  !   !END!
385!  X= 617.250,   5195.650,   127.00,   0  !   !END!
386!  X= 617.250,   5195.700,   120.95,   0  !   !END!
387!  X= 617.250,   5195.750,   122.33,   0  !   !END!
388!  X= 617.250,   5195.800,   125.65,   0  !   !END!
389!  X= 617.250,   5195.850,   126.06,   0  !   !END!
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390!  X= 617.250,   5195.900,   126.25,   0  !   !END!
391!  X= 617.250,   5195.950,   128.50,   0  !   !END!
392!  X= 617.250,   5196.000,   126.81,   0  !   !END!
393!  X= 617.250,   5196.050,   123.23,   0  !   !END!
394!  X= 617.250,   5196.100,   120.82,   0  !   !END!
395!  X= 617.250,   5196.150,   115.55,   0  !   !END!
396!  X= 617.250,   5196.200,   109.94,   0  !   !END!
397!  X= 617.250,   5196.250,   107.31,   0  !   !END!
398!  X= 617.250,   5196.300,   107.00,   0  !   !END!
399!  X= 617.250,   5196.350,   107.00,   0  !   !END!
400!  X= 617.250,   5196.400,   107.00,   0  !   !END!
401!  X= 617.250,   5196.500,   107.00,   0  !   !END!
402!  X= 617.250,   5196.600,   107.51,   0  !   !END!
403!  X= 617.300,   5194.700,   114.32,   0  !   !END!
404!  X= 617.300,   5194.750,   113.89,   0  !   !END!
405!  X= 617.300,   5194.800,   112.21,   0  !   !END!
406!  X= 617.300,   5194.850,   109.64,   0  !   !END!
407!  X= 617.300,   5194.900,   109.06,   0  !   !END!
408!  X= 617.300,   5194.950,   110.14,   0  !   !END!
409!  X= 617.300,   5195.000,   111.01,   0  !   !END!
410!  X= 617.300,   5195.050,   111.75,   0  !   !END!
411!  X= 617.300,   5195.100,   112.96,   0  !   !END!
412!  X= 617.300,   5195.150,   114.46,   0  !   !END!
413!  X= 617.300,   5195.200,   115.00,   0  !   !END!
414!  X= 617.300,   5195.250,   115.00,   0  !   !END!
415!  X= 617.300,   5195.300,   113.94,   0  !   !END!
416!  X= 617.300,   5195.350,   112.16,   0  !   !END!
417!  X= 617.300,   5195.400,   113.00,   0  !   !END!
418!  X= 617.300,   5195.450,   115.00,   0  !   !END!
419!  X= 617.300,   5195.500,   114.73,   0  !   !END!
420!  X= 617.300,   5195.550,   120.00,   0  !   !END!
421!  X= 617.300,   5195.600,   119.57,   0  !   !END!
422!  X= 617.300,   5195.650,   124.00,   0  !   !END!
423!  X= 617.300,   5195.700,   120.83,   0  !   !END!
424!  X= 617.300,   5195.750,   123.62,   0  !   !END!
425!  X= 617.300,   5195.800,   125.75,   0  !   !END!
426!  X= 617.300,   5195.850,   130.95,   0  !   !END!
427!  X= 617.300,   5195.900,   127.00,   0  !   !END!
428!  X= 617.300,   5195.950,   126.00,   0  !   !END!
429!  X= 617.300,   5196.000,   126.00,   0  !   !END!
430!  X= 617.300,   5196.050,   122.30,   0  !   !END!
431!  X= 617.300,   5196.100,   118.73,   0  !   !END!
432!  X= 617.300,   5196.150,   113.81,   0  !   !END!
433!  X= 617.300,   5196.200,   109.00,   0  !   !END!
434!  X= 617.300,   5196.250,   107.00,   0  !   !END!
435!  X= 617.300,   5196.300,   107.00,   0  !   !END!
436!  X= 617.300,   5196.350,   107.00,   0  !   !END!
437!  X= 617.300,   5196.400,   107.00,   0  !   !END!
438!  X= 617.300,   5196.500,   107.00,   0  !   !END!
439!  X= 617.300,   5196.600,   107.00,   0  !   !END!
440!  X= 617.350,   5194.700,   110.36,   0  !   !END!
441!  X= 617.350,   5194.750,   109.80,   0  !   !END!
442!  X= 617.350,   5194.800,   107.67,   0  !   !END!
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443!  X= 617.350,   5194.850,   106.47,   0  !   !END!
444!  X= 617.350,   5194.900,   107.19,   0  !   !END!
445!  X= 617.350,   5194.950,   108.17,   0  !   !END!
446!  X= 617.350,   5195.000,   109.07,   0  !   !END!
447!  X= 617.350,   5195.050,   110.21,   0  !   !END!
448!  X= 617.350,   5195.100,   111.82,   0  !   !END!
449!  X= 617.350,   5195.150,   112.78,   0  !   !END!
450!  X= 617.350,   5195.200,   111.99,   0  !   !END!
451!  X= 617.350,   5195.250,   111.13,   0  !   !END!
452!  X= 617.350,   5195.300,   110.50,   0  !   !END!
453!  X= 617.350,   5195.350,   110.50,   0  !   !END!
454!  X= 617.350,   5195.400,   111.29,   0  !   !END!
455!  X= 617.350,   5195.450,   112.00,   0  !   !END!
456!  X= 617.350,   5195.500,   114.34,   0  !   !END!
457!  X= 617.350,   5195.550,   114.12,   0  !   !END!
458!  X= 617.350,   5195.600,   119.24,   0  !   !END!
459!  X= 617.350,   5195.650,   121.48,   0  !   !END!
460!  X= 617.350,   5195.700,   122.62,   0  !   !END!
461!  X= 617.350,   5195.750,   126.27,   0  !   !END!
462!  X= 617.350,   5195.800,   132.00,   0  !   !END!
463!  X= 617.350,   5195.850,   134.62,   0  !   !END!
464!  X= 617.350,   5195.900,   132.59,   0  !   !END!
465!  X= 617.350,   5195.950,   126.37,   0  !   !END!
466!  X= 617.350,   5196.000,   124.33,   0  !   !END!
467!  X= 617.350,   5196.050,   121.59,   0  !   !END!
468!  X= 617.350,   5196.100,   116.92,   0  !   !END!
469!  X= 617.350,   5196.150,   112.75,   0  !   !END!
470!  X= 617.350,   5196.200,   108.41,   0  !   !END!
471!  X= 617.350,   5196.250,   107.00,   0  !   !END!
472!  X= 617.350,   5196.300,   107.00,   0  !   !END!
473!  X= 617.350,   5196.350,   107.00,   0  !   !END!
474!  X= 617.350,   5196.400,   107.00,   0  !   !END!
475!  X= 617.350,   5196.500,   107.00,   0  !   !END!
476!  X= 617.350,   5196.600,   107.22,   0  !   !END!
477!  X= 617.400,   5194.700,   106.95,   0  !   !END!
478!  X= 617.400,   5194.750,   106.32,   0  !   !END!
479!  X= 617.400,   5194.800,   105.89,   0  !   !END!
480!  X= 617.400,   5194.850,   106.20,   0  !   !END!
481!  X= 617.400,   5194.900,   107.69,   0  !   !END!
482!  X= 617.400,   5194.950,   108.60,   0  !   !END!
483!  X= 617.400,   5195.000,   109.68,   0  !   !END!
484!  X= 617.400,   5195.050,   110.62,   0  !   !END!
485!  X= 617.400,   5195.100,   111.37,   0  !   !END!
486!  X= 617.400,   5195.150,   111.56,   0  !   !END!
487!  X= 617.400,   5195.200,   114.00,   0  !   !END!
488!  X= 617.400,   5195.250,   110.50,   0  !   !END!
489!  X= 617.400,   5195.300,   110.50,   0  !   !END!
490!  X= 617.400,   5195.350,   110.50,   0  !   !END!
491!  X= 617.400,   5195.400,   110.50,   0  !   !END!
492!  X= 617.400,   5195.450,   111.35,   0  !   !END!
493!  X= 617.400,   5195.500,   110.50,   0  !   !END!
494!  X= 617.400,   5195.550,   112.00,   0  !   !END!
495!  X= 617.400,   5195.600,   117.00,   0  !   !END!
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496!  X= 617.400,   5195.650,   120.45,   0  !   !END!
497!  X= 617.400,   5195.700,   123.93,   0  !   !END!
498!  X= 617.400,   5195.750,   132.68,   0  !   !END!
499!  X= 617.400,   5195.800,   131.64,   0  !   !END!
500!  X= 617.400,   5195.850,   135.10,   0  !   !END!
501!  X= 617.400,   5195.900,   128.00,   0  !   !END!
502!  X= 617.400,   5195.950,   129.97,   0  !   !END!
503!  X= 617.400,   5196.000,   126.08,   0  !   !END!
504!  X= 617.400,   5196.050,   123.00,   0  !   !END!
505!  X= 617.400,   5196.100,   117.15,   0  !   !END!
506!  X= 617.400,   5196.150,   113.00,   0  !   !END!
507!  X= 617.400,   5196.200,   110.09,   0  !   !END!
508!  X= 617.400,   5196.250,   107.34,   0  !   !END!
509!  X= 617.400,   5196.300,   107.00,   0  !   !END!
510!  X= 617.400,   5196.350,   107.00,   0  !   !END!
511!  X= 617.400,   5196.400,   107.00,   0  !   !END!
512!  X= 617.400,   5196.500,   107.00,   0  !   !END!
513!  X= 617.400,   5196.600,   108.71,   0  !   !END!
514!  X= 617.450,   5194.700,   104.88,   0  !   !END!
515!  X= 617.450,   5194.750,   105.26,   0  !   !END!
516!  X= 617.450,   5194.800,   105.84,   0  !   !END!
517!  X= 617.450,   5194.850,   107.47,   0  !   !END!
518!  X= 617.450,   5194.900,   108.87,   0  !   !END!
519!  X= 617.450,   5194.950,   109.42,   0  !   !END!
520!  X= 617.450,   5195.000,   110.40,   0  !   !END!
521!  X= 617.450,   5195.050,   110.97,   0  !   !END!
522!  X= 617.450,   5195.100,   111.41,   0  !   !END!
523!  X= 617.450,   5195.150,   111.19,   0  !   !END!
524!  X= 617.450,   5195.200,   110.50,   0  !   !END!
525!  X= 617.450,   5195.250,   110.50,   0  !   !END!
526!  X= 617.450,   5195.300,   110.50,   0  !   !END!
527!  X= 617.450,   5195.350,   110.50,   0  !   !END!
528!  X= 617.450,   5195.400,   110.50,   0  !   !END!
529!  X= 617.450,   5195.450,   110.50,   0  !   !END!
530!  X= 617.450,   5195.500,   110.91,   0  !   !END!
531!  X= 617.450,   5195.550,   112.97,   0  !   !END!
532!  X= 617.450,   5195.600,   115.76,   0  !   !END!
533!  X= 617.450,   5195.650,   119.67,   0  !   !END!
534!  X= 617.450,   5195.700,   122.57,   0  !   !END!
535!  X= 617.450,   5195.750,   132.28,   0  !   !END!
536!  X= 617.450,   5195.800,   133.98,   0  !   !END!
537!  X= 617.450,   5195.850,   132.17,   0  !   !END!
538!  X= 617.450,   5195.900,   134.00,   0  !   !END!
539!  X= 617.450,   5195.950,   133.82,   0  !   !END!
540!  X= 617.450,   5196.000,   129.21,   0  !   !END!
541!  X= 617.450,   5196.050,   123.29,   0  !   !END!
542!  X= 617.450,   5196.100,   118.00,   0  !   !END!
543!  X= 617.450,   5196.150,   115.00,   0  !   !END!
544!  X= 617.450,   5196.200,   111.44,   0  !   !END!
545!  X= 617.450,   5196.250,   108.17,   0  !   !END!
546!  X= 617.450,   5196.300,   107.00,   0  !   !END!
547!  X= 617.450,   5196.350,   107.00,   0  !   !END!
548!  X= 617.450,   5196.400,   107.00,   0  !   !END!
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549!  X= 617.450,   5196.500,   108.90,   0  !   !END!
550!  X= 617.450,   5196.600,   109.99,   0  !   !END!
551!  X= 617.500,   5192.000,   0.00,   0  !   !END!
552!  X= 617.500,   5192.500,   0.00,   0  !   !END!
553!  X= 617.500,   5193.000,   48.99,   0  !   !END!
554!  X= 617.500,   5193.500,   61.70,   0  !   !END!
555!  X= 617.500,   5194.000,   74.14,   0  !   !END!
556!  X= 617.500,   5194.500,   96.85,   0  !   !END!
557!  X= 617.500,   5194.700,   103.93,   0  !   !END!
558!  X= 617.500,   5194.750,   105.61,   0  !   !END!
559!  X= 617.500,   5194.800,   106.27,   0  !   !END!
560!  X= 617.500,   5194.850,   107.53,   0  !   !END!
561!  X= 617.500,   5194.900,   108.43,   0  !   !END!
562!  X= 617.500,   5194.950,   110.59,   0  !   !END!
563!  X= 617.500,   5195.000,   111.00,   0  !   !END!
564!  X= 617.500,   5195.050,   111.96,   0  !   !END!
565!  X= 617.500,   5195.100,   111.12,   0  !   !END!
566!  X= 617.500,   5195.150,   110.77,   0  !   !END!
567!  X= 617.500,   5195.200,   110.50,   0  !   !END!
568!  X= 617.500,   5195.250,   110.85,   0  !   !END!
569!  X= 617.500,   5195.300,   110.64,   0  !   !END!
570!  X= 617.500,   5195.350,   110.50,   0  !   !END!
571!  X= 617.500,   5195.400,   110.86,   0  !   !END!
572!  X= 617.500,   5195.450,   110.67,   0  !   !END!
573!  X= 617.500,   5195.500,   112.00,   0  !   !END!
574!  X= 617.500,   5195.550,   114.17,   0  !   !END!
575!  X= 617.500,   5195.600,   115.11,   0  !   !END!
576!  X= 617.500,   5195.650,   119.78,   0  !   !END!
577!  X= 617.500,   5195.700,   122.69,   0  !   !END!
578!  X= 617.500,   5195.750,   130.12,   0  !   !END!
579!  X= 617.500,   5195.800,   134.78,   0  !   !END!
580!  X= 617.500,   5195.850,   137.00,   0  !   !END!
581!  X= 617.500,   5195.900,   134.07,   0  !   !END!
582!  X= 617.500,   5195.950,   134.67,   0  !   !END!
583!  X= 617.500,   5196.000,   130.39,   0  !   !END!
584!  X= 617.500,   5196.050,   126.00,   0  !   !END!
585!  X= 617.500,   5196.100,   119.49,   0  !   !END!
586!  X= 617.500,   5196.150,   116.14,   0  !   !END!
587!  X= 617.500,   5196.200,   114.13,   0  !   !END!
588!  X= 617.500,   5196.250,   110.55,   0  !   !END!
589!  X= 617.500,   5196.300,   107.00,   0  !   !END!
590!  X= 617.500,   5196.350,   107.00,   0  !   !END!
591!  X= 617.500,   5196.400,   107.00,   0  !   !END!
592!  X= 617.500,   5196.500,   110.65,   0  !   !END!
593!  X= 617.500,   5196.600,   110.51,   0  !   !END!
594!  X= 617.500,   5197.000,   99.50,   0  !   !END!
595!  X= 617.500,   5197.500,   91.47,   0  !   !END!
596!  X= 617.500,   5198.000,   89.05,   0  !   !END!
597!  X= 617.500,   5198.500,   70.37,   0  !   !END!
598!  X= 617.500,   5199.000,   81.43,   0  !   !END!
599!  X= 617.500,   5199.500,   72.25,   0  !   !END!
600!  X= 617.500,   5200.000,   47.16,   0  !   !END!
601!  X= 617.550,   5194.700,   103.87,   0  !   !END!
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602!  X= 617.550,   5194.750,   106.37,   0  !   !END!
603!  X= 617.550,   5194.800,   106.75,   0  !   !END!
604!  X= 617.550,   5194.850,   108.34,   0  !   !END!
605!  X= 617.550,   5194.900,   110.00,   0  !   !END!
606!  X= 617.550,   5194.950,   112.23,   0  !   !END!
607!  X= 617.550,   5195.000,   111.13,   0  !   !END!
608!  X= 617.550,   5195.050,   111.06,   0  !   !END!
609!  X= 617.550,   5195.100,   110.96,   0  !   !END!
610!  X= 617.550,   5195.150,   110.75,   0  !   !END!
611!  X= 617.550,   5195.200,   113.18,   0  !   !END!
612!  X= 617.550,   5195.250,   115.00,   0  !   !END!
613!  X= 617.550,   5195.300,   120.00,   0  !   !END!
614!  X= 617.550,   5195.350,   116.34,   0  !   !END!
615!  X= 617.550,   5195.400,   115.11,   0  !   !END!
616!  X= 617.550,   5195.450,   116.51,   0  !   !END!
617!  X= 617.550,   5195.500,   114.20,   0  !   !END!
618!  X= 617.550,   5195.550,   113.31,   0  !   !END!
619!  X= 617.550,   5195.600,   114.28,   0  !   !END!
620!  X= 617.550,   5195.650,   120.00,   0  !   !END!
621!  X= 617.550,   5195.700,   122.28,   0  !   !END!
622!  X= 617.550,   5195.750,   129.78,   0  !   !END!
623!  X= 617.550,   5195.800,   130.38,   0  !   !END!
624!  X= 617.550,   5195.850,   137.00,   0  !   !END!
625!  X= 617.550,   5195.900,   137.00,   0  !   !END!
626!  X= 617.550,   5195.950,   134.00,   0  !   !END!
627!  X= 617.550,   5196.000,   133.02,   0  !   !END!
628!  X= 617.550,   5196.050,   127.18,   0  !   !END!
629!  X= 617.550,   5196.100,   121.28,   0  !   !END!
630!  X= 617.550,   5196.150,   118.44,   0  !   !END!
631!  X= 617.550,   5196.200,   115.00,   0  !   !END!
632!  X= 617.550,   5196.250,   110.80,   0  !   !END!
633!  X= 617.550,   5196.300,   107.00,   0  !   !END!
634!  X= 617.550,   5196.350,   107.00,   0  !   !END!
635!  X= 617.550,   5196.400,   109.44,   0  !   !END!
636!  X= 617.550,   5196.500,   111.58,   0  !   !END!
637!  X= 617.550,   5196.600,   110.62,   0  !   !END!
638!  X= 617.600,   5194.700,   103.54,   0  !   !END!
639!  X= 617.600,   5194.750,   106.60,   0  !   !END!
640!  X= 617.600,   5194.800,   108.32,   0  !   !END!
641!  X= 617.600,   5194.850,   110.07,   0  !   !END!
642!  X= 617.600,   5194.900,   112.00,   0  !   !END!
643!  X= 617.600,   5194.950,   113.00,   0  !   !END!
644!  X= 617.600,   5195.000,   111.53,   0  !   !END!
645!  X= 617.600,   5195.050,   111.49,   0  !   !END!
646!  X= 617.600,   5195.100,   111.37,   0  !   !END!
647!  X= 617.600,   5195.150,   112.97,   0  !   !END!
648!  X= 617.600,   5195.200,   120.00,   0  !   !END!
649!  X= 617.600,   5195.250,   120.86,   0  !   !END!
650!  X= 617.600,   5195.300,   121.92,   0  !   !END!
651!  X= 617.600,   5195.350,   120.33,   0  !   !END!
652!  X= 617.600,   5195.400,   119.83,   0  !   !END!
653!  X= 617.600,   5195.450,   118.68,   0  !   !END!
654!  X= 617.600,   5195.500,   116.43,   0  !   !END!
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655!  X= 617.600,   5195.550,   114.09,   0  !   !END!
656!  X= 617.600,   5195.600,   115.70,   0  !   !END!
657!  X= 617.600,   5195.650,   119.23,   0  !   !END!
658!  X= 617.600,   5195.700,   123.51,   0  !   !END!
659!  X= 617.600,   5195.750,   129.00,   0  !   !END!
660!  X= 617.600,   5195.800,   133.51,   0  !   !END!
661!  X= 617.600,   5195.850,   137.15,   0  !   !END!
662!  X= 617.600,   5195.900,   135.00,   0  !   !END!
663!  X= 617.600,   5195.950,   134.00,   0  !   !END!
664!  X= 617.600,   5196.000,   130.31,   0  !   !END!
665!  X= 617.600,   5196.050,   126.00,   0  !   !END!
666!  X= 617.600,   5196.100,   121.30,   0  !   !END!
667!  X= 617.600,   5196.150,   119.71,   0  !   !END!
668!  X= 617.600,   5196.200,   114.02,   0  !   !END!
669!  X= 617.600,   5196.250,   109.45,   0  !   !END!
670!  X= 617.600,   5196.300,   111.00,   0  !   !END!
671!  X= 617.600,   5196.350,   111.20,   0  !   !END!
672!  X= 617.600,   5196.400,   111.85,   0  !   !END!
673!  X= 617.600,   5196.500,   113.28,   0  !   !END!
674!  X= 617.600,   5196.600,   111.21,   0  !   !END!
675!  X= 617.650,   5194.700,   105.40,   0  !   !END!
676!  X= 617.650,   5194.750,   109.83,   0  !   !END!
677!  X= 617.650,   5194.800,   112.01,   0  !   !END!
678!  X= 617.650,   5194.850,   112.15,   0  !   !END!
679!  X= 617.650,   5194.900,   112.39,   0  !   !END!
680!  X= 617.650,   5194.950,   111.26,   0  !   !END!
681!  X= 617.650,   5195.000,   112.21,   0  !   !END!
682!  X= 617.650,   5195.050,   112.19,   0  !   !END!
683!  X= 617.650,   5195.100,   115.00,   0  !   !END!
684!  X= 617.650,   5195.150,   119.00,   0  !   !END!
685!  X= 617.650,   5195.200,   119.30,   0  !   !END!
686!  X= 617.650,   5195.250,   121.82,   0  !   !END!
687!  X= 617.650,   5195.300,   121.00,   0  !   !END!
688!  X= 617.650,   5195.350,   122.75,   0  !   !END!
689!  X= 617.650,   5195.400,   122.00,   0  !   !END!
690!  X= 617.650,   5195.450,   121.35,   0  !   !END!
691!  X= 617.650,   5195.500,   117.52,   0  !   !END!
692!  X= 617.650,   5195.550,   115.00,   0  !   !END!
693!  X= 617.650,   5195.600,   115.38,   0  !   !END!
694!  X= 617.650,   5195.650,   119.31,   0  !   !END!
695!  X= 617.650,   5195.700,   128.39,   0  !   !END!
696!  X= 617.650,   5195.750,   129.46,   0  !   !END!
697!  X= 617.650,   5195.800,   133.74,   0  !   !END!
698!  X= 617.650,   5195.850,   135.00,   0  !   !END!
699!  X= 617.650,   5195.900,   131.51,   0  !   !END!
700!  X= 617.650,   5195.950,   128.11,   0  !   !END!
701!  X= 617.650,   5196.000,   123.05,   0  !   !END!
702!  X= 617.650,   5196.050,   121.63,   0  !   !END!
703!  X= 617.650,   5196.100,   119.80,   0  !   !END!
704!  X= 617.650,   5196.150,   118.28,   0  !   !END!
705!  X= 617.650,   5196.200,   118.28,   0  !   !END!
706!  X= 617.650,   5196.250,   117.18,   0  !   !END!
707!  X= 617.650,   5196.300,   113.86,   0  !   !END!
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708!  X= 617.650,   5196.350,   112.84,   0  !   !END!
709!  X= 617.650,   5196.400,   114.63,   0  !   !END!
710!  X= 617.650,   5196.500,   114.00,   0  !   !END!
711!  X= 617.650,   5196.600,   110.68,   0  !   !END!
712!  X= 617.700,   5194.700,   109.65,   0  !   !END!
713!  X= 617.700,   5194.750,   114.46,   0  !   !END!
714!  X= 617.700,   5194.800,   115.59,   0  !   !END!
715!  X= 617.700,   5194.850,   113.61,   0  !   !END!
716!  X= 617.700,   5194.900,   113.61,   0  !   !END!
717!  X= 617.700,   5194.950,   114.00,   0  !   !END!
718!  X= 617.700,   5195.000,   113.78,   0  !   !END!
719!  X= 617.700,   5195.050,   113.69,   0  !   !END!
720!  X= 617.700,   5195.100,   115.07,   0  !   !END!
721!  X= 617.700,   5195.150,   117.86,   0  !   !END!
722!  X= 617.700,   5195.200,   121.00,   0  !   !END!
723!  X= 617.700,   5195.250,   122.00,   0  !   !END!
724!  X= 617.700,   5195.300,   122.00,   0  !   !END!
725!  X= 617.700,   5195.350,   124.20,   0  !   !END!
726!  X= 617.700,   5195.400,   122.00,   0  !   !END!
727!  X= 617.700,   5195.450,   123.17,   0  !   !END!
728!  X= 617.700,   5195.500,   117.67,   0  !   !END!
729!  X= 617.700,   5195.550,   115.00,   0  !   !END!
730!  X= 617.700,   5195.600,   115.35,   0  !   !END!
731!  X= 617.700,   5195.650,   120.40,   0  !   !END!
732!  X= 617.700,   5195.700,   126.42,   0  !   !END!
733!  X= 617.700,   5195.750,   129.48,   0  !   !END!
734!  X= 617.700,   5195.800,   131.30,   0  !   !END!
735!  X= 617.700,   5195.850,   134.00,   0  !   !END!
736!  X= 617.700,   5195.900,   125.13,   0  !   !END!
737!  X= 617.700,   5195.950,   121.49,   0  !   !END!
738!  X= 617.700,   5196.000,   121.57,   0  !   !END!
739!  X= 617.700,   5196.050,   118.85,   0  !   !END!
740!  X= 617.700,   5196.100,   115.83,   0  !   !END!
741!  X= 617.700,   5196.150,   112.92,   0  !   !END!
742!  X= 617.700,   5196.200,   112.29,   0  !   !END!
743!  X= 617.700,   5196.250,   113.00,   0  !   !END!
744!  X= 617.700,   5196.300,   119.52,   0  !   !END!
745!  X= 617.700,   5196.350,   113.59,   0  !   !END!
746!  X= 617.700,   5196.400,   113.84,   0  !   !END!
747!  X= 617.700,   5196.500,   113.94,   0  !   !END!
748!  X= 617.700,   5196.600,   108.04,   0  !   !END!
749!  X= 617.750,   5194.700,   114.57,   0  !   !END!
750!  X= 617.750,   5194.750,   118.97,   0  !   !END!
751!  X= 617.750,   5194.800,   117.51,   0  !   !END!
752!  X= 617.750,   5194.850,   114.21,   0  !   !END!
753!  X= 617.750,   5194.900,   113.47,   0  !   !END!
754!  X= 617.750,   5194.950,   114.34,   0  !   !END!
755!  X= 617.750,   5195.000,   113.00,   0  !   !END!
756!  X= 617.750,   5195.050,   115.86,   0  !   !END!
757!  X= 617.750,   5195.100,   116.94,   0  !   !END!
758!  X= 617.750,   5195.150,   118.68,   0  !   !END!
759!  X= 617.750,   5195.200,   120.59,   0  !   !END!
760!  X= 617.750,   5195.250,   122.00,   0  !   !END!
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761!  X= 617.750,   5195.300,   121.87,   0  !   !END!
762!  X= 617.750,   5195.350,   119.77,   0  !   !END!
763!  X= 617.750,   5195.400,   120.86,   0  !   !END!
764!  X= 617.750,   5195.450,   116.81,   0  !   !END!
765!  X= 617.750,   5195.500,   115.06,   0  !   !END!
766!  X= 617.750,   5195.550,   115.00,   0  !   !END!
767!  X= 617.750,   5195.600,   117.37,   0  !   !END!
768!  X= 617.750,   5195.650,   120.27,   0  !   !END!
769!  X= 617.750,   5195.700,   124.88,   0  !   !END!
770!  X= 617.750,   5195.750,   127.63,   0  !   !END!
771!  X= 617.750,   5195.800,   127.50,   0  !   !END!
772!  X= 617.750,   5195.850,   121.71,   0  !   !END!
773!  X= 617.750,   5195.900,   119.16,   0  !   !END!
774!  X= 617.750,   5195.950,   118.20,   0  !   !END!
775!  X= 617.750,   5196.000,   114.10,   0  !   !END!
776!  X= 617.750,   5196.050,   112.19,   0  !   !END!
777!  X= 617.750,   5196.100,   111.17,   0  !   !END!
778!  X= 617.750,   5196.150,   111.00,   0  !   !END!
779!  X= 617.750,   5196.200,   111.22,   0  !   !END!
780!  X= 617.750,   5196.250,   112.00,   0  !   !END!
781!  X= 617.750,   5196.300,   115.29,   0  !   !END!
782!  X= 617.750,   5196.350,   114.47,   0  !   !END!
783!  X= 617.750,   5196.400,   112.97,   0  !   !END!
784!  X= 617.750,   5196.500,   111.24,   0  !   !END!
785!  X= 617.750,   5196.600,   104.57,   0  !   !END!
786!  X= 617.800,   5194.700,   115.25,   0  !   !END!
787!  X= 617.800,   5194.750,   118.50,   0  !   !END!
788!  X= 617.800,   5194.800,   115.51,   0  !   !END!
789!  X= 617.800,   5194.850,   112.10,   0  !   !END!
790!  X= 617.800,   5194.900,   112.22,   0  !   !END!
791!  X= 617.800,   5194.950,   115.00,   0  !   !END!
792!  X= 617.800,   5195.000,   115.94,   0  !   !END!
793!  X= 617.800,   5195.050,   119.42,   0  !   !END!
794!  X= 617.800,   5195.100,   120.00,   0  !   !END!
795!  X= 617.800,   5195.150,   120.07,   0  !   !END!
796!  X= 617.800,   5195.200,   120.75,   0  !   !END!
797!  X= 617.800,   5195.250,   124.00,   0  !   !END!
798!  X= 617.800,   5195.300,   119.43,   0  !   !END!
799!  X= 617.800,   5195.350,   115.46,   0  !   !END!
800!  X= 617.800,   5195.400,   116.00,   0  !   !END!
801!  X= 617.800,   5195.450,   116.77,   0  !   !END!
802!  X= 617.800,   5195.500,   118.77,   0  !   !END!
803!  X= 617.800,   5195.550,   119.70,   0  !   !END!
804!  X= 617.800,   5195.600,   118.00,   0  !   !END!
805!  X= 617.800,   5195.650,   119.28,   0  !   !END!
806!  X= 617.800,   5195.700,   118.79,   0  !   !END!
807!  X= 617.800,   5195.750,   118.69,   0  !   !END!
808!  X= 617.800,   5195.800,   120.27,   0  !   !END!
809!  X= 617.800,   5195.850,   116.00,   0  !   !END!
810!  X= 617.800,   5195.900,   115.37,   0  !   !END!
811!  X= 617.800,   5195.950,   113.09,   0  !   !END!
812!  X= 617.800,   5196.000,   111.46,   0  !   !END!
813!  X= 617.800,   5196.050,   110.00,   0  !   !END!
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814!  X= 617.800,   5196.100,   110.00,   0  !   !END!
815!  X= 617.800,   5196.150,   109.00,   0  !   !END!
816!  X= 617.800,   5196.200,   110.37,   0  !   !END!
817!  X= 617.800,   5196.250,   111.15,   0  !   !END!
818!  X= 617.800,   5196.300,   112.17,   0  !   !END!
819!  X= 617.800,   5196.350,   118.33,   0  !   !END!
820!  X= 617.800,   5196.400,   112.99,   0  !   !END!
821!  X= 617.800,   5196.500,   110.00,   0  !   !END!
822!  X= 617.800,   5196.600,   101.16,   0  !   !END!
823!  X= 617.850,   5194.700,   111.43,   0  !   !END!
824!  X= 617.850,   5194.750,   115.78,   0  !   !END!
825!  X= 617.850,   5194.800,   111.99,   0  !   !END!
826!  X= 617.850,   5194.850,   110.45,   0  !   !END!
827!  X= 617.850,   5194.900,   112.01,   0  !   !END!
828!  X= 617.850,   5194.950,   116.00,   0  !   !END!
829!  X= 617.850,   5195.000,   119.15,   0  !   !END!
830!  X= 617.850,   5195.050,   124.00,   0  !   !END!
831!  X= 617.850,   5195.100,   121.33,   0  !   !END!
832!  X= 617.850,   5195.150,   122.00,   0  !   !END!
833!  X= 617.850,   5195.200,   123.56,   0  !   !END!
834!  X= 617.850,   5195.250,   118.26,   0  !   !END!
835!  X= 617.850,   5195.300,   117.92,   0  !   !END!
836!  X= 617.850,   5195.350,   115.28,   0  !   !END!
837!  X= 617.850,   5195.400,   119.22,   0  !   !END!
838!  X= 617.850,   5195.450,   122.05,   0  !   !END!
839!  X= 617.850,   5195.500,   120.79,   0  !   !END!
840!  X= 617.850,   5195.550,   118.09,   0  !   !END!
841!  X= 617.850,   5195.600,   114.44,   0  !   !END!
842!  X= 617.850,   5195.650,   114.00,   0  !   !END!
843!  X= 617.850,   5195.700,   116.23,   0  !   !END!
844!  X= 617.850,   5195.750,   111.46,   0  !   !END!
845!  X= 617.850,   5195.800,   119.00,   0  !   !END!
846!  X= 617.850,   5195.850,   110.19,   0  !   !END!
847!  X= 617.850,   5195.900,   110.97,   0  !   !END!
848!  X= 617.850,   5195.950,   110.33,   0  !   !END!
849!  X= 617.850,   5196.000,   109.81,   0  !   !END!
850!  X= 617.850,   5196.050,   109.15,   0  !   !END!
851!  X= 617.850,   5196.100,   109.25,   0  !   !END!
852!  X= 617.850,   5196.150,   109.15,   0  !   !END!
853!  X= 617.850,   5196.200,   110.00,   0  !   !END!
854!  X= 617.850,   5196.250,   111.14,   0  !   !END!
855!  X= 617.850,   5196.300,   113.00,   0  !   !END!
856!  X= 617.850,   5196.350,   116.07,   0  !   !END!
857!  X= 617.850,   5196.400,   113.50,   0  !   !END!
858!  X= 617.850,   5196.500,   105.19,   0  !   !END!
859!  X= 617.850,   5196.600,   102.86,   0  !   !END!
860!  X= 617.900,   5194.700,   106.05,   0  !   !END!
861!  X= 617.900,   5194.750,   109.37,   0  !   !END!
862!  X= 617.900,   5194.800,   109.50,   0  !   !END!
863!  X= 617.900,   5194.850,   110.07,   0  !   !END!
864!  X= 617.900,   5194.900,   115.25,   0  !   !END!
865!  X= 617.900,   5194.950,   122.00,   0  !   !END!
866!  X= 617.900,   5195.000,   120.79,   0  !   !END!
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867!  X= 617.900,   5195.050,   120.18,   0  !   !END!
868!  X= 617.900,   5195.100,   121.15,   0  !   !END!
869!  X= 617.900,   5195.150,   123.00,   0  !   !END!
870!  X= 617.900,   5195.200,   123.10,   0  !   !END!
871!  X= 617.900,   5195.250,   118.68,   0  !   !END!
872!  X= 617.900,   5195.300,   118.97,   0  !   !END!
873!  X= 617.900,   5195.350,   122.59,   0  !   !END!
874!  X= 617.900,   5195.400,   121.58,   0  !   !END!
875!  X= 617.900,   5195.450,   121.13,   0  !   !END!
876!  X= 617.900,   5195.500,   120.02,   0  !   !END!
877!  X= 617.900,   5195.550,   112.20,   0  !   !END!
878!  X= 617.900,   5195.600,   109.15,   0  !   !END!
879!  X= 617.900,   5195.650,   109.30,   0  !   !END!
880!  X= 617.900,   5195.700,   106.62,   0  !   !END!
881!  X= 617.900,   5195.750,   108.35,   0  !   !END!
882!  X= 617.900,   5195.800,   120.00,   0  !   !END!
883!  X= 617.900,   5195.850,   111.00,   0  !   !END!
884!  X= 617.900,   5195.900,   109.57,   0  !   !END!
885!  X= 617.900,   5195.950,   109.50,   0  !   !END!
886!  X= 617.900,   5196.000,   111.00,   0  !   !END!
887!  X= 617.900,   5196.050,   109.39,   0  !   !END!
888!  X= 617.900,   5196.100,   108.26,   0  !   !END!
889!  X= 617.900,   5196.150,   108.91,   0  !   !END!
890!  X= 617.900,   5196.200,   109.98,   0  !   !END!
891!  X= 617.900,   5196.250,   110.00,   0  !   !END!
892!  X= 617.900,   5196.300,   111.06,   0  !   !END!
893!  X= 617.900,   5196.350,   111.87,   0  !   !END!
894!  X= 617.900,   5196.400,   120.25,   0  !   !END!
895!  X= 617.900,   5196.500,   104.95,   0  !   !END!
896!  X= 617.900,   5196.600,   103.47,   0  !   !END!
897!  X= 617.950,   5194.700,   102.67,   0  !   !END!
898!  X= 617.950,   5194.750,   104.62,   0  !   !END!
899!  X= 617.950,   5194.800,   108.58,   0  !   !END!
900!  X= 617.950,   5194.850,   110.16,   0  !   !END!
901!  X= 617.950,   5194.900,   113.80,   0  !   !END!
902!  X= 617.950,   5194.950,   118.51,   0  !   !END!
903!  X= 617.950,   5195.000,   118.89,   0  !   !END!
904!  X= 617.950,   5195.050,   117.67,   0  !   !END!
905!  X= 617.950,   5195.100,   120.40,   0  !   !END!
906!  X= 617.950,   5195.150,   120.00,   0  !   !END!
907!  X= 617.950,   5195.200,   119.83,   0  !   !END!
908!  X= 617.950,   5195.250,   119.83,   0  !   !END!
909!  X= 617.950,   5195.300,   120.89,   0  !   !END!
910!  X= 617.950,   5195.350,   120.84,   0  !   !END!
911!  X= 617.950,   5195.400,   121.73,   0  !   !END!
912!  X= 617.950,   5195.450,   126.37,   0  !   !END!
913!  X= 617.950,   5195.500,   121.72,   0  !   !END!
914!  X= 617.950,   5195.550,   110.29,   0  !   !END!
915!  X= 617.950,   5195.600,   108.88,   0  !   !END!
916!  X= 617.950,   5195.650,   103.00,   0  !   !END!
917!  X= 617.950,   5195.700,   103.61,   0  !   !END!
918!  X= 617.950,   5195.750,   100.07,   0  !   !END!
919!  X= 617.950,   5195.800,   107.57,   0  !   !END!
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920!  X= 617.950,   5195.850,   118.65,   0  !   !END!
921!  X= 617.950,   5195.900,   115.37,   0  !   !END!
922!  X= 617.950,   5195.950,   108.87,   0  !   !END!
923!  X= 617.950,   5196.000,   108.35,   0  !   !END!
924!  X= 617.950,   5196.050,   108.00,   0  !   !END!
925!  X= 617.950,   5196.100,   108.08,   0  !   !END!
926!  X= 617.950,   5196.150,   108.48,   0  !   !END!
927!  X= 617.950,   5196.200,   108.90,   0  !   !END!
928!  X= 617.950,   5196.250,   109.26,   0  !   !END!
929!  X= 617.950,   5196.300,   110.00,   0  !   !END!
930!  X= 617.950,   5196.350,   110.89,   0  !   !END!
931!  X= 617.950,   5196.400,   113.92,   0  !   !END!
932!  X= 617.950,   5196.500,   107.09,   0  !   !END!
933!  X= 617.950,   5196.600,   105.68,   0  !   !END!
934!  X= 618.000,   5192.000,   0.00,   0  !   !END!
935!  X= 618.000,   5192.500,   0.00,   0  !   !END!
936!  X= 618.000,   5193.000,   14.44,   0  !   !END!
937!  X= 618.000,   5193.500,   62.05,   0  !   !END!
938!  X= 618.000,   5194.000,   63.18,   0  !   !END!
939!  X= 618.000,   5194.500,   84.41,   0  !   !END!
940!  X= 618.000,   5194.700,   100.53,   0  !   !END!
941!  X= 618.000,   5194.750,   102.10,   0  !   !END!
942!  X= 618.000,   5194.800,   105.00,   0  !   !END!
943!  X= 618.000,   5194.850,   108.55,   0  !   !END!
944!  X= 618.000,   5194.900,   110.31,   0  !   !END!
945!  X= 618.000,   5194.950,   113.49,   0  !   !END!
946!  X= 618.000,   5195.000,   116.21,   0  !   !END!
947!  X= 618.000,   5195.050,   117.59,   0  !   !END!
948!  X= 618.000,   5195.100,   120.59,   0  !   !END!
949!  X= 618.000,   5195.150,   120.00,   0  !   !END!
950!  X= 618.000,   5195.200,   120.59,   0  !   !END!
951!  X= 618.000,   5195.250,   122.31,   0  !   !END!
952!  X= 618.000,   5195.300,   121.00,   0  !   !END!
953!  X= 618.000,   5195.350,   121.00,   0  !   !END!
954!  X= 618.000,   5195.400,   125.00,   0  !   !END!
955!  X= 618.000,   5195.450,   115.54,   0  !   !END!
956!  X= 618.000,   5195.500,   107.70,   0  !   !END!
957!  X= 618.000,   5195.550,   105.78,   0  !   !END!
958!  X= 618.000,   5195.600,   100.53,   0  !   !END!
959!  X= 618.000,   5195.650,   100.86,   0  !   !END!
960!  X= 618.000,   5195.700,   99.19,   0  !   !END!
961!  X= 618.000,   5195.750,   100.08,   0  !   !END!
962!  X= 618.000,   5195.800,   99.38,   0  !   !END!
963!  X= 618.000,   5195.850,   101.83,   0  !   !END!
964!  X= 618.000,   5195.900,   113.66,   0  !   !END!
965!  X= 618.000,   5195.950,   118.71,   0  !   !END!
966!  X= 618.000,   5196.000,   108.84,   0  !   !END!
967!  X= 618.000,   5196.050,   108.02,   0  !   !END!
968!  X= 618.000,   5196.100,   108.00,   0  !   !END!
969!  X= 618.000,   5196.150,   108.04,   0  !   !END!
970!  X= 618.000,   5196.200,   108.62,   0  !   !END!
971!  X= 618.000,   5196.250,   109.00,   0  !   !END!
972!  X= 618.000,   5196.300,   109.78,   0  !   !END!
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973!  X= 618.000,   5196.350,   110.29,   0  !   !END!
974!  X= 618.000,   5196.400,   111.00,   0  !   !END!
975!  X= 618.000,   5196.500,   111.00,   0  !   !END!
976!  X= 618.000,   5196.600,   108.03,   0  !   !END!
977!  X= 618.000,   5197.000,   103.25,   0  !   !END!
978!  X= 618.000,   5197.500,   98.40,   0  !   !END!
979!  X= 618.000,   5198.000,   97.59,   0  !   !END!
980!  X= 618.000,   5198.500,   89.55,   0  !   !END!
981!  X= 618.000,   5199.000,   83.45,   0  !   !END!
982!  X= 618.000,   5199.500,   118.50,   0  !   !END!
983!  X= 618.000,   5200.000,   91.05,   0  !   !END!
984!  X= 618.050,   5194.700,   98.11,   0  !   !END!
985!  X= 618.050,   5194.750,   100.16,   0  !   !END!
986!  X= 618.050,   5194.800,   102.22,   0  !   !END!
987!  X= 618.050,   5194.850,   104.16,   0  !   !END!
988!  X= 618.050,   5194.900,   105.85,   0  !   !END!
989!  X= 618.050,   5194.950,   107.00,   0  !   !END!
990!  X= 618.050,   5195.000,   108.06,   0  !   !END!
991!  X= 618.050,   5195.050,   113.38,   0  !   !END!
992!  X= 618.050,   5195.100,   122.46,   0  !   !END!
993!  X= 618.050,   5195.150,   120.36,   0  !   !END!
994!  X= 618.050,   5195.200,   113.99,   0  !   !END!
995!  X= 618.050,   5195.250,   112.00,   0  !   !END!
996!  X= 618.050,   5195.300,   112.13,   0  !   !END!
997!  X= 618.050,   5195.350,   111.77,   0  !   !END!
998!  X= 618.050,   5195.400,   109.16,   0  !   !END!
999!  X= 618.050,   5195.450,   109.76,   0  !   !END!
1000!  X= 618.050,   5195.500,   101.58,   0  !   !END!
1001!  X= 618.050,   5195.550,   100.00,   0  !   !END!
1002!  X= 618.050,   5195.600,   100.99,   0  !   !END!
1003!  X= 618.050,   5195.650,   99.37,   0  !   !END!
1004!  X= 618.050,   5195.700,   101.00,   0  !   !END!
1005!  X= 618.050,   5195.750,   101.00,   0  !   !END!
1006!  X= 618.050,   5195.800,   97.02,   0  !   !END!
1007!  X= 618.050,   5195.850,   95.88,   0  !   !END!
1008!  X= 618.050,   5195.900,   101.85,   0  !   !END!
1009!  X= 618.050,   5195.950,   106.99,   0  !   !END!
1010!  X= 618.050,   5196.000,   120.00,   0  !   !END!
1011!  X= 618.050,   5196.050,   114.64,   0  !   !END!
1012!  X= 618.050,   5196.100,   109.32,   0  !   !END!
1013!  X= 618.050,   5196.150,   108.73,   0  !   !END!
1014!  X= 618.050,   5196.200,   108.79,   0  !   !END!
1015!  X= 618.050,   5196.250,   109.00,   0  !   !END!
1016!  X= 618.050,   5196.300,   109.60,   0  !   !END!
1017!  X= 618.050,   5196.350,   110.09,   0  !   !END!
1018!  X= 618.050,   5196.400,   111.06,   0  !   !END!
1019!  X= 618.050,   5196.500,   114.85,   0  !   !END!
1020!  X= 618.050,   5196.600,   108.95,   0  !   !END!
1021!  X= 618.100,   5194.700,   94.81,   0  !   !END!
1022!  X= 618.100,   5194.750,   96.17,   0  !   !END!
1023!  X= 618.100,   5194.800,   98.34,   0  !   !END!
1024!  X= 618.100,   5194.850,   100.14,   0  !   !END!
1025!  X= 618.100,   5194.900,   101.77,   0  !   !END!
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1026!  X= 618.100,   5194.950,   106.00,   0  !   !END!
1027!  X= 618.100,   5195.000,   102.43,   0  !   !END!
1028!  X= 618.100,   5195.050,   104.89,   0  !   !END!
1029!  X= 618.100,   5195.100,   119.41,   0  !   !END!
1030!  X= 618.100,   5195.150,   108.67,   0  !   !END!
1031!  X= 618.100,   5195.200,   109.25,   0  !   !END!
1032!  X= 618.100,   5195.250,   111.34,   0  !   !END!
1033!  X= 618.100,   5195.300,   105.12,   0  !   !END!
1034!  X= 618.100,   5195.350,   101.86,   0  !   !END!
1035!  X= 618.100,   5195.400,   101.00,   0  !   !END!
1036!  X= 618.100,   5195.450,   105.27,   0  !   !END!
1037!  X= 618.100,   5195.500,   101.40,   0  !   !END!
1038!  X= 618.100,   5195.550,   102.00,   0  !   !END!
1039!  X= 618.100,   5195.600,   94.85,   0  !   !END!
1040!  X= 618.100,   5195.650,   93.00,   0  !   !END!
1041!  X= 618.100,   5195.700,   93.00,   0  !   !END!
1042!  X= 618.100,   5195.750,   93.00,   0  !   !END!
1043!  X= 618.100,   5195.800,   93.56,   0  !   !END!
1044!  X= 618.100,   5195.850,   95.78,   0  !   !END!
1045!  X= 618.100,   5195.900,   99.00,   0  !   !END!
1046!  X= 618.100,   5195.950,   99.30,   0  !   !END!
1047!  X= 618.100,   5196.000,   100.59,   0  !   !END!
1048!  X= 618.100,   5196.050,   112.92,   0  !   !END!
1049!  X= 618.100,   5196.100,   118.83,   0  !   !END!
1050!  X= 618.100,   5196.150,   111.16,   0  !   !END!
1051!  X= 618.100,   5196.200,   110.00,   0  !   !END!
1052!  X= 618.100,   5196.250,   109.00,   0  !   !END!
1053!  X= 618.100,   5196.300,   109.63,   0  !   !END!
1054!  X= 618.100,   5196.350,   110.23,   0  !   !END!
1055!  X= 618.100,   5196.400,   111.00,   0  !   !END!
1056!  X= 618.100,   5196.500,   116.56,   0  !   !END!
1057!  X= 618.100,   5196.600,   111.00,   0  !   !END!
1058!  X= 618.150,   5194.700,   93.93,   0  !   !END!
1059!  X= 618.150,   5194.750,   95.04,   0  !   !END!
1060!  X= 618.150,   5194.800,   95.88,   0  !   !END!
1061!  X= 618.150,   5194.850,   97.33,   0  !   !END!
1062!  X= 618.150,   5194.900,   97.61,   0  !   !END!
1063!  X= 618.150,   5194.950,   99.23,   0  !   !END!
1064!  X= 618.150,   5195.000,   100.02,   0  !   !END!
1065!  X= 618.150,   5195.050,   101.00,   0  !   !END!
1066!  X= 618.150,   5195.100,   103.53,   0  !   !END!
1067!  X= 618.150,   5195.150,   102.03,   0  !   !END!
1068!  X= 618.150,   5195.200,   102.06,   0  !   !END!
1069!  X= 618.150,   5195.250,   102.58,   0  !   !END!
1070!  X= 618.150,   5195.300,   101.89,   0  !   !END!
1071!  X= 618.150,   5195.350,   104.23,   0  !   !END!
1072!  X= 618.150,   5195.400,   102.00,   0  !   !END!
1073!  X= 618.150,   5195.450,   102.93,   0  !   !END!
1074!  X= 618.150,   5195.500,   100.77,   0  !   !END!
1075!  X= 618.150,   5195.550,   100.71,   0  !   !END!
1076!  X= 618.150,   5195.600,   91.88,   0  !   !END!
1077!  X= 618.150,   5195.650,   91.97,   0  !   !END!
1078!  X= 618.150,   5195.700,   91.71,   0  !   !END!
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1079!  X= 618.150,   5195.750,   91.82,   0  !   !END!
1080!  X= 618.150,   5195.800,   92.00,   0  !   !END!
1081!  X= 618.150,   5195.850,   92.76,   0  !   !END!
1082!  X= 618.150,   5195.900,   93.25,   0  !   !END!
1083!  X= 618.150,   5195.950,   93.83,   0  !   !END!
1084!  X= 618.150,   5196.000,   93.19,   0  !   !END!
1085!  X= 618.150,   5196.050,   97.53,   0  !   !END!
1086!  X= 618.150,   5196.100,   106.82,   0  !   !END!
1087!  X= 618.150,   5196.150,   119.18,   0  !   !END!
1088!  X= 618.150,   5196.200,   116.17,   0  !   !END!
1089!  X= 618.150,   5196.250,   111.00,   0  !   !END!
1090!  X= 618.150,   5196.300,   109.58,   0  !   !END!
1091!  X= 618.150,   5196.350,   110.00,   0  !   !END!
1092!  X= 618.150,   5196.400,   113.30,   0  !   !END!
1093!  X= 618.150,   5196.500,   117.42,   0  !   !END!
1094!  X= 618.150,   5196.600,   111.12,   0  !   !END!
1095!  X= 618.200,   5194.700,   91.43,   0  !   !END!
1096!  X= 618.200,   5194.750,   90.64,   0  !   !END!
1097!  X= 618.200,   5194.800,   91.90,   0  !   !END!
1098!  X= 618.200,   5194.850,   93.42,   0  !   !END!
1099!  X= 618.200,   5194.900,   94.57,   0  !   !END!
1100!  X= 618.200,   5194.950,   96.42,   0  !   !END!
1101!  X= 618.200,   5195.000,   98.47,   0  !   !END!
1102!  X= 618.200,   5195.050,   96.68,   0  !   !END!
1103!  X= 618.200,   5195.100,   100.17,   0  !   !END!
1104!  X= 618.200,   5195.150,   100.28,   0  !   !END!
1105!  X= 618.200,   5195.200,   98.00,   0  !   !END!
1106!  X= 618.200,   5195.250,   99.00,   0  !   !END!
1107!  X= 618.200,   5195.300,   97.39,   0  !   !END!
1108!  X= 618.200,   5195.350,   106.62,   0  !   !END!
1109!  X= 618.200,   5195.400,   103.05,   0  !   !END!
1110!  X= 618.200,   5195.450,   97.35,   0  !   !END!
1111!  X= 618.200,   5195.500,   93.33,   0  !   !END!
1112!  X= 618.200,   5195.550,   92.00,   0  !   !END!
1113!  X= 618.200,   5195.600,   93.72,   0  !   !END!
1114!  X= 618.200,   5195.650,   91.42,   0  !   !END!
1115!  X= 618.200,   5195.700,   90.93,   0  !   !END!
1116!  X= 618.200,   5195.750,   90.82,   0  !   !END!
1117!  X= 618.200,   5195.800,   90.71,   0  !   !END!
1118!  X= 618.200,   5195.850,   91.31,   0  !   !END!
1119!  X= 618.200,   5195.900,   90.63,   0  !   !END!
1120!  X= 618.200,   5195.950,   90.91,   0  !   !END!
1121!  X= 618.200,   5196.000,   89.53,   0  !   !END!
1122!  X= 618.200,   5196.050,   91.00,   0  !   !END!
1123!  X= 618.200,   5196.100,   95.00,   0  !   !END!
1124!  X= 618.200,   5196.150,   99.49,   0  !   !END!
1125!  X= 618.200,   5196.200,   111.97,   0  !   !END!
1126!  X= 618.200,   5196.250,   119.46,   0  !   !END!
1127!  X= 618.200,   5196.300,   111.96,   0  !   !END!
1128!  X= 618.200,   5196.350,   115.48,   0  !   !END!
1129!  X= 618.200,   5196.400,   120.79,   0  !   !END!
1130!  X= 618.200,   5196.500,   111.69,   0  !   !END!
1131!  X= 618.200,   5196.600,   104.87,   0  !   !END!
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1132!  X= 618.250,   5194.700,   87.61,   0  !   !END!
1133!  X= 618.250,   5194.750,   88.43,   0  !   !END!
1134!  X= 618.250,   5194.800,   89.16,   0  !   !END!
1135!  X= 618.250,   5194.850,   89.72,   0  !   !END!
1136!  X= 618.250,   5194.900,   91.45,   0  !   !END!
1137!  X= 618.250,   5194.950,   91.54,   0  !   !END!
1138!  X= 618.250,   5195.000,   91.93,   0  !   !END!
1139!  X= 618.250,   5195.050,   91.76,   0  !   !END!
1140!  X= 618.250,   5195.100,   94.04,   0  !   !END!
1141!  X= 618.250,   5195.150,   95.26,   0  !   !END!
1142!  X= 618.250,   5195.200,   93.64,   0  !   !END!
1143!  X= 618.250,   5195.250,   91.61,   0  !   !END!
1144!  X= 618.250,   5195.300,   92.75,   0  !   !END!
1145!  X= 618.250,   5195.350,   93.16,   0  !   !END!
1146!  X= 618.250,   5195.400,   93.32,   0  !   !END!
1147!  X= 618.250,   5195.450,   93.36,   0  !   !END!
1148!  X= 618.250,   5195.500,   92.37,   0  !   !END!
1149!  X= 618.250,   5195.550,   90.85,   0  !   !END!
1150!  X= 618.250,   5195.600,   90.50,   0  !   !END!
1151!  X= 618.250,   5195.650,   90.61,   0  !   !END!
1152!  X= 618.250,   5195.700,   90.55,   0  !   !END!
1153!  X= 618.250,   5195.750,   90.43,   0  !   !END!
1154!  X= 618.250,   5195.800,   90.22,   0  !   !END!
1155!  X= 618.250,   5195.850,   90.04,   0  !   !END!
1156!  X= 618.250,   5195.900,   89.85,   0  !   !END!
1157!  X= 618.250,   5195.950,   89.93,   0  !   !END!
1158!  X= 618.250,   5196.000,   92.07,   0  !   !END!
1159!  X= 618.250,   5196.050,   94.96,   0  !   !END!
1160!  X= 618.250,   5196.100,   98.94,   0  !   !END!
1161!  X= 618.250,   5196.150,   103.00,   0  !   !END!
1162!  X= 618.250,   5196.200,   106.44,   0  !   !END!
1163!  X= 618.250,   5196.250,   108.94,   0  !   !END!
1164!  X= 618.250,   5196.300,   116.88,   0  !   !END!
1165!  X= 618.250,   5196.350,   114.00,   0  !   !END!
1166!  X= 618.250,   5196.400,   111.00,   0  !   !END!
1167!  X= 618.250,   5196.500,   107.70,   0  !   !END!
1168!  X= 618.250,   5196.600,   102.72,   0  !   !END!
1169!  X= 618.300,   5194.700,   84.94,   0  !   !END!
1170!  X= 618.300,   5194.750,   85.32,   0  !   !END!
1171!  X= 618.300,   5194.800,   86.26,   0  !   !END!
1172!  X= 618.300,   5194.850,   85.81,   0  !   !END!
1173!  X= 618.300,   5194.900,   86.97,   0  !   !END!
1174!  X= 618.300,   5194.950,   87.19,   0  !   !END!
1175!  X= 618.300,   5195.000,   86.93,   0  !   !END!
1176!  X= 618.300,   5195.050,   88.61,   0  !   !END!
1177!  X= 618.300,   5195.100,   91.00,   0  !   !END!
1178!  X= 618.300,   5195.150,   89.54,   0  !   !END!
1179!  X= 618.300,   5195.200,   88.86,   0  !   !END!
1180!  X= 618.300,   5195.250,   90.03,   0  !   !END!
1181!  X= 618.300,   5195.300,   90.69,   0  !   !END!
1182!  X= 618.300,   5195.350,   89.90,   0  !   !END!
1183!  X= 618.300,   5195.400,   90.06,   0  !   !END!
1184!  X= 618.300,   5195.450,   89.66,   0  !   !END!
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1185!  X= 618.300,   5195.500,   89.53,   0  !   !END!
1186!  X= 618.300,   5195.550,   89.45,   0  !   !END!
1187!  X= 618.300,   5195.600,   90.16,   0  !   !END!
1188!  X= 618.300,   5195.650,   90.37,   0  !   !END!
1189!  X= 618.300,   5195.700,   90.19,   0  !   !END!
1190!  X= 618.300,   5195.750,   90.06,   0  !   !END!
1191!  X= 618.300,   5195.800,   89.82,   0  !   !END!
1192!  X= 618.300,   5195.850,   89.82,   0  !   !END!
1193!  X= 618.300,   5195.900,   89.80,   0  !   !END!
1194!  X= 618.300,   5195.950,   90.78,   0  !   !END!
1195!  X= 618.300,   5196.000,   93.20,   0  !   !END!
1196!  X= 618.300,   5196.050,   98.58,   0  !   !END!
1197!  X= 618.300,   5196.100,   103.00,   0  !   !END!
1198!  X= 618.300,   5196.150,   103.00,   0  !   !END!
1199!  X= 618.300,   5196.200,   105.87,   0  !   !END!
1200!  X= 618.300,   5196.250,   106.00,   0  !   !END!
1201!  X= 618.300,   5196.300,   105.00,   0  !   !END!
1202!  X= 618.300,   5196.350,   105.18,   0  !   !END!
1203!  X= 618.300,   5196.400,   105.00,   0  !   !END!
1204!  X= 618.300,   5196.500,   102.85,   0  !   !END!
1205!  X= 618.300,   5196.600,   99.72,   0  !   !END!
1206!  X= 618.350,   5194.700,   82.10,   0  !   !END!
1207!  X= 618.350,   5194.750,   82.33,   0  !   !END!
1208!  X= 618.350,   5194.800,   80.60,   0  !   !END!
1209!  X= 618.350,   5194.850,   80.78,   0  !   !END!
1210!  X= 618.350,   5194.900,   82.64,   0  !   !END!
1211!  X= 618.350,   5194.950,   83.15,   0  !   !END!
1212!  X= 618.350,   5195.000,   83.31,   0  !   !END!
1213!  X= 618.350,   5195.050,   85.72,   0  !   !END!
1214!  X= 618.350,   5195.100,   84.71,   0  !   !END!
1215!  X= 618.350,   5195.150,   85.01,   0  !   !END!
1216!  X= 618.350,   5195.200,   85.70,   0  !   !END!
1217!  X= 618.350,   5195.250,   86.56,   0  !   !END!
1218!  X= 618.350,   5195.300,   87.44,   0  !   !END!
1219!  X= 618.350,   5195.350,   87.89,   0  !   !END!
1220!  X= 618.350,   5195.400,   88.22,   0  !   !END!
1221!  X= 618.350,   5195.450,   88.27,   0  !   !END!
1222!  X= 618.350,   5195.500,   88.58,   0  !   !END!
1223!  X= 618.350,   5195.550,   88.93,   0  !   !END!
1224!  X= 618.350,   5195.600,   90.17,   0  !   !END!
1225!  X= 618.350,   5195.650,   91.17,   0  !   !END!
1226!  X= 618.350,   5195.700,   90.60,   0  !   !END!
1227!  X= 618.350,   5195.750,   90.00,   0  !   !END!
1228!  X= 618.350,   5195.800,   89.71,   0  !   !END!
1229!  X= 618.350,   5195.850,   89.66,   0  !   !END!
1230!  X= 618.350,   5195.900,   90.14,   0  !   !END!
1231!  X= 618.350,   5195.950,   91.19,   0  !   !END!
1232!  X= 618.350,   5196.000,   93.85,   0  !   !END!
1233!  X= 618.350,   5196.050,   94.68,   0  !   !END!
1234!  X= 618.350,   5196.100,   96.19,   0  !   !END!
1235!  X= 618.350,   5196.150,   98.59,   0  !   !END!
1236!  X= 618.350,   5196.200,   101.00,   0  !   !END!
1237!  X= 618.350,   5196.250,   100.00,   0  !   !END!
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1238!  X= 618.350,   5196.300,   98.44,   0  !   !END!
1239!  X= 618.350,   5196.350,   98.90,   0  !   !END!
1240!  X= 618.350,   5196.400,   98.17,   0  !   !END!
1241!  X= 618.350,   5196.500,   95.25,   0  !   !END!
1242!  X= 618.350,   5196.600,   94.54,   0  !   !END!
1243!  X= 618.400,   5194.700,   78.70,   0  !   !END!
1244!  X= 618.400,   5194.750,   77.51,   0  !   !END!
1245!  X= 618.400,   5194.800,   77.01,   0  !   !END!
1246!  X= 618.400,   5194.850,   78.64,   0  !   !END!
1247!  X= 618.400,   5194.900,   80.49,   0  !   !END!
1248!  X= 618.400,   5194.950,   81.28,   0  !   !END!
1249!  X= 618.400,   5195.000,   81.62,   0  !   !END!
1250!  X= 618.400,   5195.050,   82.89,   0  !   !END!
1251!  X= 618.400,   5195.100,   81.15,   0  !   !END!
1252!  X= 618.450,   5194.700,   74.96,   0  !   !END!
1253!  X= 618.450,   5194.750,   75.74,   0  !   !END!
1254!  X= 618.450,   5194.800,   75.90,   0  !   !END!
1255!  X= 618.450,   5194.850,   76.93,   0  !   !END!
1256!  X= 618.450,   5194.900,   77.92,   0  !   !END!
1257!  X= 618.450,   5194.950,   80.38,   0  !   !END!
1258!  X= 618.450,   5195.000,   79.40,   0  !   !END!
1259!  X= 618.450,   5195.050,   79.33,   0  !   !END!
1260!  X= 618.450,   5195.100,   80.41,   0  !   !END!
1261!  X= 618.500,   5192.000,   0.00,   0  !   !END!
1262!  X= 618.500,   5192.500,   0.00,   0  !   !END!
1263!  X= 618.500,   5193.000,   54.61,   0  !   !END!
1264!  X= 618.500,   5193.500,   64.13,   0  !   !END!
1265!  X= 618.500,   5194.000,   72.36,   0  !   !END!
1266!  X= 618.500,   5194.500,   70.86,   0  !   !END!
1267!  X= 618.500,   5194.700,   72.21,   0  !   !END!
1268!  X= 618.500,   5194.750,   73.70,   0  !   !END!
1269!  X= 618.500,   5194.800,   73.78,   0  !   !END!
1270!  X= 618.500,   5194.850,   74.65,   0  !   !END!
1271!  X= 618.500,   5194.900,   81.34,   0  !   !END!
1272!  X= 618.500,   5194.950,   77.78,   0  !   !END!
1273!  X= 618.500,   5195.000,   76.64,   0  !   !END!
1274!  X= 618.500,   5195.050,   77.25,   0  !   !END!
1275!  X= 618.500,   5195.100,   78.58,   0  !   !END!
1276!  X= 618.500,   5195.500,   82.20,   0  !   !END!
1277!  X= 618.500,   5196.000,   92.04,   0  !   !END!
1278!  X= 618.500,   5196.500,   82.95,   0  !   !END!
1279!  X= 618.500,   5197.000,   71.50,   0  !   !END!
1280!  X= 618.500,   5197.500,   71.50,   0  !   !END!
1281!  X= 618.500,   5198.000,   81.08,   0  !   !END!
1282!  X= 618.500,   5198.500,   96.52,   0  !   !END!
1283!  X= 618.500,   5199.000,   83.57,   0  !   !END!
1284!  X= 618.500,   5199.500,   88.33,   0  !   !END!
1285!  X= 618.500,   5200.000,   79.21,   0  !   !END!
1286!  X= 618.550,   5194.700,   70.76,   0  !   !END!
1287!  X= 618.550,   5194.750,   71.12,   0  !   !END!
1288!  X= 618.550,   5194.800,   71.59,   0  !   !END!
1289!  X= 618.550,   5194.850,   73.05,   0  !   !END!
1290!  X= 618.550,   5194.900,   75.00,   0  !   !END!
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1291!  X= 618.550,   5194.950,   74.77,   0  !   !END!
1292!  X= 618.550,   5195.000,   75.02,   0  !   !END!
1293!  X= 618.550,   5195.050,   75.01,   0  !   !END!
1294!  X= 618.550,   5195.100,   75.23,   0  !   !END!
1295!  X= 618.600,   5194.700,   69.77,   0  !   !END!
1296!  X= 618.600,   5194.750,   70.14,   0  !   !END!
1297!  X= 618.600,   5194.800,   70.96,   0  !   !END!
1298!  X= 618.600,   5194.850,   72.53,   0  !   !END!
1299!  X= 618.600,   5194.900,   72.05,   0  !   !END!
1300!  X= 618.600,   5194.950,   72.82,   0  !   !END!
1301!  X= 618.600,   5195.000,   72.87,   0  !   !END!
1302!  X= 618.600,   5195.050,   73.55,   0  !   !END!
1303!  X= 618.600,   5195.100,   74.20,   0  !   !END!
1304!  X= 618.650,   5194.700,   69.27,   0  !   !END!
1305!  X= 618.650,   5194.750,   69.45,   0  !   !END!
1306!  X= 618.650,   5194.800,   71.20,   0  !   !END!
1307!  X= 618.650,   5194.850,   71.65,   0  !   !END!
1308!  X= 618.650,   5194.900,   69.73,   0  !   !END!
1309!  X= 618.650,   5194.950,   69.89,   0  !   !END!
1310!  X= 618.650,   5195.000,   69.58,   0  !   !END!
1311!  X= 618.650,   5195.050,   71.03,   0  !   !END!
1312!  X= 618.650,   5195.100,   70.08,   0  !   !END!
1313!  X= 618.700,   5194.700,   68.68,   0  !   !END!
1314!  X= 618.700,   5194.750,   68.82,   0  !   !END!
1315!  X= 618.700,   5194.800,   69.10,   0  !   !END!
1316!  X= 618.700,   5194.850,   69.94,   0  !   !END!
1317!  X= 618.700,   5194.900,   67.75,   0  !   !END!
1318!  X= 618.700,   5194.950,   67.47,   0  !   !END!
1319!  X= 618.700,   5195.000,   66.78,   0  !   !END!
1320!  X= 618.700,   5195.050,   66.54,   0  !   !END!
1321!  X= 618.700,   5195.100,   65.46,   0  !   !END!
1322!  X= 618.750,   5194.700,   67.14,   0  !   !END!
1323!  X= 618.750,   5194.750,   68.14,   0  !   !END!
1324!  X= 618.750,   5194.800,   66.93,   0  !   !END!
1325!  X= 618.750,   5194.850,   66.07,   0  !   !END!
1326!  X= 618.750,   5194.900,   64.27,   0  !   !END!
1327!  X= 618.750,   5194.950,   63.12,   0  !   !END!
1328!  X= 618.750,   5195.000,   62.54,   0  !   !END!
1329!  X= 618.750,   5195.050,   62.28,   0  !   !END!
1330!  X= 618.750,   5195.100,   61.71,   0  !   !END!
1331!  X= 618.800,   5194.700,   63.01,   0  !   !END!
1332!  X= 618.800,   5194.750,   62.96,   0  !   !END!
1333!  X= 618.800,   5194.800,   63.56,   0  !   !END!
1334!  X= 618.800,   5194.850,   62.10,   0  !   !END!
1335!  X= 618.800,   5194.900,   60.75,   0  !   !END!
1336!  X= 618.800,   5194.950,   60.16,   0  !   !END!
1337!  X= 618.800,   5195.000,   60.38,   0  !   !END!
1338!  X= 618.800,   5195.050,   59.65,   0  !   !END!
1339!  X= 618.800,   5195.100,   59.75,   0  !   !END!
1340!  X= 618.850,   5194.700,   62.18,   0  !   !END!
1341!  X= 618.850,   5194.750,   61.87,   0  !   !END!
1342!  X= 618.850,   5194.800,   60.29,   0  !   !END!
1343!  X= 618.850,   5194.850,   59.99,   0  !   !END!
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1344!  X= 618.850,   5194.900,   58.68,   0  !   !END!
1345!  X= 618.850,   5194.950,   58.48,   0  !   !END!
1346!  X= 618.850,   5195.000,   57.88,   0  !   !END!
1347!  X= 618.850,   5195.050,   57.88,   0  !   !END!
1348!  X= 618.850,   5195.100,   57.64,   0  !   !END!
1349!  X= 618.900,   5194.700,   59.60,   0  !   !END!
1350!  X= 618.900,   5194.750,   58.66,   0  !   !END!
1351!  X= 618.900,   5194.800,   59.00,   0  !   !END!
1352!  X= 618.900,   5194.850,   58.25,   0  !   !END!
1353!  X= 618.900,   5194.900,   56.93,   0  !   !END!
1354!  X= 618.900,   5194.950,   56.44,   0  !   !END!
1355!  X= 618.900,   5195.000,   56.17,   0  !   !END!
1356!  X= 618.900,   5195.050,   56.29,   0  !   !END!
1357!  X= 618.900,   5195.100,   56.18,   0  !   !END!
1358!  X= 618.950,   5194.700,   56.82,   0  !   !END!
1359!  X= 618.950,   5194.750,   56.60,   0  !   !END!
1360!  X= 618.950,   5194.800,   56.90,   0  !   !END!
1361!  X= 618.950,   5194.850,   56.60,   0  !   !END!
1362!  X= 618.950,   5194.900,   55.05,   0  !   !END!
1363!  X= 618.950,   5194.950,   54.99,   0  !   !END!
1364!  X= 618.950,   5195.000,   55.10,   0  !   !END!
1365!  X= 618.950,   5195.050,   55.15,   0  !   !END!
1366!  X= 618.950,   5195.100,   55.58,   0  !   !END!
1367!  X= 619.000,   5192.000,   0.00,   0  !   !END!
1368!  X= 619.000,   5192.500,   0.00,   0  !   !END!
1369!  X= 619.000,   5193.000,   47.32,   0  !   !END!
1370!  X= 619.000,   5193.500,   72.58,   0  !   !END!
1371!  X= 619.000,   5194.000,   60.68,   0  !   !END!
1372!  X= 619.000,   5194.500,   55.72,   0  !   !END!
1373!  X= 619.000,   5194.700,   54.91,   0  !   !END!
1374!  X= 619.000,   5194.750,   54.49,   0  !   !END!
1375!  X= 619.000,   5194.800,   54.90,   0  !   !END!
1376!  X= 619.000,   5194.850,   55.40,   0  !   !END!
1377!  X= 619.000,   5194.900,   54.08,   0  !   !END!
1378!  X= 619.000,   5194.950,   54.24,   0  !   !END!
1379!  X= 619.000,   5195.000,   54.61,   0  !   !END!
1380!  X= 619.000,   5195.050,   55.02,   0  !   !END!
1381!  X= 619.000,   5195.100,   55.98,   0  !   !END!
1382!  X= 619.000,   5195.500,   62.60,   0  !   !END!
1383!  X= 619.000,   5196.000,   73.03,   0  !   !END!
1384!  X= 619.000,   5196.500,   74.09,   0  !   !END!
1385!  X= 619.000,   5197.000,   75.77,   0  !   !END!
1386!  X= 619.000,   5197.500,   71.50,   0  !   !END!
1387!  X= 619.000,   5198.000,   74.52,   0  !   !END!
1388!  X= 619.000,   5198.500,   87.85,   0  !   !END!
1389!  X= 619.000,   5199.000,   96.87,   0  !   !END!
1390!  X= 619.000,   5199.500,   114.93,   0  !   !END!
1391!  X= 619.000,   5200.000,   102.66,   0  !   !END!
1392!  X= 619.050,   5194.700,   53.33,   0  !   !END!
1393!  X= 619.050,   5194.750,   53.02,   0  !   !END!
1394!  X= 619.050,   5194.800,   53.22,   0  !   !END!
1395!  X= 619.050,   5194.850,   54.00,   0  !   !END!
1396!  X= 619.050,   5194.900,   53.94,   0  !   !END!
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1397!  X= 619.050,   5194.950,   54.76,   0  !   !END!
1398!  X= 619.050,   5195.000,   55.55,   0  !   !END!
1399!  X= 619.050,   5195.050,   56.82,   0  !   !END!
1400!  X= 619.050,   5195.100,   57.91,   0  !   !END!
1401!  X= 619.100,   5194.700,   51.95,   0  !   !END!
1402!  X= 619.100,   5194.750,   52.14,   0  !   !END!
1403!  X= 619.100,   5194.800,   52.60,   0  !   !END!
1404!  X= 619.100,   5194.850,   55.00,   0  !   !END!
1405!  X= 619.100,   5194.900,   54.51,   0  !   !END!
1406!  X= 619.100,   5194.950,   56.00,   0  !   !END!
1407!  X= 619.100,   5195.000,   57.33,   0  !   !END!
1408!  X= 619.100,   5195.050,   58.15,   0  !   !END!
1409!  X= 619.100,   5195.100,   59.47,   0  !   !END!
1410!  X= 619.150,   5194.700,   51.56,   0  !   !END!
1411!  X= 619.150,   5194.750,   52.69,   0  !   !END!
1412!  X= 619.150,   5194.800,   53.81,   0  !   !END!
1413!  X= 619.150,   5194.850,   57.00,   0  !   !END!
1414!  X= 619.150,   5194.900,   58.00,   0  !   !END!
1415!  X= 619.150,   5194.950,   57.62,   0  !   !END!
1416!  X= 619.150,   5195.000,   58.57,   0  !   !END!
1417!  X= 619.150,   5195.050,   59.55,   0  !   !END!
1418!  X= 619.150,   5195.100,   60.40,   0  !   !END!
1419!  X= 619.200,   5194.700,   52.41,   0  !   !END!
1420!  X= 619.200,   5194.750,   53.36,   0  !   !END!
1421!  X= 619.200,   5194.800,   54.44,   0  !   !END!
1422!  X= 619.200,   5194.850,   58.00,   0  !   !END!
1423!  X= 619.200,   5194.900,   59.00,   0  !   !END!
1424!  X= 619.200,   5194.950,   59.83,   0  !   !END!
1425!  X= 619.200,   5195.000,   59.05,   0  !   !END!
1426!  X= 619.200,   5195.050,   60.09,   0  !   !END!
1427!  X= 619.200,   5195.100,   60.81,   0  !   !END!
1428!  X= 619.250,   5194.700,   52.70,   0  !   !END!
1429!  X= 619.250,   5194.750,   53.60,   0  !   !END!
1430!  X= 619.250,   5194.800,   55.16,   0  !   !END!
1431!  X= 619.250,   5194.850,   57.73,   0  !   !END!
1432!  X= 619.250,   5194.900,   58.51,   0  !   !END!
1433!  X= 619.250,   5194.950,   60.00,   0  !   !END!
1434!  X= 619.250,   5195.000,   61.06,   0  !   !END!
1435!  X= 619.250,   5195.050,   60.47,   0  !   !END!
1436!  X= 619.250,   5195.100,   61.12,   0  !   !END!
1437!  X= 619.300,   5194.700,   52.82,   0  !   !END!
1438!  X= 619.300,   5194.750,   54.19,   0  !   !END!
1439!  X= 619.300,   5194.800,   55.67,   0  !   !END!
1440!  X= 619.300,   5194.850,   57.87,   0  !   !END!
1441!  X= 619.300,   5194.900,   59.79,   0  !   !END!
1442!  X= 619.300,   5194.950,   61.00,   0  !   !END!
1443!  X= 619.300,   5195.000,   60.37,   0  !   !END!
1444!  X= 619.300,   5195.050,   60.67,   0  !   !END!
1445!  X= 619.300,   5195.100,   61.25,   0  !   !END!
1446!  X= 619.350,   5194.700,   52.83,   0  !   !END!
1447!  X= 619.350,   5194.750,   53.77,   0  !   !END!
1448!  X= 619.350,   5194.800,   55.97,   0  !   !END!
1449!  X= 619.350,   5194.850,   58.53,   0  !   !END!
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1450!  X= 619.350,   5194.900,   63.70,   0  !   !END!
1451!  X= 619.350,   5194.950,   63.39,   0  !   !END!
1452!  X= 619.350,   5195.000,   60.43,   0  !   !END!
1453!  X= 619.350,   5195.050,   60.62,   0  !   !END!
1454!  X= 619.350,   5195.100,   61.05,   0  !   !END!
1455!  X= 619.400,   5194.700,   52.37,   0  !   !END!
1456!  X= 619.400,   5194.750,   53.73,   0  !   !END!
1457!  X= 619.400,   5194.800,   56.11,   0  !   !END!
1458!  X= 619.400,   5194.850,   58.07,   0  !   !END!
1459!  X= 619.400,   5194.900,   59.46,   0  !   !END!
1460!  X= 619.400,   5194.950,   62.13,   0  !   !END!
1461!  X= 619.400,   5195.000,   61.37,   0  !   !END!
1462!  X= 619.400,   5195.050,   60.34,   0  !   !END!
1463!  X= 619.400,   5195.100,   60.73,   0  !   !END!
1464!  X= 619.450,   5194.700,   51.79,   0  !   !END!
1465!  X= 619.450,   5194.750,   53.39,   0  !   !END!
1466!  X= 619.450,   5194.800,   55.03,   0  !   !END!
1467!  X= 619.450,   5194.850,   56.61,   0  !   !END!
1468!  X= 619.450,   5194.900,   57.82,   0  !   !END!
1469!  X= 619.450,   5194.950,   60.68,   0  !   !END!
1470!  X= 619.450,   5195.000,   59.17,   0  !   !END!
1471!  X= 619.450,   5195.050,   59.43,   0  !   !END!
1472!  X= 619.450,   5195.100,   59.91,   0  !   !END!
1473!  X= 619.500,   5192.000,   0.00,   0  !   !END!
1474!  X= 619.500,   5192.500,   0.45,   0  !   !END!
1475!  X= 619.500,   5192.600,   3.00,   0  !   !END!
1476!  X= 619.500,   5192.700,   13.86,   0  !   !END!
1477!  X= 619.500,   5192.800,   14.46,   0  !   !END!
1478!  X= 619.500,   5192.900,   14.94,   0  !   !END!
1479!  X= 619.500,   5193.000,   15.40,   0  !   !END!
1480!  X= 619.500,   5193.100,   19.47,   0  !   !END!
1481!  X= 619.500,   5193.200,   27.74,   0  !   !END!
1482!  X= 619.500,   5193.300,   31.34,   0  !   !END!
1483!  X= 619.500,   5193.400,   33.63,   0  !   !END!
1484!  X= 619.500,   5193.500,   38.01,   0  !   !END!
1485!  X= 619.500,   5193.600,   44.32,   0  !   !END!
1486!  X= 619.500,   5193.700,   48.05,   0  !   !END!
1487!  X= 619.500,   5193.800,   51.25,   0  !   !END!
1488!  X= 619.500,   5193.900,   54.12,   0  !   !END!
1489!  X= 619.500,   5194.000,   52.40,   0  !   !END!
1490!  X= 619.500,   5194.100,   48.10,   0  !   !END!
1491!  X= 619.500,   5194.200,   44.44,   0  !   !END!
1492!  X= 619.500,   5194.300,   43.27,   0  !   !END!
1493!  X= 619.500,   5194.400,   45.12,   0  !   !END!
1494!  X= 619.500,   5194.500,   47.73,   0  !   !END!
1495!  X= 619.500,   5194.600,   49.70,   0  !   !END!
1496!  X= 619.500,   5194.700,   51.16,   0  !   !END!
1497!  X= 619.500,   5194.750,   51.91,   0  !   !END!
1498!  X= 619.500,   5194.800,   52.57,   0  !   !END!
1499!  X= 619.500,   5194.850,   52.73,   0  !   !END!
1500!  X= 619.500,   5194.900,   53.96,   0  !   !END!
1501!  X= 619.500,   5194.950,   54.42,   0  !   !END!
1502!  X= 619.500,   5195.000,   66.00,   0  !   !END!
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1503!  X= 619.500,   5195.050,   58.07,   0  !   !END!
1504!  X= 619.500,   5195.100,   58.84,   0  !   !END!
1505!  X= 619.500,   5195.150,   60.04,   0  !   !END!
1506!  X= 619.500,   5195.200,   60.44,   0  !   !END!
1507!  X= 619.500,   5195.250,   61.00,   0  !   !END!
1508!  X= 619.500,   5195.300,   60.41,   0  !   !END!
1509!  X= 619.500,   5195.350,   62.45,   0  !   !END!
1510!  X= 619.500,   5195.400,   62.61,   0  !   !END!
1511!  X= 619.500,   5195.450,   58.74,   0  !   !END!
1512!  X= 619.500,   5195.500,   57.72,   0  !   !END!
1513!  X= 619.500,   5195.550,   56.58,   0  !   !END!
1514!  X= 619.500,   5195.600,   55.57,   0  !   !END!
1515!  X= 619.500,   5195.700,   52.36,   0  !   !END!
1516!  X= 619.500,   5195.800,   52.44,   0  !   !END!
1517!  X= 619.500,   5195.900,   52.75,   0  !   !END!
1518!  X= 619.500,   5196.000,   54.72,   0  !   !END!
1519!  X= 619.500,   5196.100,   57.33,   0  !   !END!
1520!  X= 619.500,   5196.200,   59.27,   0  !   !END!
1521!  X= 619.500,   5196.300,   61.35,   0  !   !END!
1522!  X= 619.500,   5196.400,   62.42,   0  !   !END!
1523!  X= 619.500,   5196.500,   62.83,   0  !   !END!
1524!  X= 619.500,   5196.600,   63.33,   0  !   !END!
1525!  X= 619.500,   5196.700,   64.06,   0  !   !END!
1526!  X= 619.500,   5196.800,   67.52,   0  !   !END!
1527!  X= 619.500,   5196.900,   72.60,   0  !   !END!
1528!  X= 619.500,   5197.000,   75.51,   0  !   !END!
1529!  X= 619.500,   5197.100,   77.27,   0  !   !END!
1530!  X= 619.500,   5197.200,   77.34,   0  !   !END!
1531!  X= 619.500,   5197.300,   79.23,   0  !   !END!
1532!  X= 619.500,   5197.400,   82.99,   0  !   !END!
1533!  X= 619.500,   5197.500,   85.26,   0  !   !END!
1534!  X= 619.500,   5197.600,   89.22,   0  !   !END!
1535!  X= 619.500,   5197.700,   90.68,   0  !   !END!
1536!  X= 619.500,   5197.800,   91.87,   0  !   !END!
1537!  X= 619.500,   5197.900,   91.78,   0  !   !END!
1538!  X= 619.500,   5198.000,   91.35,   0  !   !END!
1539!  X= 619.500,   5198.100,   90.64,   0  !   !END!
1540!  X= 619.500,   5198.200,   89.76,   0  !   !END!
1541!  X= 619.500,   5198.300,   90.03,   0  !   !END!
1542!  X= 619.500,   5198.400,   89.33,   0  !   !END!
1543!  X= 619.500,   5198.500,   90.57,   0  !   !END!
1544!  X= 619.500,   5198.600,   90.99,   0  !   !END!
1545!  X= 619.500,   5198.700,   91.05,   0  !   !END!
1546!  X= 619.500,   5198.800,   91.91,   0  !   !END!
1547!  X= 619.500,   5198.900,   93.04,   0  !   !END!
1548!  X= 619.500,   5199.000,   93.39,   0  !   !END!
1549!  X= 619.500,   5199.500,   119.95,   0  !   !END!
1550!  X= 619.500,   5200.000,   115.39,   0  !   !END!
1551!  X= 619.550,   5194.700,   49.22,   0  !   !END!
1552!  X= 619.550,   5194.750,   50.08,   0  !   !END!
1553!  X= 619.550,   5194.800,   50.44,   0  !   !END!
1554!  X= 619.550,   5194.850,   51.37,   0  !   !END!
1555!  X= 619.550,   5194.900,   51.66,   0  !   !END!
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1556!  X= 619.550,   5194.950,   52.61,   0  !   !END!
1557!  X= 619.550,   5195.000,   54.85,   0  !   !END!
1558!  X= 619.550,   5195.050,   55.82,   0  !   !END!
1559!  X= 619.550,   5195.100,   56.52,   0  !   !END!
1560!  X= 619.550,   5195.150,   56.64,   0  !   !END!
1561!  X= 619.550,   5195.200,   55.26,   0  !   !END!
1562!  X= 619.550,   5195.250,   53.37,   0  !   !END!
1563!  X= 619.550,   5195.300,   52.91,   0  !   !END!
1564!  X= 619.550,   5195.350,   53.43,   0  !   !END!
1565!  X= 619.550,   5195.400,   52.97,   0  !   !END!
1566!  X= 619.550,   5195.450,   51.49,   0  !   !END!
1567!  X= 619.550,   5195.500,   50.21,   0  !   !END!
1568!  X= 619.550,   5195.550,   50.14,   0  !   !END!
1569!  X= 619.550,   5195.600,   49.38,   0  !   !END!
1570!  X= 619.600,   5192.600,   0.13,   0  !   !END!
1571!  X= 619.600,   5192.700,   4.79,   0  !   !END!
1572!  X= 619.600,   5192.800,   11.82,   0  !   !END!
1573!  X= 619.600,   5192.900,   17.23,   0  !   !END!
1574!  X= 619.600,   5193.000,   20.59,   0  !   !END!
1575!  X= 619.600,   5193.100,   21.83,   0  !   !END!
1576!  X= 619.600,   5193.200,   23.04,   0  !   !END!
1577!  X= 619.600,   5193.300,   32.75,   0  !   !END!
1578!  X= 619.600,   5193.400,   37.85,   0  !   !END!
1579!  X= 619.600,   5193.500,   44.48,   0  !   !END!
1580!  X= 619.600,   5193.600,   48.09,   0  !   !END!
1581!  X= 619.600,   5193.700,   48.33,   0  !   !END!
1582!  X= 619.600,   5193.800,   49.60,   0  !   !END!
1583!  X= 619.600,   5193.900,   47.77,   0  !   !END!
1584!  X= 619.600,   5194.000,   45.70,   0  !   !END!
1585!  X= 619.600,   5194.100,   42.52,   0  !   !END!
1586!  X= 619.600,   5194.200,   42.15,   0  !   !END!
1587!  X= 619.600,   5194.300,   41.34,   0  !   !END!
1588!  X= 619.600,   5194.400,   43.41,   0  !   !END!
1589!  X= 619.600,   5194.500,   46.16,   0  !   !END!
1590!  X= 619.600,   5194.600,   47.73,   0  !   !END!
1591!  X= 619.600,   5194.700,   47.99,   0  !   !END!
1592!  X= 619.600,   5194.750,   48.25,   0  !   !END!
1593!  X= 619.600,   5194.800,   48.74,   0  !   !END!
1594!  X= 619.600,   5194.850,   49.49,   0  !   !END!
1595!  X= 619.600,   5194.900,   50.40,   0  !   !END!
1596!  X= 619.600,   5194.950,   51.20,   0  !   !END!
1597!  X= 619.600,   5195.000,   51.77,   0  !   !END!
1598!  X= 619.600,   5195.050,   52.54,   0  !   !END!
1599!  X= 619.600,   5195.100,   52.21,   0  !   !END!
1600!  X= 619.600,   5195.150,   49.88,   0  !   !END!
1601!  X= 619.600,   5195.200,   49.61,   0  !   !END!
1602!  X= 619.600,   5195.250,   46.96,   0  !   !END!
1603!  X= 619.600,   5195.300,   46.54,   0  !   !END!
1604!  X= 619.600,   5195.350,   47.58,   0  !   !END!
1605!  X= 619.600,   5195.400,   48.05,   0  !   !END!
1606!  X= 619.600,   5195.450,   48.33,   0  !   !END!
1607!  X= 619.600,   5195.500,   45.46,   0  !   !END!
1608!  X= 619.600,   5195.550,   44.49,   0  !   !END!
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1609!  X= 619.600,   5195.600,   44.16,   0  !   !END!
1610!  X= 619.600,   5195.700,   46.00,   0  !   !END!
1611!  X= 619.600,   5195.800,   49.72,   0  !   !END!
1612!  X= 619.600,   5195.900,   54.27,   0  !   !END!
1613!  X= 619.600,   5196.000,   58.12,   0  !   !END!
1614!  X= 619.600,   5196.100,   60.10,   0  !   !END!
1615!  X= 619.600,   5196.200,   61.32,   0  !   !END!
1616!  X= 619.600,   5196.300,   62.00,   0  !   !END!
1617!  X= 619.600,   5196.400,   63.99,   0  !   !END!
1618!  X= 619.600,   5196.500,   64.39,   0  !   !END!
1619!  X= 619.600,   5196.600,   65.68,   0  !   !END!
1620!  X= 619.600,   5196.700,   65.91,   0  !   !END!
1621!  X= 619.600,   5196.800,   66.38,   0  !   !END!
1622!  X= 619.600,   5196.900,   68.53,   0  !   !END!
1623!  X= 619.600,   5197.000,   68.36,   0  !   !END!
1624!  X= 619.600,   5197.100,   70.55,   0  !   !END!
1625!  X= 619.600,   5197.200,   74.27,   0  !   !END!
1626!  X= 619.600,   5197.300,   80.73,   0  !   !END!
1627!  X= 619.600,   5197.400,   85.41,   0  !   !END!
1628!  X= 619.600,   5197.500,   89.61,   0  !   !END!
1629!  X= 619.600,   5197.600,   94.36,   0  !   !END!
1630!  X= 619.600,   5197.700,   93.75,   0  !   !END!
1631!  X= 619.600,   5197.800,   91.57,   0  !   !END!
1632!  X= 619.600,   5197.900,   89.50,   0  !   !END!
1633!  X= 619.600,   5198.000,   87.00,   0  !   !END!
1634!  X= 619.600,   5198.100,   84.49,   0  !   !END!
1635!  X= 619.600,   5198.200,   84.95,   0  !   !END!
1636!  X= 619.600,   5198.300,   84.81,   0  !   !END!
1637!  X= 619.600,   5198.400,   86.04,   0  !   !END!
1638!  X= 619.600,   5198.500,   87.05,   0  !   !END!
1639!  X= 619.600,   5198.600,   87.68,   0  !   !END!
1640!  X= 619.600,   5198.700,   88.69,   0  !   !END!
1641!  X= 619.600,   5198.800,   89.33,   0  !   !END!
1642!  X= 619.600,   5198.900,   90.87,   0  !   !END!
1643!  X= 619.600,   5199.000,   91.96,   0  !   !END!
1644!  X= 619.650,   5194.700,   46.72,   0  !   !END!
1645!  X= 619.650,   5194.750,   47.27,   0  !   !END!
1646!  X= 619.650,   5194.800,   47.41,   0  !   !END!
1647!  X= 619.650,   5194.850,   47.65,   0  !   !END!
1648!  X= 619.650,   5194.900,   48.83,   0  !   !END!
1649!  X= 619.650,   5194.950,   46.98,   0  !   !END!
1650!  X= 619.650,   5195.000,   46.47,   0  !   !END!
1651!  X= 619.650,   5195.050,   47.00,   0  !   !END!
1652!  X= 619.650,   5195.100,   43.92,   0  !   !END!
1653!  X= 619.650,   5195.150,   41.86,   0  !   !END!
1654!  X= 619.650,   5195.200,   42.33,   0  !   !END!
1655!  X= 619.650,   5195.250,   44.24,   0  !   !END!
1656!  X= 619.650,   5195.300,   45.16,   0  !   !END!
1657!  X= 619.650,   5195.350,   43.54,   0  !   !END!
1658!  X= 619.650,   5195.400,   42.88,   0  !   !END!
1659!  X= 619.650,   5195.450,   42.33,   0  !   !END!
1660!  X= 619.650,   5195.500,   41.58,   0  !   !END!
1661!  X= 619.650,   5195.550,   42.53,   0  !   !END!
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1662!  X= 619.650,   5195.600,   43.22,   0  !   !END!
1663!  X= 619.700,   5192.600,   0.00,   0  !   !END!
1664!  X= 619.700,   5192.700,   3.74,   0  !   !END!
1665!  X= 619.700,   5192.800,   12.70,   0  !   !END!
1666!  X= 619.700,   5192.900,   18.18,   0  !   !END!
1667!  X= 619.700,   5193.000,   22.19,   0  !   !END!
1668!  X= 619.700,   5193.100,   26.73,   0  !   !END!
1669!  X= 619.700,   5193.200,   30.73,   0  !   !END!
1670!  X= 619.700,   5193.300,   35.70,   0  !   !END!
1671!  X= 619.700,   5193.400,   41.89,   0  !   !END!
1672!  X= 619.700,   5193.500,   47.08,   0  !   !END!
1673!  X= 619.700,   5193.600,   47.10,   0  !   !END!
1674!  X= 619.700,   5193.700,   45.45,   0  !   !END!
1675!  X= 619.700,   5193.800,   44.07,   0  !   !END!
1676!  X= 619.700,   5193.900,   39.63,   0  !   !END!
1677!  X= 619.700,   5194.000,   38.41,   0  !   !END!
1678!  X= 619.700,   5194.100,   39.89,   0  !   !END!
1679!  X= 619.700,   5194.200,   39.55,   0  !   !END!
1680!  X= 619.700,   5194.300,   43.46,   0  !   !END!
1681!  X= 619.700,   5194.400,   42.80,   0  !   !END!
1682!  X= 619.700,   5194.500,   43.54,   0  !   !END!
1683!  X= 619.700,   5194.600,   44.87,   0  !   !END!
1684!  X= 619.700,   5194.700,   45.22,   0  !   !END!
1685!  X= 619.700,   5194.750,   44.02,   0  !   !END!
1686!  X= 619.700,   5194.800,   44.44,   0  !   !END!
1687!  X= 619.700,   5194.850,   44.86,   0  !   !END!
1688!  X= 619.700,   5194.900,   42.46,   0  !   !END!
1689!  X= 619.700,   5194.950,   41.43,   0  !   !END!
1690!  X= 619.700,   5195.000,   41.19,   0  !   !END!
1691!  X= 619.700,   5195.050,   44.00,   0  !   !END!
1692!  X= 619.700,   5195.100,   39.19,   0  !   !END!
1693!  X= 619.700,   5195.150,   37.37,   0  !   !END!
1694!  X= 619.700,   5195.200,   39.10,   0  !   !END!
1695!  X= 619.700,   5195.250,   40.78,   0  !   !END!
1696!  X= 619.700,   5195.300,   40.85,   0  !   !END!
1697!  X= 619.700,   5195.350,   40.00,   0  !   !END!
1698!  X= 619.700,   5195.400,   38.91,   0  !   !END!
1699!  X= 619.700,   5195.450,   39.82,   0  !   !END!
1700!  X= 619.700,   5195.500,   40.97,   0  !   !END!
1701!  X= 619.700,   5195.550,   42.20,   0  !   !END!
1702!  X= 619.700,   5195.600,   43.64,   0  !   !END!
1703!  X= 619.700,   5195.700,   46.80,   0  !   !END!
1704!  X= 619.700,   5195.800,   50.44,   0  !   !END!
1705!  X= 619.700,   5195.900,   54.27,   0  !   !END!
1706!  X= 619.700,   5196.000,   58.45,   0  !   !END!
1707!  X= 619.700,   5196.100,   60.66,   0  !   !END!
1708!  X= 619.700,   5196.200,   63.21,   0  !   !END!
1709!  X= 619.700,   5196.300,   66.38,   0  !   !END!
1710!  X= 619.700,   5196.400,   68.47,   0  !   !END!
1711!  X= 619.700,   5196.500,   67.96,   0  !   !END!
1712!  X= 619.700,   5196.600,   67.84,   0  !   !END!
1713!  X= 619.700,   5196.700,   65.78,   0  !   !END!
1714!  X= 619.700,   5196.800,   65.27,   0  !   !END!
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1715!  X= 619.700,   5196.900,   65.30,   0  !   !END!
1716!  X= 619.700,   5197.000,   67.88,   0  !   !END!
1717!  X= 619.700,   5197.100,   74.79,   0  !   !END!
1718!  X= 619.700,   5197.200,   80.19,   0  !   !END!
1719!  X= 619.700,   5197.300,   85.09,   0  !   !END!
1720!  X= 619.700,   5197.400,   86.71,   0  !   !END!
1721!  X= 619.700,   5197.500,   88.39,   0  !   !END!
1722!  X= 619.700,   5197.600,   88.93,   0  !   !END!
1723!  X= 619.700,   5197.700,   87.61,   0  !   !END!
1724!  X= 619.700,   5197.800,   83.55,   0  !   !END!
1725!  X= 619.700,   5197.900,   80.46,   0  !   !END!
1726!  X= 619.700,   5198.000,   79.27,   0  !   !END!
1727!  X= 619.700,   5198.100,   79.69,   0  !   !END!
1728!  X= 619.700,   5198.200,   80.58,   0  !   !END!
1729!  X= 619.700,   5198.300,   82.91,   0  !   !END!
1730!  X= 619.700,   5198.400,   84.32,   0  !   !END!
1731!  X= 619.700,   5198.500,   85.69,   0  !   !END!
1732!  X= 619.700,   5198.600,   87.40,   0  !   !END!
1733!  X= 619.700,   5198.700,   87.81,   0  !   !END!
1734!  X= 619.700,   5198.800,   88.81,   0  !   !END!
1735!  X= 619.700,   5198.900,   89.92,   0  !   !END!
1736!  X= 619.700,   5199.000,   91.58,   0  !   !END!
1737!  X= 619.750,   5194.700,   41.06,   0  !   !END!
1738!  X= 619.750,   5194.750,   38.29,   0  !   !END!
1739!  X= 619.750,   5194.800,   37.83,   0  !   !END!
1740!  X= 619.750,   5194.850,   36.86,   0  !   !END!
1741!  X= 619.750,   5194.900,   35.64,   0  !   !END!
1742!  X= 619.750,   5194.950,   35.30,   0  !   !END!
1743!  X= 619.750,   5195.000,   35.24,   0  !   !END!
1744!  X= 619.750,   5195.050,   39.00,   0  !   !END!
1745!  X= 619.750,   5195.100,   37.02,   0  !   !END!
1746!  X= 619.750,   5195.150,   36.12,   0  !   !END!
1747!  X= 619.750,   5195.200,   36.56,   0  !   !END!
1748!  X= 619.750,   5195.250,   37.28,   0  !   !END!
1749!  X= 619.750,   5195.300,   37.18,   0  !   !END!
1750!  X= 619.750,   5195.350,   37.57,   0  !   !END!
1751!  X= 619.750,   5195.400,   38.30,   0  !   !END!
1752!  X= 619.750,   5195.450,   39.35,   0  !   !END!
1753!  X= 619.750,   5195.500,   40.89,   0  !   !END!
1754!  X= 619.750,   5195.550,   43.13,   0  !   !END!
1755!  X= 619.750,   5195.600,   45.03,   0  !   !END!
1756!  X= 619.800,   5192.600,   0.00,   0  !   !END!
1757!  X= 619.800,   5192.700,   0.69,   0  !   !END!
1758!  X= 619.800,   5192.800,   13.17,   0  !   !END!
1759!  X= 619.800,   5192.900,   18.66,   0  !   !END!
1760!  X= 619.800,   5193.000,   23.85,   0  !   !END!
1761!  X= 619.800,   5193.100,   25.97,   0  !   !END!
1762!  X= 619.800,   5193.200,   30.85,   0  !   !END!
1763!  X= 619.800,   5193.300,   31.34,   0  !   !END!
1764!  X= 619.800,   5193.400,   38.98,   0  !   !END!
1765!  X= 619.800,   5193.500,   36.95,   0  !   !END!
1766!  X= 619.800,   5193.600,   33.85,   0  !   !END!
1767!  X= 619.800,   5193.700,   33.45,   0  !   !END!
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1768!  X= 619.800,   5193.800,   32.62,   0  !   !END!
1769!  X= 619.800,   5193.900,   32.99,   0  !   !END!
1770!  X= 619.800,   5194.000,   33.24,   0  !   !END!
1771!  X= 619.800,   5194.100,   33.05,   0  !   !END!
1772!  X= 619.800,   5194.200,   34.52,   0  !   !END!
1773!  X= 619.800,   5194.300,   35.04,   0  !   !END!
1774!  X= 619.800,   5194.400,   37.55,   0  !   !END!
1775!  X= 619.800,   5194.500,   42.49,   0  !   !END!
1776!  X= 619.800,   5194.600,   38.47,   0  !   !END!
1777!  X= 619.800,   5194.700,   35.95,   0  !   !END!
1778!  X= 619.800,   5194.750,   35.32,   0  !   !END!
1779!  X= 619.800,   5194.800,   33.79,   0  !   !END!
1780!  X= 619.800,   5194.850,   33.66,   0  !   !END!
1781!  X= 619.800,   5194.900,   32.90,   0  !   !END!
1782!  X= 619.800,   5194.950,   32.66,   0  !   !END!
1783!  X= 619.800,   5195.000,   32.92,   0  !   !END!
1784!  X= 619.800,   5195.050,   34.94,   0  !   !END!
1785!  X= 619.800,   5195.100,   35.00,   0  !   !END!
1786!  X= 619.800,   5195.150,   34.77,   0  !   !END!
1787!  X= 619.800,   5195.200,   35.16,   0  !   !END!
1788!  X= 619.800,   5195.250,   35.96,   0  !   !END!
1789!  X= 619.800,   5195.300,   36.66,   0  !   !END!
1790!  X= 619.800,   5195.350,   37.55,   0  !   !END!
1791!  X= 619.800,   5195.400,   38.42,   0  !   !END!
1792!  X= 619.800,   5195.450,   39.64,   0  !   !END!
1793!  X= 619.800,   5195.500,   41.81,   0  !   !END!
1794!  X= 619.800,   5195.550,   43.36,   0  !   !END!
1795!  X= 619.800,   5195.600,   44.71,   0  !   !END!
1796!  X= 619.800,   5195.700,   47.59,   0  !   !END!
1797!  X= 619.800,   5195.800,   50.67,   0  !   !END!
1798!  X= 619.800,   5195.900,   53.78,   0  !   !END!
1799!  X= 619.800,   5196.000,   57.60,   0  !   !END!
1800!  X= 619.800,   5196.100,   61.75,   0  !   !END!
1801!  X= 619.800,   5196.200,   66.50,   0  !   !END!
1802!  X= 619.800,   5196.300,   68.95,   0  !   !END!
1803!  X= 619.800,   5196.400,   68.99,   0  !   !END!
1804!  X= 619.800,   5196.500,   67.71,   0  !   !END!
1805!  X= 619.800,   5196.600,   65.43,   0  !   !END!
1806!  X= 619.800,   5196.700,   62.19,   0  !   !END!
1807!  X= 619.800,   5196.800,   62.92,   0  !   !END!
1808!  X= 619.800,   5196.900,   67.00,   0  !   !END!
1809!  X= 619.800,   5197.000,   68.00,   0  !   !END!
1810!  X= 619.800,   5197.100,   70.52,   0  !   !END!
1811!  X= 619.800,   5197.200,   74.46,   0  !   !END!
1812!  X= 619.800,   5197.300,   77.74,   0  !   !END!
1813!  X= 619.800,   5197.400,   81.54,   0  !   !END!
1814!  X= 619.800,   5197.500,   86.78,   0  !   !END!
1815!  X= 619.800,   5197.600,   80.51,   0  !   !END!
1816!  X= 619.800,   5197.700,   75.99,   0  !   !END!
1817!  X= 619.800,   5197.800,   72.23,   0  !   !END!
1818!  X= 619.800,   5197.900,   71.02,   0  !   !END!
1819!  X= 619.800,   5198.000,   72.23,   0  !   !END!
1820!  X= 619.800,   5198.100,   75.18,   0  !   !END!
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1821!  X= 619.800,   5198.200,   77.98,   0  !   !END!
1822!  X= 619.800,   5198.300,   80.25,   0  !   !END!
1823!  X= 619.800,   5198.400,   83.09,   0  !   !END!
1824!  X= 619.800,   5198.500,   84.66,   0  !   !END!
1825!  X= 619.800,   5198.600,   86.72,   0  !   !END!
1826!  X= 619.800,   5198.700,   87.61,   0  !   !END!
1827!  X= 619.800,   5198.800,   87.21,   0  !   !END!
1828!  X= 619.800,   5198.900,   87.29,   0  !   !END!
1829!  X= 619.800,   5199.000,   87.85,   0  !   !END!
1830!  X= 619.850,   5194.700,   31.91,   0  !   !END!
1831!  X= 619.850,   5194.750,   30.33,   0  !   !END!
1832!  X= 619.850,   5194.800,   29.91,   0  !   !END!
1833!  X= 619.850,   5194.850,   30.07,   0  !   !END!
1834!  X= 619.850,   5194.900,   30.16,   0  !   !END!
1835!  X= 619.850,   5194.950,   31.23,   0  !   !END!
1836!  X= 619.850,   5195.000,   31.88,   0  !   !END!
1837!  X= 619.850,   5195.050,   32.35,   0  !   !END!
1838!  X= 619.850,   5195.100,   35.60,   0  !   !END!
1839!  X= 619.850,   5195.150,   33.92,   0  !   !END!
1840!  X= 619.850,   5195.200,   35.01,   0  !   !END!
1841!  X= 619.850,   5195.250,   36.58,   0  !   !END!
1842!  X= 619.850,   5195.300,   37.41,   0  !   !END!
1843!  X= 619.850,   5195.350,   38.09,   0  !   !END!
1844!  X= 619.850,   5195.400,   38.93,   0  !   !END!
1845!  X= 619.850,   5195.450,   40.21,   0  !   !END!
1846!  X= 619.850,   5195.500,   41.47,   0  !   !END!
1847!  X= 619.850,   5195.550,   42.89,   0  !   !END!
1848!  X= 619.850,   5195.600,   44.12,   0  !   !END!
1849!  X= 619.900,   5192.600,   0.00,   0  !   !END!
1850!  X= 619.900,   5192.700,   0.22,   0  !   !END!
1851!  X= 619.900,   5192.800,   13.07,   0  !   !END!
1852!  X= 619.900,   5192.900,   20.81,   0  !   !END!
1853!  X= 619.900,   5193.000,   27.43,   0  !   !END!
1854!  X= 619.900,   5193.100,   28.17,   0  !   !END!
1855!  X= 619.900,   5193.200,   29.05,   0  !   !END!
1856!  X= 619.900,   5193.300,   28.16,   0  !   !END!
1857!  X= 619.900,   5193.400,   26.14,   0  !   !END!
1858!  X= 619.900,   5193.500,   24.82,   0  !   !END!
1859!  X= 619.900,   5193.600,   23.49,   0  !   !END!
1860!  X= 619.900,   5193.700,   27.44,   0  !   !END!
1861!  X= 619.900,   5193.800,   27.29,   0  !   !END!
1862!  X= 619.900,   5193.900,   27.34,   0  !   !END!
1863!  X= 619.900,   5194.000,   27.42,   0  !   !END!
1864!  X= 619.900,   5194.100,   27.65,   0  !   !END!
1865!  X= 619.900,   5194.200,   29.65,   0  !   !END!
1866!  X= 619.900,   5194.300,   31.05,   0  !   !END!
1867!  X= 619.900,   5194.400,   31.86,   0  !   !END!
1868!  X= 619.900,   5194.500,   29.87,   0  !   !END!
1869!  X= 619.900,   5194.600,   29.15,   0  !   !END!
1870!  X= 619.900,   5194.700,   30.85,   0  !   !END!
1871!  X= 619.900,   5194.750,   28.48,   0  !   !END!
1872!  X= 619.900,   5194.800,   28.51,   0  !   !END!
1873!  X= 619.900,   5194.850,   28.83,   0  !   !END!
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1874!  X= 619.900,   5194.900,   29.43,   0  !   !END!
1875!  X= 619.900,   5194.950,   30.88,   0  !   !END!
1876!  X= 619.900,   5195.000,   31.43,   0  !   !END!
1877!  X= 619.900,   5195.050,   32.19,   0  !   !END!
1878!  X= 619.900,   5195.100,   41.00,   0  !   !END!
1879!  X= 619.900,   5195.150,   35.02,   0  !   !END!
1880!  X= 619.900,   5195.200,   36.29,   0  !   !END!
1881!  X= 619.900,   5195.250,   37.20,   0  !   !END!
1882!  X= 619.900,   5195.300,   38.27,   0  !   !END!
1883!  X= 619.900,   5195.350,   39.08,   0  !   !END!
1884!  X= 619.900,   5195.400,   39.44,   0  !   !END!
1885!  X= 619.900,   5195.450,   40.32,   0  !   !END!
1886!  X= 619.900,   5195.500,   41.58,   0  !   !END!
1887!  X= 619.900,   5195.550,   43.33,   0  !   !END!
1888!  X= 619.900,   5195.600,   44.50,   0  !   !END!
1889!  X= 619.900,   5195.700,   47.58,   0  !   !END!
1890!  X= 619.900,   5195.800,   50.36,   0  !   !END!
1891!  X= 619.900,   5195.900,   53.64,   0  !   !END!
1892!  X= 619.900,   5196.000,   61.79,   0  !   !END!
1893!  X= 619.900,   5196.100,   67.01,   0  !   !END!
1894!  X= 619.900,   5196.200,   70.39,   0  !   !END!
1895!  X= 619.900,   5196.300,   69.79,   0  !   !END!
1896!  X= 619.900,   5196.400,   69.63,   0  !   !END!
1897!  X= 619.900,   5196.500,   67.66,   0  !   !END!
1898!  X= 619.900,   5196.600,   65.78,   0  !   !END!
1899!  X= 619.900,   5196.700,   60.60,   0  !   !END!
1900!  X= 619.900,   5196.800,   60.20,   0  !   !END!
1901!  X= 619.900,   5196.900,   63.31,   0  !   !END!
1902!  X= 619.900,   5197.000,   66.36,   0  !   !END!
1903!  X= 619.900,   5197.100,   69.05,   0  !   !END!
1904!  X= 619.900,   5197.200,   71.58,   0  !   !END!
1905!  X= 619.900,   5197.300,   70.88,   0  !   !END!
1906!  X= 619.900,   5197.400,   71.15,   0  !   !END!
1907!  X= 619.900,   5197.500,   68.99,   0  !   !END!
1908!  X= 619.900,   5197.600,   66.67,   0  !   !END!
1909!  X= 619.900,   5197.700,   64.07,   0  !   !END!
1910!  X= 619.900,   5197.800,   64.39,   0  !   !END!
1911!  X= 619.900,   5197.900,   66.08,   0  !   !END!
1912!  X= 619.900,   5198.000,   68.04,   0  !   !END!
1913!  X= 619.900,   5198.100,   72.36,   0  !   !END!
1914!  X= 619.900,   5198.200,   75.53,   0  !   !END!
1915!  X= 619.900,   5198.300,   78.69,   0  !   !END!
1916!  X= 619.900,   5198.400,   82.18,   0  !   !END!
1917!  X= 619.900,   5198.500,   84.36,   0  !   !END!
1918!  X= 619.900,   5198.600,   84.34,   0  !   !END!
1919!  X= 619.900,   5198.700,   84.14,   0  !   !END!
1920!  X= 619.900,   5198.800,   82.49,   0  !   !END!
1921!  X= 619.900,   5198.900,   81.80,   0  !   !END!
1922!  X= 619.900,   5199.000,   82.20,   0  !   !END!
1923!  X= 619.950,   5194.700,   27.13,   0  !   !END!
1924!  X= 619.950,   5194.750,   29.00,   0  !   !END!
1925!  X= 619.950,   5194.800,   30.00,   0  !   !END!
1926!  X= 619.950,   5194.850,   29.23,   0  !   !END!
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1927!  X= 619.950,   5194.900,   29.74,   0  !   !END!
1928!  X= 619.950,   5194.950,   30.67,   0  !   !END!
1929!  X= 619.950,   5195.000,   31.86,   0  !   !END!
1930!  X= 619.950,   5195.050,   33.37,   0  !   !END!
1931!  X= 619.950,   5195.100,   36.09,   0  !   !END!
1932!  X= 619.950,   5195.150,   38.13,   0  !   !END!
1933!  X= 619.950,   5195.200,   37.47,   0  !   !END!
1934!  X= 619.950,   5195.250,   37.93,   0  !   !END!
1935!  X= 619.950,   5195.300,   38.51,   0  !   !END!
1936!  X= 619.950,   5195.350,   39.50,   0  !   !END!
1937!  X= 619.950,   5195.400,   40.27,   0  !   !END!
1938!  X= 619.950,   5195.450,   41.49,   0  !   !END!
1939!  X= 619.950,   5195.500,   42.86,   0  !   !END!
1940!  X= 619.950,   5195.550,   44.29,   0  !   !END!
1941!  X= 619.950,   5195.600,   45.30,   0  !   !END!
1942!  X= 620.000,   5192.000,   0.00,   0  !   !END!
1943!  X= 620.000,   5192.500,   0.00,   0  !   !END!
1944!  X= 620.000,   5192.600,   0.00,   0  !   !END!
1945!  X= 620.000,   5192.700,   0.00,   0  !   !END!
1946!  X= 620.000,   5192.800,   13.94,   0  !   !END!
1947!  X= 620.000,   5192.900,   19.10,   0  !   !END!
1948!  X= 620.000,   5193.000,   23.80,   0  !   !END!
1949!  X= 620.000,   5193.100,   27.63,   0  !   !END!
1950!  X= 620.000,   5193.200,   21.77,   0  !   !END!
1951!  X= 620.000,   5193.300,   19.08,   0  !   !END!
1952!  X= 620.000,   5193.400,   14.02,   0  !   !END!
1953!  X= 620.000,   5193.500,   14.27,   0  !   !END!
1954!  X= 620.000,   5193.600,   15.56,   0  !   !END!
1955!  X= 620.000,   5193.700,   17.20,   0  !   !END!
1956!  X= 620.000,   5193.800,   20.57,   0  !   !END!
1957!  X= 620.000,   5193.900,   22.02,   0  !   !END!
1958!  X= 620.000,   5194.000,   23.42,   0  !   !END!
1959!  X= 620.000,   5194.100,   24.72,   0  !   !END!
1960!  X= 620.000,   5194.200,   25.16,   0  !   !END!
1961!  X= 620.000,   5194.300,   24.84,   0  !   !END!
1962!  X= 620.000,   5194.400,   24.02,   0  !   !END!
1963!  X= 620.000,   5194.500,   23.99,   0  !   !END!
1964!  X= 620.000,   5194.600,   24.86,   0  !   !END!
1965!  X= 620.000,   5194.700,   25.99,   0  !   !END!
1966!  X= 620.000,   5194.750,   26.90,   0  !   !END!
1967!  X= 620.000,   5194.800,   29.09,   0  !   !END!
1968!  X= 620.000,   5194.850,   31.00,   0  !   !END!
1969!  X= 620.000,   5194.900,   33.00,   0  !   !END!
1970!  X= 620.000,   5194.950,   33.99,   0  !   !END!
1971!  X= 620.000,   5195.000,   33.71,   0  !   !END!
1972!  X= 620.000,   5195.050,   35.03,   0  !   !END!
1973!  X= 620.000,   5195.100,   37.00,   0  !   !END!
1974!  X= 620.000,   5195.150,   39.00,   0  !   !END!
1975!  X= 620.000,   5195.200,   38.13,   0  !   !END!
1976!  X= 620.000,   5195.250,   38.56,   0  !   !END!
1977!  X= 620.000,   5195.300,   39.06,   0  !   !END!
1978!  X= 620.000,   5195.350,   39.61,   0  !   !END!
1979!  X= 620.000,   5195.400,   41.09,   0  !   !END!
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1980!  X= 620.000,   5195.450,   42.38,   0  !   !END!
1981!  X= 620.000,   5195.500,   43.51,   0  !   !END!
1982!  X= 620.000,   5195.550,   44.68,   0  !   !END!
1983!  X= 620.000,   5195.600,   45.39,   0  !   !END!
1984!  X= 620.000,   5195.700,   50.19,   0  !   !END!
1985!  X= 620.000,   5195.800,   55.28,   0  !   !END!
1986!  X= 620.000,   5195.900,   63.56,   0  !   !END!
1987!  X= 620.000,   5196.000,   72.41,   0  !   !END!
1988!  X= 620.000,   5196.100,   75.70,   0  !   !END!
1989!  X= 620.000,   5196.200,   73.11,   0  !   !END!
1990!  X= 620.000,   5196.300,   68.34,   0  !   !END!
1991!  X= 620.000,   5196.400,   65.14,   0  !   !END!
1992!  X= 620.000,   5196.500,   63.15,   0  !   !END!
1993!  X= 620.000,   5196.600,   56.84,   0  !   !END!
1994!  X= 620.000,   5196.700,   56.12,   0  !   !END!
1995!  X= 620.000,   5196.800,   57.74,   0  !   !END!
1996!  X= 620.000,   5196.900,   62.57,   0  !   !END!
1997!  X= 620.000,   5197.000,   63.96,   0  !   !END!
1998!  X= 620.000,   5197.100,   65.09,   0  !   !END!
1999!  X= 620.000,   5197.200,   64.07,   0  !   !END!
2000!  X= 620.000,   5197.300,   62.27,   0  !   !END!
2001!  X= 620.000,   5197.400,   58.45,   0  !   !END!
2002!  X= 620.000,   5197.500,   60.81,   0  !   !END!
2003!  X= 620.000,   5197.600,   61.22,   0  !   !END!
2004!  X= 620.000,   5197.700,   60.92,   0  !   !END!
2005!  X= 620.000,   5197.800,   62.42,   0  !   !END!
2006!  X= 620.000,   5197.900,   63.73,   0  !   !END!
2007!  X= 620.000,   5198.000,   65.53,   0  !   !END!
2008!  X= 620.000,   5198.100,   69.41,   0  !   !END!
2009!  X= 620.000,   5198.200,   74.12,   0  !   !END!
2010!  X= 620.000,   5198.300,   78.04,   0  !   !END!
2011!  X= 620.000,   5198.400,   80.42,   0  !   !END!
2012!  X= 620.000,   5198.500,   81.67,   0  !   !END!
2013!  X= 620.000,   5198.600,   82.16,   0  !   !END!
2014!  X= 620.000,   5198.700,   81.55,   0  !   !END!
2015!  X= 620.000,   5198.800,   80.30,   0  !   !END!
2016!  X= 620.000,   5198.900,   79.49,   0  !   !END!
2017!  X= 620.000,   5199.000,   80.08,   0  !   !END!
2018!  X= 620.000,   5199.500,   91.49,   0  !   !END!
2019!  X= 620.000,   5200.000,   98.08,   0  !   !END!
2020!  X= 620.050,   5194.700,   26.31,   0  !   !END!
2021!  X= 620.050,   5194.750,   28.69,   0  !   !END!
2022!  X= 620.050,   5194.800,   30.13,   0  !   !END!
2023!  X= 620.050,   5194.850,   31.50,   0  !   !END!
2024!  X= 620.050,   5194.900,   34.04,   0  !   !END!
2025!  X= 620.050,   5194.950,   38.00,   0  !   !END!
2026!  X= 620.050,   5195.000,   37.54,   0  !   !END!
2027!  X= 620.050,   5195.050,   35.50,   0  !   !END!
2028!  X= 620.050,   5195.100,   35.91,   0  !   !END!
2029!  X= 620.050,   5195.150,   40.12,   0  !   !END!
2030!  X= 620.050,   5195.200,   38.19,   0  !   !END!
2031!  X= 620.050,   5195.250,   38.82,   0  !   !END!
2032!  X= 620.050,   5195.300,   39.78,   0  !   !END!
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2033!  X= 620.050,   5195.350,   40.76,   0  !   !END!
2034!  X= 620.050,   5195.400,   41.34,   0  !   !END!
2035!  X= 620.050,   5195.450,   42.31,   0  !   !END!
2036!  X= 620.050,   5195.500,   43.39,   0  !   !END!
2037!  X= 620.050,   5195.550,   45.26,   0  !   !END!
2038!  X= 620.050,   5195.600,   46.91,   0  !   !END!
2039!  X= 620.100,   5192.600,   0.00,   0  !   !END!
2040!  X= 620.100,   5192.700,   0.00,   0  !   !END!
2041!  X= 620.100,   5192.800,   4.10,   0  !   !END!
2042!  X= 620.100,   5192.900,   16.27,   0  !   !END!
2043!  X= 620.100,   5193.000,   15.58,   0  !   !END!
2044!  X= 620.100,   5193.100,   12.48,   0  !   !END!
2045!  X= 620.100,   5193.200,   12.05,   0  !   !END!
2046!  X= 620.100,   5193.300,   9.87,   0  !   !END!
2047!  X= 620.100,   5193.400,   9.65,   0  !   !END!
2048!  X= 620.100,   5193.500,   10.92,   0  !   !END!
2049!  X= 620.100,   5193.600,   14.90,   0  !   !END!
2050!  X= 620.100,   5193.700,   16.04,   0  !   !END!
2051!  X= 620.100,   5193.800,   16.67,   0  !   !END!
2052!  X= 620.100,   5193.900,   18.01,   0  !   !END!
2053!  X= 620.100,   5194.000,   18.81,   0  !   !END!
2054!  X= 620.100,   5194.100,   18.97,   0  !   !END!
2055!  X= 620.100,   5194.200,   19.53,   0  !   !END!
2056!  X= 620.100,   5194.300,   20.27,   0  !   !END!
2057!  X= 620.100,   5194.400,   21.26,   0  !   !END!
2058!  X= 620.100,   5194.500,   24.00,   0  !   !END!
2059!  X= 620.100,   5194.600,   25.73,   0  !   !END!
2060!  X= 620.100,   5194.700,   30.85,   0  !   !END!
2061!  X= 620.100,   5194.750,   31.56,   0  !   !END!
2062!  X= 620.100,   5194.800,   32.63,   0  !   !END!
2063!  X= 620.100,   5194.850,   33.54,   0  !   !END!
2064!  X= 620.100,   5194.900,   34.40,   0  !   !END!
2065!  X= 620.100,   5194.950,   35.43,   0  !   !END!
2066!  X= 620.100,   5195.000,   35.86,   0  !   !END!
2067!  X= 620.100,   5195.050,   39.00,   0  !   !END!
2068!  X= 620.100,   5195.100,   39.00,   0  !   !END!
2069!  X= 620.100,   5195.150,   44.59,   0  !   !END!
2070!  X= 620.100,   5195.200,   38.35,   0  !   !END!
2071!  X= 620.100,   5195.250,   38.49,   0  !   !END!
2072!  X= 620.100,   5195.300,   39.67,   0  !   !END!
2073!  X= 620.100,   5195.350,   41.13,   0  !   !END!
2074!  X= 620.100,   5195.400,   41.88,   0  !   !END!
2075!  X= 620.100,   5195.450,   43.05,   0  !   !END!
2076!  X= 620.100,   5195.500,   45.58,   0  !   !END!
2077!  X= 620.100,   5195.550,   47.69,   0  !   !END!
2078!  X= 620.100,   5195.600,   49.04,   0  !   !END!
2079!  X= 620.100,   5195.700,   52.64,   0  !   !END!
2080!  X= 620.100,   5195.800,   57.88,   0  !   !END!
2081!  X= 620.100,   5195.900,   64.01,   0  !   !END!
2082!  X= 620.100,   5196.000,   67.13,   0  !   !END!
2083!  X= 620.100,   5196.100,   69.25,   0  !   !END!
2084!  X= 620.100,   5196.200,   64.32,   0  !   !END!
2085!  X= 620.100,   5196.300,   60.00,   0  !   !END!
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2086!  X= 620.100,   5196.400,   57.60,   0  !   !END!
2087!  X= 620.100,   5196.500,   54.69,   0  !   !END!
2088!  X= 620.100,   5196.600,   57.96,   0  !   !END!
2089!  X= 620.100,   5196.700,   60.70,   0  !   !END!
2090!  X= 620.100,   5196.800,   61.69,   0  !   !END!
2091!  X= 620.100,   5196.900,   59.11,   0  !   !END!
2092!  X= 620.100,   5197.000,   59.84,   0  !   !END!
2093!  X= 620.100,   5197.100,   59.42,   0  !   !END!
2094!  X= 620.100,   5197.200,   57.50,   0  !   !END!
2095!  X= 620.100,   5197.300,   57.50,   0  !   !END!
2096!  X= 620.100,   5197.400,   57.50,   0  !   !END!
2097!  X= 620.100,   5197.500,   57.50,   0  !   !END!
2098!  X= 620.100,   5197.600,   57.50,   0  !   !END!
2099!  X= 620.100,   5197.700,   57.50,   0  !   !END!
2100!  X= 620.100,   5197.800,   60.35,   0  !   !END!
2101!  X= 620.100,   5197.900,   62.76,   0  !   !END!
2102!  X= 620.100,   5198.000,   67.12,   0  !   !END!
2103!  X= 620.100,   5198.100,   71.01,   0  !   !END!
2104!  X= 620.100,   5198.200,   75.86,   0  !   !END!
2105!  X= 620.100,   5198.300,   78.04,   0  !   !END!
2106!  X= 620.100,   5198.400,   80.23,   0  !   !END!
2107!  X= 620.100,   5198.500,   80.92,   0  !   !END!
2108!  X= 620.100,   5198.600,   80.60,   0  !   !END!
2109!  X= 620.100,   5198.700,   79.55,   0  !   !END!
2110!  X= 620.100,   5198.800,   79.03,   0  !   !END!
2111!  X= 620.100,   5198.900,   78.67,   0  !   !END!
2112!  X= 620.100,   5199.000,   79.31,   0  !   !END!
2113!  X= 620.150,   5194.700,   31.98,   0  !   !END!
2114!  X= 620.150,   5194.750,   32.98,   0  !   !END!
2115!  X= 620.150,   5194.800,   34.13,   0  !   !END!
2116!  X= 620.150,   5194.850,   34.91,   0  !   !END!
2117!  X= 620.150,   5194.900,   35.35,   0  !   !END!
2118!  X= 620.150,   5194.950,   35.83,   0  !   !END!
2119!  X= 620.150,   5195.000,   36.29,   0  !   !END!
2120!  X= 620.150,   5195.050,   36.64,   0  !   !END!
2121!  X= 620.150,   5195.100,   37.26,   0  !   !END!
2122!  X= 620.150,   5195.150,   39.00,   0  !   !END!
2123!  X= 620.150,   5195.200,   39.17,   0  !   !END!
2124!  X= 620.150,   5195.250,   39.64,   0  !   !END!
2125!  X= 620.150,   5195.300,   40.02,   0  !   !END!
2126!  X= 620.150,   5195.350,   40.82,   0  !   !END!
2127!  X= 620.150,   5195.400,   42.50,   0  !   !END!
2128!  X= 620.150,   5195.450,   44.37,   0  !   !END!
2129!  X= 620.150,   5195.500,   46.75,   0  !   !END!
2130!  X= 620.150,   5195.550,   48.90,   0  !   !END!
2131!  X= 620.150,   5195.600,   48.87,   0  !   !END!
2132!  X= 620.200,   5192.600,   0.00,   0  !   !END!
2133!  X= 620.200,   5192.700,   0.00,   0  !   !END!
2134!  X= 620.200,   5192.800,   0.00,   0  !   !END!
2135!  X= 620.200,   5192.900,   0.75,   0  !   !END!
2136!  X= 620.200,   5193.000,   3.19,   0  !   !END!
2137!  X= 620.200,   5193.100,   3.32,   0  !   !END!
2138!  X= 620.200,   5193.200,   5.50,   0  !   !END!
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2139!  X= 620.200,   5193.300,   6.63,   0  !   !END!
2140!  X= 620.200,   5193.400,   8.89,   0  !   !END!
2141!  X= 620.200,   5193.500,   11.56,   0  !   !END!
2142!  X= 620.200,   5193.600,   13.61,   0  !   !END!
2143!  X= 620.200,   5193.700,   10.47,   0  !   !END!
2144!  X= 620.200,   5193.800,   11.61,   0  !   !END!
2145!  X= 620.200,   5193.900,   11.32,   0  !   !END!
2146!  X= 620.200,   5194.000,   13.10,   0  !   !END!
2147!  X= 620.200,   5194.100,   15.88,   0  !   !END!
2148!  X= 620.200,   5194.200,   18.52,   0  !   !END!
2149!  X= 620.200,   5194.300,   20.80,   0  !   !END!
2150!  X= 620.200,   5194.400,   23.77,   0  !   !END!
2151!  X= 620.200,   5194.500,   25.32,   0  !   !END!
2152!  X= 620.200,   5194.600,   28.48,   0  !   !END!
2153!  X= 620.200,   5194.700,   32.58,   0  !   !END!
2154!  X= 620.200,   5194.750,   33.81,   0  !   !END!
2155!  X= 620.200,   5194.800,   34.76,   0  !   !END!
2156!  X= 620.200,   5194.850,   35.28,   0  !   !END!
2157!  X= 620.200,   5194.900,   35.70,   0  !   !END!
2158!  X= 620.200,   5194.950,   36.05,   0  !   !END!
2159!  X= 620.200,   5195.000,   36.34,   0  !   !END!
2160!  X= 620.200,   5195.050,   36.63,   0  !   !END!
2161!  X= 620.200,   5195.100,   37.12,   0  !   !END!
2162!  X= 620.200,   5195.150,   39.00,   0  !   !END!
2163!  X= 620.200,   5195.200,   40.00,   0  !   !END!
2164!  X= 620.200,   5195.250,   41.46,   0  !   !END!
2165!  X= 620.200,   5195.300,   43.39,   0  !   !END!
2166!  X= 620.200,   5195.350,   46.00,   0  !   !END!
2167!  X= 620.200,   5195.400,   44.85,   0  !   !END!
2168!  X= 620.200,   5195.450,   45.38,   0  !   !END!
2169!  X= 620.200,   5195.500,   45.86,   0  !   !END!
2170!  X= 620.200,   5195.550,   46.69,   0  !   !END!
2171!  X= 620.200,   5195.600,   47.90,   0  !   !END!
2172!  X= 620.200,   5195.700,   50.75,   0  !   !END!
2173!  X= 620.200,   5195.800,   54.22,   0  !   !END!
2174!  X= 620.200,   5195.900,   56.72,   0  !   !END!
2175!  X= 620.200,   5196.000,   56.35,   0  !   !END!
2176!  X= 620.200,   5196.100,   55.60,   0  !   !END!
2177!  X= 620.200,   5196.200,   54.00,   0  !   !END!
2178!  X= 620.200,   5196.300,   51.18,   0  !   !END!
2179!  X= 620.200,   5196.400,   55.74,   0  !   !END!
2180!  X= 620.200,   5196.500,   61.13,   0  !   !END!
2181!  X= 620.200,   5196.600,   64.08,   0  !   !END!
2182!  X= 620.200,   5196.700,   64.16,   0  !   !END!
2183!  X= 620.200,   5196.800,   63.28,   0  !   !END!
2184!  X= 620.200,   5196.900,   61.89,   0  !   !END!
2185!  X= 620.200,   5197.000,   59.02,   0  !   !END!
2186!  X= 620.200,   5197.100,   57.50,   0  !   !END!
2187!  X= 620.200,   5197.200,   57.50,   0  !   !END!
2188!  X= 620.200,   5197.300,   57.50,   0  !   !END!
2189!  X= 620.200,   5197.400,   57.50,   0  !   !END!
2190!  X= 620.200,   5197.500,   57.50,   0  !   !END!
2191!  X= 620.200,   5197.600,   57.50,   0  !   !END!
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2192!  X= 620.200,   5197.700,   57.50,   0  !   !END!
2193!  X= 620.200,   5197.800,   60.15,   0  !   !END!
2194!  X= 620.200,   5197.900,   62.93,   0  !   !END!
2195!  X= 620.200,   5198.000,   67.57,   0  !   !END!
2196!  X= 620.200,   5198.100,   71.27,   0  !   !END!
2197!  X= 620.200,   5198.200,   77.21,   0  !   !END!
2198!  X= 620.200,   5198.300,   79.94,   0  !   !END!
2199!  X= 620.200,   5198.400,   80.31,   0  !   !END!
2200!  X= 620.200,   5198.500,   79.74,   0  !   !END!
2201!  X= 620.200,   5198.600,   79.11,   0  !   !END!
2202!  X= 620.200,   5198.700,   77.69,   0  !   !END!
2203!  X= 620.200,   5198.800,   76.65,   0  !   !END!
2204!  X= 620.200,   5198.900,   76.55,   0  !   !END!
2205!  X= 620.200,   5199.000,   76.83,   0  !   !END!
2206!  X= 620.250,   5194.700,   33.32,   0  !   !END!
2207!  X= 620.250,   5194.750,   34.51,   0  !   !END!
2208!  X= 620.250,   5194.800,   35.02,   0  !   !END!
2209!  X= 620.250,   5194.850,   35.28,   0  !   !END!
2210!  X= 620.250,   5194.900,   35.55,   0  !   !END!
2211!  X= 620.250,   5194.950,   35.87,   0  !   !END!
2212!  X= 620.250,   5195.000,   36.37,   0  !   !END!
2213!  X= 620.250,   5195.050,   36.89,   0  !   !END!
2214!  X= 620.250,   5195.100,   37.28,   0  !   !END!
2215!  X= 620.250,   5195.150,   40.69,   0  !   !END!
2216!  X= 620.250,   5195.200,   41.30,   0  !   !END!
2217!  X= 620.250,   5195.250,   41.04,   0  !   !END!
2218!  X= 620.250,   5195.300,   42.87,   0  !   !END!
2219!  X= 620.250,   5195.350,   45.08,   0  !   !END!
2220!  X= 620.250,   5195.400,   45.81,   0  !   !END!
2221!  X= 620.250,   5195.450,   48.00,   0  !   !END!
2222!  X= 620.250,   5195.500,   47.57,   0  !   !END!
2223!  X= 620.250,   5195.550,   45.62,   0  !   !END!
2224!  X= 620.250,   5195.600,   45.38,   0  !   !END!
2225!  X= 620.300,   5192.600,   0.00,   0  !   !END!
2226!  X= 620.300,   5192.700,   0.00,   0  !   !END!
2227!  X= 620.300,   5192.800,   0.00,   0  !   !END!
2228!  X= 620.300,   5192.900,   0.00,   0  !   !END!
2229!  X= 620.300,   5193.000,   0.00,   0  !   !END!
2230!  X= 620.300,   5193.100,   1.86,   0  !   !END!
2231!  X= 620.300,   5193.200,   2.40,   0  !   !END!
2232!  X= 620.300,   5193.300,   4.64,   0  !   !END!
2233!  X= 620.300,   5193.400,   6.24,   0  !   !END!
2234!  X= 620.300,   5193.500,   7.36,   0  !   !END!
2235!  X= 620.300,   5193.600,   8.72,   0  !   !END!
2236!  X= 620.300,   5193.700,   7.61,   0  !   !END!
2237!  X= 620.300,   5193.800,   8.43,   0  !   !END!
2238!  X= 620.300,   5193.900,   9.20,   0  !   !END!
2239!  X= 620.300,   5194.000,   10.54,   0  !   !END!
2240!  X= 620.300,   5194.100,   15.35,   0  !   !END!
2241!  X= 620.300,   5194.200,   18.53,   0  !   !END!
2242!  X= 620.300,   5194.300,   20.91,   0  !   !END!
2243!  X= 620.300,   5194.400,   23.81,   0  !   !END!
2244!  X= 620.300,   5194.500,   26.74,   0  !   !END!
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2245!  X= 620.300,   5194.600,   30.90,   0  !   !END!
2246!  X= 620.300,   5194.700,   33.41,   0  !   !END!
2247!  X= 620.300,   5194.750,   34.26,   0  !   !END!
2248!  X= 620.300,   5194.800,   34.92,   0  !   !END!
2249!  X= 620.300,   5194.850,   35.39,   0  !   !END!
2250!  X= 620.300,   5194.900,   35.50,   0  !   !END!
2251!  X= 620.300,   5194.950,   36.10,   0  !   !END!
2252!  X= 620.300,   5195.000,   36.64,   0  !   !END!
2253!  X= 620.300,   5195.050,   37.54,   0  !   !END!
2254!  X= 620.300,   5195.100,   38.38,   0  !   !END!
2255!  X= 620.300,   5195.150,   40.46,   0  !   !END!
2256!  X= 620.300,   5195.200,   41.42,   0  !   !END!
2257!  X= 620.300,   5195.250,   41.89,   0  !   !END!
2258!  X= 620.300,   5195.300,   42.18,   0  !   !END!
2259!  X= 620.300,   5195.350,   42.96,   0  !   !END!
2260!  X= 620.300,   5195.400,   44.33,   0  !   !END!
2261!  X= 620.300,   5195.450,   44.57,   0  !   !END!
2262!  X= 620.300,   5195.500,   44.73,   0  !   !END!
2263!  X= 620.300,   5195.550,   45.00,   0  !   !END!
2264!  X= 620.300,   5195.600,   44.41,   0  !   !END!
2265!  X= 620.300,   5195.700,   44.28,   0  !   !END!
2266!  X= 620.300,   5195.800,   45.64,   0  !   !END!
2267!  X= 620.300,   5195.900,   49.10,   0  !   !END!
2268!  X= 620.300,   5196.000,   53.18,   0  !   !END!
2269!  X= 620.300,   5196.100,   52.07,   0  !   !END!
2270!  X= 620.300,   5196.200,   47.44,   0  !   !END!
2271!  X= 620.300,   5196.300,   53.91,   0  !   !END!
2272!  X= 620.300,   5196.400,   57.89,   0  !   !END!
2273!  X= 620.300,   5196.500,   59.50,   0  !   !END!
2274!  X= 620.300,   5196.600,   61.90,   0  !   !END!
2275!  X= 620.300,   5196.700,   63.20,   0  !   !END!
2276!  X= 620.300,   5196.800,   62.09,   0  !   !END!
2277!  X= 620.300,   5196.900,   61.33,   0  !   !END!
2278!  X= 620.300,   5197.000,   60.46,   0  !   !END!
2279!  X= 620.300,   5197.100,   60.74,   0  !   !END!
2280!  X= 620.300,   5197.200,   60.36,   0  !   !END!
2281!  X= 620.300,   5197.300,   59.28,   0  !   !END!
2282!  X= 620.300,   5197.400,   57.50,   0  !   !END!
2283!  X= 620.300,   5197.500,   57.50,   0  !   !END!
2284!  X= 620.300,   5197.600,   57.50,   0  !   !END!
2285!  X= 620.300,   5197.700,   57.50,   0  !   !END!
2286!  X= 620.300,   5197.800,   60.72,   0  !   !END!
2287!  X= 620.300,   5197.900,   63.71,   0  !   !END!
2288!  X= 620.300,   5198.000,   68.63,   0  !   !END!
2289!  X= 620.300,   5198.100,   73.40,   0  !   !END!
2290!  X= 620.300,   5198.200,   78.98,   0  !   !END!
2291!  X= 620.300,   5198.300,   79.95,   0  !   !END!
2292!  X= 620.300,   5198.400,   79.66,   0  !   !END!
2293!  X= 620.300,   5198.500,   78.85,   0  !   !END!
2294!  X= 620.300,   5198.600,   77.52,   0  !   !END!
2295!  X= 620.300,   5198.700,   75.42,   0  !   !END!
2296!  X= 620.300,   5198.800,   74.42,   0  !   !END!
2297!  X= 620.300,   5198.900,   73.95,   0  !   !END!
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2298!  X= 620.300,   5199.000,   73.88,   0  !   !END!
2299!  X= 620.350,   5194.700,   32.90,   0  !   !END!
2300!  X= 620.350,   5194.750,   34.09,   0  !   !END!
2301!  X= 620.350,   5194.800,   34.81,   0  !   !END!
2302!  X= 620.350,   5194.850,   35.45,   0  !   !END!
2303!  X= 620.350,   5194.900,   35.90,   0  !   !END!
2304!  X= 620.350,   5194.950,   36.59,   0  !   !END!
2305!  X= 620.350,   5195.000,   37.10,   0  !   !END!
2306!  X= 620.350,   5195.050,   37.96,   0  !   !END!
2307!  X= 620.350,   5195.100,   38.87,   0  !   !END!
2308!  X= 620.350,   5195.150,   39.89,   0  !   !END!
2309!  X= 620.350,   5195.200,   42.61,   0  !   !END!
2310!  X= 620.350,   5195.250,   42.19,   0  !   !END!
2311!  X= 620.350,   5195.300,   41.75,   0  !   !END!
2312!  X= 620.350,   5195.350,   42.09,   0  !   !END!
2313!  X= 620.350,   5195.400,   42.06,   0  !   !END!
2314!  X= 620.350,   5195.450,   40.99,   0  !   !END!
2315!  X= 620.350,   5195.500,   40.69,   0  !   !END!
2316!  X= 620.350,   5195.550,   41.51,   0  !   !END!
2317!  X= 620.350,   5195.600,   41.95,   0  !   !END!
2318!  X= 620.400,   5192.600,   0.00,   0  !   !END!
2319!  X= 620.400,   5192.700,   0.00,   0  !   !END!
2320!  X= 620.400,   5192.800,   0.00,   0  !   !END!
2321!  X= 620.400,   5192.900,   0.00,   0  !   !END!
2322!  X= 620.400,   5193.000,   0.00,   0  !   !END!
2323!  X= 620.400,   5193.100,   2.02,   0  !   !END!
2324!  X= 620.400,   5193.200,   2.47,   0  !   !END!
2325!  X= 620.400,   5193.300,   3.21,   0  !   !END!
2326!  X= 620.400,   5193.400,   4.44,   0  !   !END!
2327!  X= 620.400,   5193.500,   6.39,   0  !   !END!
2328!  X= 620.400,   5193.600,   7.26,   0  !   !END!
2329!  X= 620.400,   5193.700,   9.06,   0  !   !END!
2330!  X= 620.400,   5193.800,   10.32,   0  !   !END!
2331!  X= 620.400,   5193.900,   12.62,   0  !   !END!
2332!  X= 620.400,   5194.000,   13.57,   0  !   !END!
2333!  X= 620.400,   5194.100,   15.16,   0  !   !END!
2334!  X= 620.400,   5194.200,   16.08,   0  !   !END!
2335!  X= 620.400,   5194.300,   19.74,   0  !   !END!
2336!  X= 620.400,   5194.400,   23.47,   0  !   !END!
2337!  X= 620.400,   5194.500,   27.18,   0  !   !END!
2338!  X= 620.400,   5194.600,   29.59,   0  !   !END!
2339!  X= 620.400,   5194.700,   32.45,   0  !   !END!
2340!  X= 620.400,   5194.750,   33.45,   0  !   !END!
2341!  X= 620.400,   5194.800,   34.45,   0  !   !END!
2342!  X= 620.400,   5194.850,   35.20,   0  !   !END!
2343!  X= 620.400,   5194.900,   35.77,   0  !   !END!
2344!  X= 620.400,   5194.950,   36.40,   0  !   !END!
2345!  X= 620.400,   5195.000,   36.96,   0  !   !END!
2346!  X= 620.400,   5195.050,   37.55,   0  !   !END!
2347!  X= 620.400,   5195.100,   38.50,   0  !   !END!
2348!  X= 620.400,   5195.150,   39.18,   0  !   !END!
2349!  X= 620.400,   5195.200,   41.00,   0  !   !END!
2350!  X= 620.400,   5195.250,   40.69,   0  !   !END!
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2351!  X= 620.400,   5195.300,   39.72,   0  !   !END!
2352!  X= 620.400,   5195.350,   38.86,   0  !   !END!
2353!  X= 620.400,   5195.400,   38.49,   0  !   !END!
2354!  X= 620.400,   5195.450,   38.17,   0  !   !END!
2355!  X= 620.400,   5195.500,   38.96,   0  !   !END!
2356!  X= 620.400,   5195.550,   39.79,   0  !   !END!
2357!  X= 620.400,   5195.600,   40.42,   0  !   !END!
2358!  X= 620.400,   5195.700,   40.73,   0  !   !END!
2359!  X= 620.400,   5195.800,   41.29,   0  !   !END!
2360!  X= 620.400,   5195.900,   43.73,   0  !   !END!
2361!  X= 620.400,   5196.000,   44.18,   0  !   !END!
2362!  X= 620.400,   5196.100,   43.94,   0  !   !END!
2363!  X= 620.400,   5196.200,   44.65,   0  !   !END!
2364!  X= 620.400,   5196.300,   47.88,   0  !   !END!
2365!  X= 620.400,   5196.400,   50.08,   0  !   !END!
2366!  X= 620.400,   5196.500,   52.86,   0  !   !END!
2367!  X= 620.400,   5196.600,   56.34,   0  !   !END!
2368!  X= 620.400,   5196.700,   58.30,   0  !   !END!
2369!  X= 620.400,   5196.800,   60.75,   0  !   !END!
2370!  X= 620.400,   5196.900,   61.35,   0  !   !END!
2371!  X= 620.400,   5197.000,   62.99,   0  !   !END!
2372!  X= 620.400,   5197.100,   63.26,   0  !   !END!
2373!  X= 620.400,   5197.200,   62.64,   0  !   !END!
2374!  X= 620.400,   5197.300,   61.31,   0  !   !END!
2375!  X= 620.400,   5197.400,   59.77,   0  !   !END!
2376!  X= 620.400,   5197.500,   57.50,   0  !   !END!
2377!  X= 620.400,   5197.600,   57.50,   0  !   !END!
2378!  X= 620.400,   5197.700,   57.50,   0  !   !END!
2379!  X= 620.400,   5197.800,   61.06,   0  !   !END!
2380!  X= 620.400,   5197.900,   64.11,   0  !   !END!
2381!  X= 620.400,   5198.000,   67.23,   0  !   !END!
2382!  X= 620.400,   5198.100,   70.66,   0  !   !END!
2383!  X= 620.400,   5198.200,   75.88,   0  !   !END!
2384!  X= 620.400,   5198.300,   78.13,   0  !   !END!
2385!  X= 620.400,   5198.400,   78.65,   0  !   !END!
2386!  X= 620.400,   5198.500,   78.36,   0  !   !END!
2387!  X= 620.400,   5198.600,   76.76,   0  !   !END!
2388!  X= 620.400,   5198.700,   74.09,   0  !   !END!
2389!  X= 620.400,   5198.800,   73.21,   0  !   !END!
2390!  X= 620.400,   5198.900,   73.30,   0  !   !END!
2391!  X= 620.400,   5199.000,   73.99,   0  !   !END!
2392!  X= 620.450,   5194.700,   31.98,   0  !   !END!
2393!  X= 620.450,   5194.750,   33.00,   0  !   !END!
2394!  X= 620.450,   5194.800,   33.79,   0  !   !END!
2395!  X= 620.450,   5194.850,   34.55,   0  !   !END!
2396!  X= 620.450,   5194.900,   35.19,   0  !   !END!
2397!  X= 620.450,   5194.950,   35.90,   0  !   !END!
2398!  X= 620.450,   5195.000,   36.21,   0  !   !END!
2399!  X= 620.450,   5195.050,   36.69,   0  !   !END!
2400!  X= 620.450,   5195.100,   36.91,   0  !   !END!
2401!  X= 620.450,   5195.150,   36.82,   0  !   !END!
2402!  X= 620.450,   5195.200,   38.03,   0  !   !END!
2403!  X= 620.450,   5195.250,   38.38,   0  !   !END!
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2404!  X= 620.450,   5195.300,   36.36,   0  !   !END!
2405!  X= 620.450,   5195.350,   36.32,   0  !   !END!
2406!  X= 620.450,   5195.400,   36.26,   0  !   !END!
2407!  X= 620.450,   5195.450,   36.55,   0  !   !END!
2408!  X= 620.450,   5195.500,   37.51,   0  !   !END!
2409!  X= 620.450,   5195.550,   38.32,   0  !   !END!
2410!  X= 620.450,   5195.600,   39.20,   0  !   !END!
2411!  X= 620.500,   5192.000,   0.00,   0  !   !END!
2412!  X= 620.500,   5192.500,   0.00,   0  !   !END!
2413!  X= 620.500,   5192.600,   0.00,   0  !   !END!
2414!  X= 620.500,   5192.700,   0.00,   0  !   !END!
2415!  X= 620.500,   5192.800,   0.00,   0  !   !END!
2416!  X= 620.500,   5192.900,   0.00,   0  !   !END!
2417!  X= 620.500,   5193.000,   1.76,   0  !   !END!
2418!  X= 620.500,   5193.100,   2.83,   0  !   !END!
2419!  X= 620.500,   5193.200,   3.44,   0  !   !END!
2420!  X= 620.500,   5193.300,   5.15,   0  !   !END!
2421!  X= 620.500,   5193.400,   6.95,   0  !   !END!
2422!  X= 620.500,   5193.500,   8.40,   0  !   !END!
2423!  X= 620.500,   5193.600,   11.32,   0  !   !END!
2424!  X= 620.500,   5193.650,   12.83,   0  !   !END!
2425!  X= 620.500,   5193.700,   13.68,   0  !   !END!
2426!  X= 620.500,   5193.750,   14.07,   0  !   !END!
2427!  X= 620.500,   5193.800,   13.85,   0  !   !END!
2428!  X= 620.500,   5193.850,   13.51,   0  !   !END!
2429!  X= 620.500,   5193.900,   13.86,   0  !   !END!
2430!  X= 620.500,   5193.950,   14.37,   0  !   !END!
2431!  X= 620.500,   5194.000,   14.87,   0  !   !END!
2432!  X= 620.500,   5194.050,   15.41,   0  !   !END!
2433!  X= 620.500,   5194.100,   15.93,   0  !   !END!
2434!  X= 620.500,   5194.150,   16.14,   0  !   !END!
2435!  X= 620.500,   5194.200,   16.53,   0  !   !END!
2436!  X= 620.500,   5194.250,   16.94,   0  !   !END!
2437!  X= 620.500,   5194.300,   17.30,   0  !   !END!
2438!  X= 620.500,   5194.350,   18.80,   0  !   !END!
2439!  X= 620.500,   5194.400,   22.00,   0  !   !END!
2440!  X= 620.500,   5194.450,   24.11,   0  !   !END!
2441!  X= 620.500,   5194.500,   25.38,   0  !   !END!
2442!  X= 620.500,   5194.550,   26.93,   0  !   !END!
2443!  X= 620.500,   5194.600,   28.16,   0  !   !END!
2444!  X= 620.500,   5194.650,   30.28,   0  !   !END!
2445!  X= 620.500,   5194.700,   31.38,   0  !   !END!
2446!  X= 620.500,   5194.750,   32.35,   0  !   !END!
2447!  X= 620.500,   5194.800,   33.09,   0  !   !END!
2448!  X= 620.500,   5194.850,   33.54,   0  !   !END!
2449!  X= 620.500,   5194.900,   34.12,   0  !   !END!
2450!  X= 620.500,   5194.950,   34.84,   0  !   !END!
2451!  X= 620.500,   5195.000,   35.08,   0  !   !END!
2452!  X= 620.500,   5195.050,   35.05,   0  !   !END!
2453!  X= 620.500,   5195.100,   35.07,   0  !   !END!
2454!  X= 620.500,   5195.150,   35.10,   0  !   !END!
2455!  X= 620.500,   5195.200,   35.95,   0  !   !END!
2456!  X= 620.500,   5195.250,   37.00,   0  !   !END!
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2457!  X= 620.500,   5195.300,   35.49,   0  !   !END!
2458!  X= 620.500,   5195.350,   35.88,   0  !   !END!
2459!  X= 620.500,   5195.400,   36.21,   0  !   !END!
2460!  X= 620.500,   5195.450,   36.67,   0  !   !END!
2461!  X= 620.500,   5195.500,   37.40,   0  !   !END!
2462!  X= 620.500,   5195.550,   37.75,   0  !   !END!
2463!  X= 620.500,   5195.600,   38.35,   0  !   !END!
2464!  X= 620.500,   5195.700,   38.77,   0  !   !END!
2465!  X= 620.500,   5195.800,   39.23,   0  !   !END!
2466!  X= 620.500,   5195.900,   39.82,   0  !   !END!
2467!  X= 620.500,   5196.000,   40.50,   0  !   !END!
2468!  X= 620.500,   5196.100,   42.26,   0  !   !END!
2469!  X= 620.500,   5196.200,   41.22,   0  !   !END!
2470!  X= 620.500,   5196.300,   41.73,   0  !   !END!
2471!  X= 620.500,   5196.400,   42.74,   0  !   !END!
2472!  X= 620.500,   5196.500,   47.86,   0  !   !END!
2473!  X= 620.500,   5196.600,   51.39,   0  !   !END!
2474!  X= 620.500,   5196.700,   56.46,   0  !   !END!
2475!  X= 620.500,   5196.800,   60.93,   0  !   !END!
2476!  X= 620.500,   5196.900,   64.33,   0  !   !END!
2477!  X= 620.500,   5197.000,   65.27,   0  !   !END!
2478!  X= 620.500,   5197.100,   65.14,   0  !   !END!
2479!  X= 620.500,   5197.200,   64.34,   0  !   !END!
2480!  X= 620.500,   5197.300,   62.63,   0  !   !END!
2481!  X= 620.500,   5197.400,   60.51,   0  !   !END!
2482!  X= 620.500,   5197.500,   58.93,   0  !   !END!
2483!  X= 620.500,   5197.600,   59.27,   0  !   !END!
2484!  X= 620.500,   5197.700,   59.84,   0  !   !END!
2485!  X= 620.500,   5197.800,   60.60,   0  !   !END!
2486!  X= 620.500,   5197.900,   62.37,   0  !   !END!
2487!  X= 620.500,   5198.000,   64.17,   0  !   !END!
2488!  X= 620.500,   5198.100,   67.76,   0  !   !END!
2489!  X= 620.500,   5198.200,   71.20,   0  !   !END!
2490!  X= 620.500,   5198.300,   75.67,   0  !   !END!
2491!  X= 620.500,   5198.400,   77.22,   0  !   !END!
2492!  X= 620.500,   5198.500,   76.53,   0  !   !END!
2493!  X= 620.500,   5198.600,   73.58,   0  !   !END!
2494!  X= 620.500,   5198.700,   72.10,   0  !   !END!
2495!  X= 620.500,   5198.800,   73.09,   0  !   !END!
2496!  X= 620.500,   5198.900,   73.77,   0  !   !END!
2497!  X= 620.500,   5199.000,   74.89,   0  !   !END!
2498!  X= 620.500,   5199.500,   74.92,   0  !   !END!
2499!  X= 620.500,   5200.000,   88.98,   0  !   !END!
2500!  X= 620.550,   5193.600,   12.01,   0  !   !END!
2501!  X= 620.550,   5193.650,   13.05,   0  !   !END!
2502!  X= 620.550,   5193.700,   13.94,   0  !   !END!
2503!  X= 620.550,   5193.750,   14.28,   0  !   !END!
2504!  X= 620.550,   5193.800,   14.03,   0  !   !END!
2505!  X= 620.550,   5193.850,   14.08,   0  !   !END!
2506!  X= 620.550,   5193.900,   14.19,   0  !   !END!
2507!  X= 620.550,   5193.950,   14.53,   0  !   !END!
2508!  X= 620.550,   5194.000,   15.02,   0  !   !END!
2509!  X= 620.550,   5194.050,   15.77,   0  !   !END!
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2510!  X= 620.550,   5194.100,   16.19,   0  !   !END!
2511!  X= 620.550,   5194.150,   16.78,   0  !   !END!
2512!  X= 620.550,   5194.200,   17.23,   0  !   !END!
2513!  X= 620.550,   5194.250,   17.67,   0  !   !END!
2514!  X= 620.550,   5194.300,   18.04,   0  !   !END!
2515!  X= 620.550,   5194.350,   18.34,   0  !   !END!
2516!  X= 620.550,   5194.400,   19.36,   0  !   !END!
2517!  X= 620.550,   5194.450,   23.10,   0  !   !END!
2518!  X= 620.550,   5194.500,   24.67,   0  !   !END!
2519!  X= 620.550,   5194.550,   26.37,   0  !   !END!
2520!  X= 620.550,   5194.600,   27.71,   0  !   !END!
2521!  X= 620.550,   5194.650,   29.39,   0  !   !END!
2522!  X= 620.550,   5194.700,   30.76,   0  !   !END!
2523!  X= 620.550,   5194.750,   31.57,   0  !   !END!
2524!  X= 620.550,   5194.800,   32.18,   0  !   !END!
2525!  X= 620.550,   5194.850,   32.70,   0  !   !END!
2526!  X= 620.550,   5194.900,   33.02,   0  !   !END!
2527!  X= 620.550,   5194.950,   33.21,   0  !   !END!
2528!  X= 620.550,   5195.000,   33.42,   0  !   !END!
2529!  X= 620.550,   5195.050,   33.57,   0  !   !END!
2530!  X= 620.550,   5195.100,   33.73,   0  !   !END!
2531!  X= 620.550,   5195.150,   33.81,   0  !   !END!
2532!  X= 620.550,   5195.200,   34.18,   0  !   !END!
2533!  X= 620.550,   5195.250,   36.22,   0  !   !END!
2534!  X= 620.550,   5195.300,   35.46,   0  !   !END!
2535!  X= 620.550,   5195.350,   36.19,   0  !   !END!
2536!  X= 620.550,   5195.400,   36.78,   0  !   !END!
2537!  X= 620.550,   5195.450,   37.22,   0  !   !END!
2538!  X= 620.550,   5195.500,   37.36,   0  !   !END!
2539!  X= 620.550,   5195.550,   37.46,   0  !   !END!
2540!  X= 620.550,   5195.600,   37.42,   0  !   !END!
2541!  X= 620.600,   5192.600,   0.00,   0  !   !END!
2542!  X= 620.600,   5192.700,   0.00,   0  !   !END!
2543!  X= 620.600,   5192.800,   0.26,   0  !   !END!
2544!  X= 620.600,   5192.900,   4.36,   0  !   !END!
2545!  X= 620.600,   5193.000,   9.24,   0  !   !END!
2546!  X= 620.600,   5193.100,   7.58,   0  !   !END!
2547!  X= 620.600,   5193.200,   7.65,   0  !   !END!
2548!  X= 620.600,   5193.300,   9.91,   0  !   !END!
2549!  X= 620.600,   5193.400,   12.14,   0  !   !END!
2550!  X= 620.600,   5193.500,   13.39,   0  !   !END!
2551!  X= 620.600,   5193.600,   12.31,   0  !   !END!
2552!  X= 620.600,   5193.650,   13.05,   0  !   !END!
2553!  X= 620.600,   5193.700,   13.74,   0  !   !END!
2554!  X= 620.600,   5193.750,   13.87,   0  !   !END!
2555!  X= 620.600,   5193.800,   14.09,   0  !   !END!
2556!  X= 620.600,   5193.850,   14.32,   0  !   !END!
2557!  X= 620.600,   5193.900,   14.63,   0  !   !END!
2558!  X= 620.600,   5193.950,   15.08,   0  !   !END!
2559!  X= 620.600,   5194.000,   15.67,   0  !   !END!
2560!  X= 620.600,   5194.050,   16.25,   0  !   !END!
2561!  X= 620.600,   5194.100,   17.00,   0  !   !END!
2562!  X= 620.600,   5194.150,   17.34,   0  !   !END!
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2563!  X= 620.600,   5194.200,   17.76,   0  !   !END!
2564!  X= 620.600,   5194.250,   18.16,   0  !   !END!
2565!  X= 620.600,   5194.300,   18.86,   0  !   !END!
2566!  X= 620.600,   5194.350,   19.11,   0  !   !END!
2567!  X= 620.600,   5194.400,   19.45,   0  !   !END!
2568!  X= 620.600,   5194.450,   21.20,   0  !   !END!
2569!  X= 620.600,   5194.500,   24.56,   0  !   !END!
2570!  X= 620.600,   5194.550,   25.96,   0  !   !END!
2571!  X= 620.600,   5194.600,   27.16,   0  !   !END!
2572!  X= 620.600,   5194.650,   28.35,   0  !   !END!
2573!  X= 620.600,   5194.700,   29.36,   0  !   !END!
2574!  X= 620.600,   5194.750,   30.41,   0  !   !END!
2575!  X= 620.600,   5194.800,   31.22,   0  !   !END!
2576!  X= 620.600,   5194.850,   31.79,   0  !   !END!
2577!  X= 620.600,   5194.900,   32.04,   0  !   !END!
2578!  X= 620.600,   5194.950,   32.21,   0  !   !END!
2579!  X= 620.600,   5195.000,   32.33,   0  !   !END!
2580!  X= 620.600,   5195.050,   32.53,   0  !   !END!
2581!  X= 620.600,   5195.100,   32.31,   0  !   !END!
2582!  X= 620.600,   5195.150,   33.10,   0  !   !END!
2583!  X= 620.600,   5195.200,   34.28,   0  !   !END!
2584!  X= 620.600,   5195.250,   36.50,   0  !   !END!
2585!  X= 620.600,   5195.300,   35.98,   0  !   !END!
2586!  X= 620.600,   5195.350,   36.40,   0  !   !END!
2587!  X= 620.600,   5195.400,   36.74,   0  !   !END!
2588!  X= 620.600,   5195.450,   36.87,   0  !   !END!
2589!  X= 620.600,   5195.500,   36.86,   0  !   !END!
2590!  X= 620.600,   5195.550,   36.37,   0  !   !END!
2591!  X= 620.600,   5195.600,   36.14,   0  !   !END!
2592!  X= 620.600,   5195.700,   35.92,   0  !   !END!
2593!  X= 620.600,   5195.800,   36.76,   0  !   !END!
2594!  X= 620.600,   5195.900,   37.92,   0  !   !END!
2595!  X= 620.600,   5196.000,   39.24,   0  !   !END!
2596!  X= 620.600,   5196.100,   40.04,   0  !   !END!
2597!  X= 620.600,   5196.200,   40.26,   0  !   !END!
2598!  X= 620.600,   5196.300,   41.04,   0  !   !END!
2599!  X= 620.600,   5196.400,   43.57,   0  !   !END!
2600!  X= 620.600,   5196.500,   48.35,   0  !   !END!
2601!  X= 620.600,   5196.600,   53.28,   0  !   !END!
2602!  X= 620.600,   5196.700,   56.61,   0  !   !END!
2603!  X= 620.600,   5196.800,   59.72,   0  !   !END!
2604!  X= 620.600,   5196.900,   63.39,   0  !   !END!
2605!  X= 620.600,   5197.000,   65.35,   0  !   !END!
2606!  X= 620.600,   5197.100,   65.47,   0  !   !END!
2607!  X= 620.600,   5197.200,   65.01,   0  !   !END!
2608!  X= 620.600,   5197.300,   63.61,   0  !   !END!
2609!  X= 620.600,   5197.400,   62.37,   0  !   !END!
2610!  X= 620.600,   5197.500,   60.62,   0  !   !END!
2611!  X= 620.600,   5197.600,   59.95,   0  !   !END!
2612!  X= 620.600,   5197.700,   60.04,   0  !   !END!
2613!  X= 620.600,   5197.800,   60.43,   0  !   !END!
2614!  X= 620.600,   5197.900,   61.38,   0  !   !END!
2615!  X= 620.600,   5198.000,   62.78,   0  !   !END!
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2616!  X= 620.600,   5198.100,   64.58,   0  !   !END!
2617!  X= 620.600,   5198.200,   66.94,   0  !   !END!
2618!  X= 620.600,   5198.300,   69.78,   0  !   !END!
2619!  X= 620.600,   5198.400,   70.98,   0  !   !END!
2620!  X= 620.600,   5198.500,   68.84,   0  !   !END!
2621!  X= 620.600,   5198.600,   69.21,   0  !   !END!
2622!  X= 620.600,   5198.700,   71.23,   0  !   !END!
2623!  X= 620.600,   5198.800,   72.42,   0  !   !END!
2624!  X= 620.600,   5198.900,   73.20,   0  !   !END!
2625!  X= 620.600,   5199.000,   73.25,   0  !   !END!
2626!  X= 620.650,   5193.600,   12.66,   0  !   !END!
2627!  X= 620.650,   5193.650,   13.00,   0  !   !END!
2628!  X= 620.650,   5193.700,   13.53,   0  !   !END!
2629!  X= 620.650,   5193.750,   13.93,   0  !   !END!
2630!  X= 620.650,   5193.800,   14.16,   0  !   !END!
2631!  X= 620.650,   5193.850,   14.46,   0  !   !END!
2632!  X= 620.650,   5193.900,   14.86,   0  !   !END!
2633!  X= 620.650,   5193.950,   15.40,   0  !   !END!
2634!  X= 620.650,   5194.000,   16.29,   0  !   !END!
2635!  X= 620.650,   5194.050,   16.84,   0  !   !END!
2636!  X= 620.650,   5194.100,   17.56,   0  !   !END!
2637!  X= 620.650,   5194.150,   18.18,   0  !   !END!
2638!  X= 620.650,   5194.200,   18.72,   0  !   !END!
2639!  X= 620.650,   5194.250,   19.27,   0  !   !END!
2640!  X= 620.650,   5194.300,   19.73,   0  !   !END!
2641!  X= 620.650,   5194.350,   19.57,   0  !   !END!
2642!  X= 620.650,   5194.400,   19.86,   0  !   !END!
2643!  X= 620.650,   5194.450,   20.83,   0  !   !END!
2644!  X= 620.650,   5194.500,   23.05,   0  !   !END!
2645!  X= 620.650,   5194.550,   24.94,   0  !   !END!
2646!  X= 620.650,   5194.600,   26.37,   0  !   !END!
2647!  X= 620.650,   5194.650,   27.44,   0  !   !END!
2648!  X= 620.650,   5194.700,   28.54,   0  !   !END!
2649!  X= 620.650,   5194.750,   29.53,   0  !   !END!
2650!  X= 620.650,   5194.800,   30.47,   0  !   !END!
2651!  X= 620.650,   5194.850,   30.99,   0  !   !END!
2652!  X= 620.650,   5194.900,   31.11,   0  !   !END!
2653!  X= 620.650,   5194.950,   30.42,   0  !   !END!
2654!  X= 620.650,   5195.000,   30.07,   0  !   !END!
2655!  X= 620.650,   5195.050,   30.40,   0  !   !END!
2656!  X= 620.650,   5195.100,   31.36,   0  !   !END!
2657!  X= 620.650,   5195.150,   32.30,   0  !   !END!
2658!  X= 620.650,   5195.200,   32.83,   0  !   !END!
2659!  X= 620.650,   5195.250,   34.95,   0  !   !END!
2660!  X= 620.650,   5195.300,   35.12,   0  !   !END!
2661!  X= 620.650,   5195.350,   34.82,   0  !   !END!
2662!  X= 620.650,   5195.400,   35.26,   0  !   !END!
2663!  X= 620.650,   5195.450,   35.40,   0  !   !END!
2664!  X= 620.650,   5195.500,   34.99,   0  !   !END!
2665!  X= 620.650,   5195.550,   35.16,   0  !   !END!
2666!  X= 620.650,   5195.600,   34.89,   0  !   !END!
2667!  X= 620.700,   5192.600,   0.00,    0  !   !END!
2668!  X= 620.700,   5192.700,   6.32,    0  !   !END!
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2669!  X= 620.700,   5192.800,   16.71,   0  !   !END!
2670!  X= 620.700,   5192.900,   17.59,   0  !   !END!
2671!  X= 620.700,   5193.000,   17.40,   0  !   !END!
2672!  X= 620.700,   5193.100,   14.70,   0  !   !END!
2673!  X= 620.700,   5193.200,   14.03,   0  !   !END!
2674!  X= 620.700,   5193.300,   14.78,   0  !   !END!
2675!  X= 620.700,   5193.400,   14.77,   0  !   !END!
2676!  X= 620.700,   5193.500,   13.83,   0  !   !END!
2677!  X= 620.700,   5193.600,   12.99,   0  !   !END!
2678!  X= 620.700,   5193.650,   13.07,   0  !   !END!
2679!  X= 620.700,   5193.700,   13.44,   0  !   !END!
2680!  X= 620.700,   5193.750,   13.78,   0  !   !END!
2681!  X= 620.700,   5193.800,   14.21,   0  !   !END!
2682!  X= 620.700,   5193.850,   14.73,   0  !   !END!
2683!  X= 620.700,   5193.900,   15.30,   0  !   !END!
2684!  X= 620.700,   5193.950,   16.08,   0  !   !END!
2685!  X= 620.700,   5194.000,   16.88,   0  !   !END!
2686!  X= 620.700,   5194.050,   17.77,   0  !   !END!
2687!  X= 620.700,   5194.100,   18.19,   0  !   !END!
2688!  X= 620.700,   5194.150,   20.35,   0  !   !END!
2689!  X= 620.700,   5194.200,   21.58,   0  !   !END!
2690!  X= 620.700,   5194.250,   22.26,   0  !   !END!
2691!  X= 620.700,   5194.300,   20.63,   0  !   !END!
2692!  X= 620.700,   5194.350,   20.58,   0  !   !END!
2693!  X= 620.700,   5194.400,   20.65,   0  !   !END!
2694!  X= 620.700,   5194.450,   21.11,   0  !   !END!
2695!  X= 620.700,   5194.500,   23.11,   0  !   !END!
2696!  X= 620.700,   5194.550,   24.47,   0  !   !END!
2697!  X= 620.700,   5194.600,   26.37,   0  !   !END!
2698!  X= 620.700,   5194.650,   27.01,   0  !   !END!
2699!  X= 620.700,   5194.700,   28.03,   0  !   !END!
2700!  X= 620.700,   5194.750,   28.61,   0  !   !END!
2701!  X= 620.700,   5194.800,   28.78,   0  !   !END!
2702!  X= 620.700,   5194.850,   28.39,   0  !   !END!
2703!  X= 620.700,   5194.900,   27.95,   0  !   !END!
2704!  X= 620.700,   5194.950,   27.82,   0  !   !END!
2705!  X= 620.700,   5195.000,   28.70,   0  !   !END!
2706!  X= 620.700,   5195.050,   29.00,   0  !   !END!
2707!  X= 620.700,   5195.100,   29.48,   0  !   !END!
2708!  X= 620.700,   5195.150,   30.20,   0  !   !END!
2709!  X= 620.700,   5195.200,   30.80,   0  !   !END!
2710!  X= 620.700,   5195.250,   34.00,   0  !   !END!
2711!  X= 620.700,   5195.300,   36.58,   0  !   !END!
2712!  X= 620.700,   5195.350,   33.29,   0  !   !END!
2713!  X= 620.700,   5195.400,   33.29,   0  !   !END!
2714!  X= 620.700,   5195.450,   33.63,   0  !   !END!
2715!  X= 620.700,   5195.500,   34.16,   0  !   !END!
2716!  X= 620.700,   5195.550,   34.26,   0  !   !END!
2717!  X= 620.700,   5195.600,   34.40,   0  !   !END!
2718!  X= 620.700,   5195.700,   35.04,   0  !   !END!
2719!  X= 620.700,   5195.800,   36.18,   0  !   !END!
2720!  X= 620.700,   5195.900,   37.17,   0  !   !END!
2721!  X= 620.700,   5196.000,   38.23,   0  !   !END!
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2722!  X= 620.700,   5196.100,   39.28,   0  !   !END!
2723!  X= 620.700,   5196.200,   40.75,   0  !   !END!
2724!  X= 620.700,   5196.300,   40.82,   0  !   !END!
2725!  X= 620.700,   5196.400,   44.60,   0  !   !END!
2726!  X= 620.700,   5196.500,   48.39,   0  !   !END!
2727!  X= 620.700,   5196.600,   51.53,   0  !   !END!
2728!  X= 620.700,   5196.700,   54.57,   0  !   !END!
2729!  X= 620.700,   5196.800,   57.53,   0  !   !END!
2730!  X= 620.700,   5196.900,   60.32,   0  !   !END!
2731!  X= 620.700,   5197.000,   62.41,   0  !   !END!
2732!  X= 620.700,   5197.100,   64.72,   0  !   !END!
2733!  X= 620.700,   5197.200,   66.39,   0  !   !END!
2734!  X= 620.700,   5197.300,   66.63,   0  !   !END!
2735!  X= 620.700,   5197.400,   65.42,   0  !   !END!
2736!  X= 620.700,   5197.500,   62.61,   0  !   !END!
2737!  X= 620.700,   5197.600,   61.01,   0  !   !END!
2738!  X= 620.700,   5197.700,   60.50,   0  !   !END!
2739!  X= 620.700,   5197.800,   60.64,   0  !   !END!
2740!  X= 620.700,   5197.900,   61.02,   0  !   !END!
2741!  X= 620.700,   5198.000,   61.71,   0  !   !END!
2742!  X= 620.700,   5198.100,   62.47,   0  !   !END!
2743!  X= 620.700,   5198.200,   63.49,   0  !   !END!
2744!  X= 620.700,   5198.300,   64.46,   0  !   !END!
2745!  X= 620.700,   5198.400,   65.18,   0  !   !END!
2746!  X= 620.700,   5198.500,   66.49,   0  !   !END!
2747!  X= 620.700,   5198.600,   67.76,   0  !   !END!
2748!  X= 620.700,   5198.700,   68.76,   0  !   !END!
2749!  X= 620.700,   5198.800,   68.90,   0  !   !END!
2750!  X= 620.700,   5198.900,   68.95,   0  !   !END!
2751!  X= 620.700,   5199.000,   68.69,   0  !   !END!
2752!  X= 620.750,   5193.600,   13.10,   0  !   !END!
2753!  X= 620.750,   5193.650,   13.19,   0  !   !END!
2754!  X= 620.750,   5193.700,   13.57,   0  !   !END!
2755!  X= 620.750,   5193.750,   13.92,   0  !   !END!
2756!  X= 620.750,   5193.800,   14.70,   0  !   !END!
2757!  X= 620.750,   5193.850,   15.69,   0  !   !END!
2758!  X= 620.750,   5193.900,   16.50,   0  !   !END!
2759!  X= 620.750,   5193.950,   16.49,   0  !   !END!
2760!  X= 620.750,   5194.000,   17.92,   0  !   !END!
2761!  X= 620.750,   5194.050,   19.76,   0  !   !END!
2762!  X= 620.750,   5194.100,   20.03,   0  !   !END!
2763!  X= 620.750,   5194.150,   20.81,   0  !   !END!
2764!  X= 620.750,   5194.200,   21.59,   0  !   !END!
2765!  X= 620.750,   5194.250,   24.75,   0  !   !END!
2766!  X= 620.750,   5194.300,   23.52,   0  !   !END!
2767!  X= 620.750,   5194.350,   23.22,   0  !   !END!
2768!  X= 620.750,   5194.400,   22.84,   0  !   !END!
2769!  X= 620.750,   5194.450,   22.38,   0  !   !END!
2770!  X= 620.750,   5194.500,   22.25,   0  !   !END!
2771!  X= 620.750,   5194.550,   23.67,   0  !   !END!
2772!  X= 620.750,   5194.600,   24.79,   0  !   !END!
2773!  X= 620.750,   5194.650,   25.24,   0  !   !END!
2774!  X= 620.750,   5194.700,   25.02,   0  !   !END!
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2775!  X= 620.750,   5194.750,   25.33,   0  !   !END!
2776!  X= 620.750,   5194.800,   26.05,   0  !   !END!
2777!  X= 620.750,   5194.850,   26.46,   0  !   !END!
2778!  X= 620.750,   5194.900,   26.72,   0  !   !END!
2779!  X= 620.750,   5194.950,   27.40,   0  !   !END!
2780!  X= 620.750,   5195.000,   27.97,   0  !   !END!
2781!  X= 620.750,   5195.050,   28.46,   0  !   !END!
2782!  X= 620.750,   5195.100,   29.83,   0  !   !END!
2783!  X= 620.750,   5195.150,   30.75,   0  !   !END!
2784!  X= 620.750,   5195.200,   31.19,   0  !   !END!
2785!  X= 620.750,   5195.250,   32.98,   0  !   !END!
2786!  X= 620.750,   5195.300,   33.21,   0  !   !END!
2787!  X= 620.750,   5195.350,   32.75,   0  !   !END!
2788!  X= 620.750,   5195.400,   33.17,   0  !   !END!
2789!  X= 620.750,   5195.450,   33.52,   0  !   !END!
2790!  X= 620.750,   5195.500,   33.80,   0  !   !END!
2791!  X= 620.750,   5195.550,   34.20,   0  !   !END!
2792!  X= 620.750,   5195.600,   34.54,   0  !   !END!
2793!  X= 620.800,   5192.600,   3.32,   0  !   !END!
2794!  X= 620.800,   5192.700,   18.75,   0  !   !END!
2795!  X= 620.800,   5192.800,   23.91,   0  !   !END!
2796!  X= 620.800,   5192.900,   24.48,   0  !   !END!
2797!  X= 620.800,   5193.000,   23.36,   0  !   !END!
2798!  X= 620.800,   5193.100,   22.05,   0  !   !END!
2799!  X= 620.800,   5193.200,   19.20,   0  !   !END!
2800!  X= 620.800,   5193.300,   16.42,   0  !   !END!
2801!  X= 620.800,   5193.400,   15.03,   0  !   !END!
2802!  X= 620.800,   5193.500,   14.00,   0  !   !END!
2803!  X= 620.800,   5193.600,   13.37,   0  !   !END!
2804!  X= 620.800,   5193.650,   13.55,   0  !   !END!
2805!  X= 620.800,   5193.700,   14.08,   0  !   !END!
2806!  X= 620.800,   5193.750,   15.03,   0  !   !END!
2807!  X= 620.800,   5193.800,   16.78,   0  !   !END!
2808!  X= 620.800,   5193.850,   18.00,   0  !   !END!
2809!  X= 620.800,   5193.900,   19.69,   0  !   !END!
2810!  X= 620.800,   5193.950,   18.34,   0  !   !END!
2811!  X= 620.800,   5194.000,   20.33,   0  !   !END!
2812!  X= 620.800,   5194.050,   21.87,   0  !   !END!
2813!  X= 620.800,   5194.100,   23.23,   0  !   !END!
2814!  X= 620.800,   5194.150,   25.68,   0  !   !END!
2815!  X= 620.800,   5194.200,   27.64,   0  !   !END!
2816!  X= 620.800,   5194.250,   28.44,   0  !   !END!
2817!  X= 620.800,   5194.300,   28.52,   0  !   !END!
2818!  X= 620.800,   5194.350,   27.38,   0  !   !END!
2819!  X= 620.800,   5194.400,   27.17,   0  !   !END!
2820!  X= 620.800,   5194.450,   25.47,   0  !   !END!
2821!  X= 620.800,   5194.500,   23.38,   0  !   !END!
2822!  X= 620.800,   5194.550,   23.26,   0  !   !END!
2823!  X= 620.800,   5194.600,   23.51,   0  !   !END!
2824!  X= 620.800,   5194.650,   24.14,   0  !   !END!
2825!  X= 620.800,   5194.700,   24.85,   0  !   !END!
2826!  X= 620.800,   5194.750,   25.73,   0  !   !END!
2827!  X= 620.800,   5194.800,   25.99,   0  !   !END!
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2828!  X= 620.800,   5194.850,   26.43,   0  !   !END!
2829!  X= 620.800,   5194.900,   27.22,   0  !   !END!
2830!  X= 620.800,   5194.950,   28.32,   0  !   !END!
2831!  X= 620.800,   5195.000,   28.42,   0  !   !END!
2832!  X= 620.800,   5195.050,   29.63,   0  !   !END!
2833!  X= 620.800,   5195.100,   31.67,   0  !   !END!
2834!  X= 620.800,   5195.150,   34.09,   0  !   !END!
2835!  X= 620.800,   5195.200,   33.52,   0  !   !END!
2836!  X= 620.800,   5195.250,   34.96,   0  !   !END!
2837!  X= 620.800,   5195.300,   38.00,   0  !   !END!
2838!  X= 620.800,   5195.350,   33.91,   0  !   !END!
2839!  X= 620.800,   5195.400,   33.81,   0  !   !END!
2840!  X= 620.800,   5195.450,   34.67,   0  !   !END!
2841!  X= 620.800,   5195.500,   35.34,   0  !   !END!
2842!  X= 620.800,   5195.550,   35.79,   0  !   !END!
2843!  X= 620.800,   5195.600,   36.12,   0  !   !END!
2844!  X= 620.800,   5195.700,   37.27,   0  !   !END!
2845!  X= 620.800,   5195.800,   37.75,   0  !   !END!
2846!  X= 620.800,   5195.900,   37.94,   0  !   !END!
2847!  X= 620.800,   5196.000,   39.20,   0  !   !END!
2848!  X= 620.800,   5196.100,   40.40,   0  !   !END!
2849!  X= 620.800,   5196.200,   41.36,   0  !   !END!
2850!  X= 620.800,   5196.300,   45.00,   0  !   !END!
2851!  X= 620.800,   5196.400,   45.01,   0  !   !END!
2852!  X= 620.800,   5196.500,   45.66,   0  !   !END!
2853!  X= 620.800,   5196.600,   47.52,   0  !   !END!
2854!  X= 620.800,   5196.700,   50.26,   0  !   !END!
2855!  X= 620.800,   5196.800,   53.80,   0  !   !END!
2856!  X= 620.800,   5196.900,   57.92,   0  !   !END!
2857!  X= 620.800,   5197.000,   61.22,   0  !   !END!
2858!  X= 620.800,   5197.100,   64.38,   0  !   !END!
2859!  X= 620.800,   5197.200,   65.96,   0  !   !END!
2860!  X= 620.800,   5197.300,   68.18,   0  !   !END!
2861!  X= 620.800,   5197.400,   67.54,   0  !   !END!
2862!  X= 620.800,   5197.500,   64.72,   0  !   !END!
2863!  X= 620.800,   5197.600,   62.40,   0  !   !END!
2864!  X= 620.800,   5197.700,   61.28,   0  !   !END!
2865!  X= 620.800,   5197.800,   61.53,   0  !   !END!
2866!  X= 620.800,   5197.900,   61.52,   0  !   !END!
2867!  X= 620.800,   5198.000,   61.88,   0  !   !END!
2868!  X= 620.800,   5198.100,   62.45,   0  !   !END!
2869!  X= 620.800,   5198.200,   63.25,   0  !   !END!
2870!  X= 620.800,   5198.300,   63.87,   0  !   !END!
2871!  X= 620.800,   5198.400,   64.59,   0  !   !END!
2872!  X= 620.800,   5198.500,   65.46,   0  !   !END!
2873!  X= 620.800,   5198.600,   66.27,   0  !   !END!
2874!  X= 620.800,   5198.700,   67.26,   0  !   !END!
2875!  X= 620.800,   5198.800,   67.95,   0  !   !END!
2876!  X= 620.800,   5198.900,   69.32,   0  !   !END!
2877!  X= 620.800,   5199.000,   72.14,   0  !   !END!
2878!  X= 620.850,   5193.600,   14.41,   0  !   !END!
2879!  X= 620.850,   5193.650,   14.71,   0  !   !END!
2880!  X= 620.850,   5193.700,   16.37,   0  !   !END!
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2881!  X= 620.850,   5193.750,   17.83,   0  !   !END!
2882!  X= 620.850,   5193.800,   19.89,   0  !   !END!
2883!  X= 620.850,   5193.850,   22.23,   0  !   !END!
2884!  X= 620.850,   5193.900,   23.58,   0  !   !END!
2885!  X= 620.850,   5193.950,   22.87,   0  !   !END!
2886!  X= 620.850,   5194.000,   24.79,   0  !   !END!
2887!  X= 620.850,   5194.050,   26.16,   0  !   !END!
2888!  X= 620.850,   5194.100,   27.85,   0  !   !END!
2889!  X= 620.850,   5194.150,   31.29,   0  !   !END!
2890!  X= 620.850,   5194.200,   33.08,   0  !   !END!
2891!  X= 620.850,   5194.250,   32.53,   0  !   !END!
2892!  X= 620.850,   5194.300,   31.72,   0  !   !END!
2893!  X= 620.850,   5194.350,   31.35,   0  !   !END!
2894!  X= 620.850,   5194.400,   29.03,   0  !   !END!
2895!  X= 620.850,   5194.450,   26.88,   0  !   !END!
2896!  X= 620.850,   5194.500,   24.96,   0  !   !END!
2897!  X= 620.850,   5194.550,   27.00,   0  !   !END!
2898!  X= 620.850,   5194.600,   25.58,   0  !   !END!
2899!  X= 620.850,   5194.650,   25.63,   0  !   !END!
2900!  X= 620.850,   5194.700,   27.00,   0  !   !END!
2901!  X= 620.850,   5194.750,   25.91,   0  !   !END!
2902!  X= 620.850,   5194.800,   26.66,   0  !   !END!
2903!  X= 620.850,   5194.850,   27.30,   0  !   !END!
2904!  X= 620.850,   5194.900,   28.22,   0  !   !END!
2905!  X= 620.850,   5194.950,   29.03,   0  !   !END!
2906!  X= 620.850,   5195.000,   31.07,   0  !   !END!
2907!  X= 620.850,   5195.050,   31.74,   0  !   !END!
2908!  X= 620.850,   5195.100,   33.87,   0  !   !END!
2909!  X= 620.850,   5195.150,   34.89,   0  !   !END!
2910!  X= 620.850,   5195.200,   34.44,   0  !   !END!
2911!  X= 620.850,   5195.250,   35.12,   0  !   !END!
2912!  X= 620.850,   5195.300,   35.19,   0  !   !END!
2913!  X= 620.850,   5195.350,   37.52,   0  !   !END!
2914!  X= 620.850,   5195.400,   35.94,   0  !   !END!
2915!  X= 620.850,   5195.450,   37.76,   0  !   !END!
2916!  X= 620.850,   5195.500,   37.20,   0  !   !END!
2917!  X= 620.850,   5195.550,   37.42,   0  !   !END!
2918!  X= 620.850,   5195.600,   37.66,   0  !   !END!
2919!  X= 620.900,   5192.600,   23.09,   0  !   !END!
2920!  X= 620.900,   5192.700,   31.19,   0  !   !END!
2921!  X= 620.900,   5192.800,   31.06,   0  !   !END!
2922!  X= 620.900,   5192.900,   30.96,   0  !   !END!
2923!  X= 620.900,   5193.000,   28.95,   0  !   !END!
2924!  X= 620.900,   5193.100,   26.48,   0  !   !END!
2925!  X= 620.900,   5193.200,   22.71,   0  !   !END!
2926!  X= 620.900,   5193.300,   19.78,   0  !   !END!
2927!  X= 620.900,   5193.400,   15.91,   0  !   !END!
2928!  X= 620.900,   5193.500,   15.45,   0  !   !END!
2929!  X= 620.900,   5193.600,   17.25,   0  !   !END!
2930!  X= 620.900,   5193.650,   18.75,   0  !   !END!
2931!  X= 620.900,   5193.700,   19.90,   0  !   !END!
2932!  X= 620.900,   5193.750,   21.99,   0  !   !END!
2933!  X= 620.900,   5193.800,   24.66,   0  !   !END!
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2934!  X= 620.900,   5193.850,   27.51,   0  !   !END!
2935!  X= 620.900,   5193.900,   29.22,   0  !   !END!
2936!  X= 620.900,   5193.950,   28.16,   0  !   !END!
2937!  X= 620.900,   5194.000,   29.91,   0  !   !END!
2938!  X= 620.900,   5194.050,   31.72,   0  !   !END!
2939!  X= 620.900,   5194.100,   33.15,   0  !   !END!
2940!  X= 620.900,   5194.150,   34.87,   0  !   !END!
2941!  X= 620.900,   5194.200,   35.79,   0  !   !END!
2942!  X= 620.900,   5194.250,   34.41,   0  !   !END!
2943!  X= 620.900,   5194.300,   34.17,   0  !   !END!
2944!  X= 620.900,   5194.350,   32.32,   0  !   !END!
2945!  X= 620.900,   5194.400,   29.38,   0  !   !END!
2946!  X= 620.900,   5194.450,   26.49,   0  !   !END!
2947!  X= 620.900,   5194.500,   26.00,   0  !   !END!
2948!  X= 620.900,   5194.550,   25.12,   0  !   !END!
2949!  X= 620.900,   5194.600,   26.00,   0  !   !END!
2950!  X= 620.900,   5194.650,   27.00,   0  !   !END!
2951!  X= 620.900,   5194.700,   28.00,   0  !   !END!
2952!  X= 620.900,   5194.750,   28.00,   0  !   !END!
2953!  X= 620.900,   5194.800,   27.69,   0  !   !END!
2954!  X= 620.900,   5194.850,   28.21,   0  !   !END!
2955!  X= 620.900,   5194.900,   29.11,   0  !   !END!
2956!  X= 620.900,   5194.950,   30.36,   0  !   !END!
2957!  X= 620.900,   5195.000,   31.92,   0  !   !END!
2958!  X= 620.900,   5195.050,   33.29,   0  !   !END!
2959!  X= 620.900,   5195.100,   34.58,   0  !   !END!
2960!  X= 620.900,   5195.150,   35.00,   0  !   !END!
2961!  X= 620.900,   5195.200,   34.71,   0  !   !END!
2962!  X= 620.900,   5195.250,   34.64,   0  !   !END!
2963!  X= 620.900,   5195.300,   40.00,   0  !   !END!
2964!  X= 620.900,   5195.350,   42.69,   0  !   !END!
2965!  X= 620.900,   5195.400,   38.36,   0  !   !END!
2966!  X= 620.900,   5195.450,   39.04,   0  !   !END!
2967!  X= 620.900,   5195.500,   39.04,   0  !   !END!
2968!  X= 620.900,   5195.550,   39.08,   0  !   !END!
2969!  X= 620.900,   5195.600,   38.87,   0  !   !END!
2970!  X= 620.900,   5195.700,   38.89,   0  !   !END!
2971!  X= 620.900,   5195.800,   39.72,   0  !   !END!
2972!  X= 620.900,   5195.900,   40.21,   0  !   !END!
2973!  X= 620.900,   5196.000,   40.48,   0  !   !END!
2974!  X= 620.900,   5196.100,   40.89,   0  !   !END!
2975!  X= 620.900,   5196.200,   41.36,   0  !   !END!
2976!  X= 620.900,   5196.300,   42.08,   0  !   !END!
2977!  X= 620.900,   5196.400,   43.60,   0  !   !END!
2978!  X= 620.900,   5196.500,   44.70,   0  !   !END!
2979!  X= 620.900,   5196.600,   46.40,   0  !   !END!
2980!  X= 620.900,   5196.700,   48.52,   0  !   !END!
2981!  X= 620.900,   5196.800,   51.77,   0  !   !END!
2982!  X= 620.900,   5196.900,   54.73,   0  !   !END!
2983!  X= 620.900,   5197.000,   58.71,   0  !   !END!
2984!  X= 620.900,   5197.100,   62.27,   0  !   !END!
2985!  X= 620.900,   5197.200,   67.01,   0  !   !END!
2986!  X= 620.900,   5197.300,   68.84,   0  !   !END!
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2987!  X= 620.900,   5197.400,   68.06,   0  !   !END!
2988!  X= 620.900,   5197.500,   67.06,   0  !   !END!
2989!  X= 620.900,   5197.600,   66.71,   0  !   !END!
2990!  X= 620.900,   5197.700,   64.48,   0  !   !END!
2991!  X= 620.900,   5197.800,   65.45,   0  !   !END!
2992!  X= 620.900,   5197.900,   66.90,   0  !   !END!
2993!  X= 620.900,   5198.000,   67.62,   0  !   !END!
2994!  X= 620.900,   5198.100,   67.49,   0  !   !END!
2995!  X= 620.900,   5198.200,   66.53,   0  !   !END!
2996!  X= 620.900,   5198.300,   66.14,   0  !   !END!
2997!  X= 620.900,   5198.400,   65.64,   0  !   !END!
2998!  X= 620.900,   5198.500,   66.07,   0  !   !END!
2999!  X= 620.900,   5198.600,   67.31,   0  !   !END!
3000!  X= 620.900,   5198.700,   69.59,   0  !   !END!
3001!  X= 620.900,   5198.800,   71.57,   0  !   !END!
3002!  X= 620.900,   5198.900,   74.09,   0  !   !END!
3003!  X= 620.900,   5199.000,   76.16,   0  !   !END!
3004!  X= 620.950,   5193.600,   20.00,   0  !   !END!
3005!  X= 620.950,   5193.650,   21.37,   0  !   !END!
3006!  X= 620.950,   5193.700,   23.86,   0  !   !END!
3007!  X= 620.950,   5193.750,   27.16,   0  !   !END!
3008!  X= 620.950,   5193.800,   29.86,   0  !   !END!
3009!  X= 620.950,   5193.850,   33.99,   0  !   !END!
3010!  X= 620.950,   5193.900,   35.12,   0  !   !END!
3011!  X= 620.950,   5193.950,   34.64,   0  !   !END!
3012!  X= 620.950,   5194.000,   36.01,   0  !   !END!
3013!  X= 620.950,   5194.050,   36.79,   0  !   !END!
3014!  X= 620.950,   5194.100,   36.44,   0  !   !END!
3015!  X= 620.950,   5194.150,   36.74,   0  !   !END!
3016!  X= 620.950,   5194.200,   36.23,   0  !   !END!
3017!  X= 620.950,   5194.250,   35.01,   0  !   !END!
3018!  X= 620.950,   5194.300,   34.83,   0  !   !END!
3019!  X= 620.950,   5194.350,   32.90,   0  !   !END!
3020!  X= 620.950,   5194.400,   28.80,   0  !   !END!
3021!  X= 620.950,   5194.450,   26.31,   0  !   !END!
3022!  X= 620.950,   5194.500,   26.08,   0  !   !END!
3023!  X= 620.950,   5194.550,   25.81,   0  !   !END!
3024!  X= 620.950,   5194.600,   26.14,   0  !   !END!
3025!  X= 620.950,   5194.650,   27.00,   0  !   !END!
3026!  X= 620.950,   5194.700,   27.17,   0  !   !END!
3027!  X= 620.950,   5194.750,   28.05,   0  !   !END!
3028!  X= 620.950,   5194.800,   29.19,   0  !   !END!
3029!  X= 620.950,   5194.850,   29.51,   0  !   !END!
3030!  X= 620.950,   5194.900,   30.57,   0  !   !END!
3031!  X= 620.950,   5194.950,   31.79,   0  !   !END!
3032!  X= 620.950,   5195.000,   33.04,   0  !   !END!
3033!  X= 620.950,   5195.050,   33.98,   0  !   !END!
3034!  X= 620.950,   5195.100,   34.85,   0  !   !END!
3035!  X= 620.950,   5195.150,   34.86,   0  !   !END!
3036!  X= 620.950,   5195.200,   35.80,   0  !   !END!
3037!  X= 620.950,   5195.250,   38.11,   0  !   !END!
3038!  X= 620.950,   5195.300,   40.40,   0  !   !END!
3039!  X= 620.950,   5195.350,   43.00,   0  !   !END!
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3040!  X= 620.950,   5195.400,   39.32,   0  !   !END!
3041!  X= 620.950,   5195.450,   39.49,   0  !   !END!
3042!  X= 620.950,   5195.500,   39.74,   0  !   !END!
3043!  X= 620.950,   5195.550,   39.80,   0  !   !END!
3044!  X= 620.950,   5195.600,   39.86,   0  !   !END!
3045!  X= 621.000,   5192.000,   0.00,   0  !   !END!
3046!  X= 621.000,   5192.500,   18.36,   0  !   !END!
3047!  X= 621.000,   5192.600,   36.85,   0  !   !END!
3048!  X= 621.000,   5192.700,   37.33,   0  !   !END!
3049!  X= 621.000,   5192.800,   35.78,   0  !   !END!
3050!  X= 621.000,   5192.900,   33.23,   0  !   !END!
3051!  X= 621.000,   5193.000,   31.33,   0  !   !END!
3052!  X= 621.000,   5193.100,   29.32,   0  !   !END!
3053!  X= 621.000,   5193.200,   27.03,   0  !   !END!
3054!  X= 621.000,   5193.300,   25.75,   0  !   !END!
3055!  X= 621.000,   5193.400,   21.94,   0  !   !END!
3056!  X= 621.000,   5193.500,   20.40,   0  !   !END!
3057!  X= 621.000,   5193.600,   23.05,   0  !   !END!
3058!  X= 621.000,   5193.650,   24.92,   0  !   !END!
3059!  X= 621.000,   5193.700,   28.24,   0  !   !END!
3060!  X= 621.000,   5193.750,   31.41,   0  !   !END!
3061!  X= 621.000,   5193.800,   33.61,   0  !   !END!
3062!  X= 621.000,   5193.850,   35.56,   0  !   !END!
3063!  X= 621.000,   5193.900,   39.50,   0  !   !END!
3064!  X= 621.000,   5193.950,   39.12,   0  !   !END!
3065!  X= 621.000,   5194.000,   40.31,   0  !   !END!
3066!  X= 621.000,   5194.050,   41.12,   0  !   !END!
3067!  X= 621.000,   5194.100,   38.75,   0  !   !END!
3068!  X= 621.000,   5194.150,   37.74,   0  !   !END!
3069!  X= 621.000,   5194.200,   35.81,   0  !   !END!
3070!  X= 621.000,   5194.250,   33.60,   0  !   !END!
3071!  X= 621.000,   5194.300,   33.83,   0  !   !END!
3072!  X= 621.000,   5194.350,   32.01,   0  !   !END!
3073!  X= 621.000,   5194.400,   29.19,   0  !   !END!
3074!  X= 621.000,   5194.450,   26.81,   0  !   !END!
3075!  X= 621.000,   5194.500,   26.00,   0  !   !END!
3076!  X= 621.000,   5194.550,   26.61,   0  !   !END!
3077!  X= 621.000,   5194.600,   26.53,   0  !   !END!
3078!  X= 621.000,   5194.650,   27.55,   0  !   !END!
3079!  X= 621.000,   5194.700,   28.61,   0  !   !END!
3080!  X= 621.000,   5194.750,   29.81,   0  !   !END!
3081!  X= 621.000,   5194.800,   31.00,   0  !   !END!
3082!  X= 621.000,   5194.850,   31.84,   0  !   !END!
3083!  X= 621.000,   5194.900,   31.63,   0  !   !END!
3084!  X= 621.000,   5194.950,   32.62,   0  !   !END!
3085!  X= 621.000,   5195.000,   33.71,   0  !   !END!
3086!  X= 621.000,   5195.050,   34.06,   0  !   !END!
3087!  X= 621.000,   5195.100,   34.78,   0  !   !END!
3088!  X= 621.000,   5195.150,   35.17,   0  !   !END!
3089!  X= 621.000,   5195.200,   37.22,   0  !   !END!
3090!  X= 621.000,   5195.250,   37.79,   0  !   !END!
3091!  X= 621.000,   5195.300,   40.84,   0  !   !END!
3092!  X= 621.000,   5195.350,   44.00,   0  !   !END!
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3093!  X= 621.000,   5195.400,   39.64,   0  !   !END!
3094!  X= 621.000,   5195.450,   39.82,   0  !   !END!
3095!  X= 621.000,   5195.500,   40.13,   0  !   !END!
3096!  X= 621.000,   5195.550,   40.42,   0  !   !END!
3097!  X= 621.000,   5195.600,   40.62,   0  !   !END!
3098!  X= 621.000,   5195.700,   41.08,   0  !   !END!
3099!  X= 621.000,   5195.800,   41.45,   0  !   !END!
3100!  X= 621.000,   5195.900,   41.63,   0  !   !END!
3101!  X= 621.000,   5196.000,   41.55,   0  !   !END!
3102!  X= 621.000,   5196.100,   41.49,   0  !   !END!
3103!  X= 621.000,   5196.200,   41.73,   0  !   !END!
3104!  X= 621.000,   5196.300,   42.24,   0  !   !END!
3105!  X= 621.000,   5196.400,   44.90,   0  !   !END!
3106!  X= 621.000,   5196.500,   45.03,   0  !   !END!
3107!  X= 621.000,   5196.600,   47.60,   0  !   !END!
3108!  X= 621.000,   5196.700,   49.90,   0  !   !END!
3109!  X= 621.000,   5196.800,   52.84,   0  !   !END!
3110!  X= 621.000,   5196.900,   56.66,   0  !   !END!
3111!  X= 621.000,   5197.000,   60.78,   0  !   !END!
3112!  X= 621.000,   5197.100,   63.99,   0  !   !END!
3113!  X= 621.000,   5197.200,   67.68,   0  !   !END!
3114!  X= 621.000,   5197.300,   71.55,   0  !   !END!
3115!  X= 621.000,   5197.400,   73.07,   0  !   !END!
3116!  X= 621.000,   5197.500,   72.92,   0  !   !END!
3117!  X= 621.000,   5197.600,   73.77,   0  !   !END!
3118!  X= 621.000,   5197.700,   72.19,   0  !   !END!
3119!  X= 621.000,   5197.800,   72.03,   0  !   !END!
3120!  X= 621.000,   5197.900,   72.08,   0  !   !END!
3121!  X= 621.000,   5198.000,   71.36,   0  !   !END!
3122!  X= 621.000,   5198.100,   71.08,   0  !   !END!
3123!  X= 621.000,   5198.200,   69.14,   0  !   !END!
3124!  X= 621.000,   5198.300,   67.22,   0  !   !END!
3125!  X= 621.000,   5198.400,   66.22,   0  !   !END!
3126!  X= 621.000,   5198.500,   66.95,   0  !   !END!
3127!  X= 621.000,   5198.600,   69.76,   0  !   !END!
3128!  X= 621.000,   5198.700,   72.20,   0  !   !END!
3129!  X= 621.000,   5198.800,   74.10,   0  !   !END!
3130!  X= 621.000,   5198.900,   76.24,   0  !   !END!
3131!  X= 621.000,   5199.000,   77.70,   0  !   !END!
3132!  X= 621.000,   5199.500,   76.76,   0  !   !END!
3133!  X= 621.000,   5200.000,   120.46,   0  !   !END!
3134!  X= 621.050,   5193.600,   27.15,   0  !   !END!
3135!  X= 621.050,   5193.650,   29.88,   0  !   !END!
3136!  X= 621.050,   5193.700,   33.82,   0  !   !END!
3137!  X= 621.050,   5193.750,   37.30,   0  !   !END!
3138!  X= 621.050,   5193.800,   40.49,   0  !   !END!
3139!  X= 621.050,   5193.850,   42.26,   0  !   !END!
3140!  X= 621.050,   5193.900,   43.49,   0  !   !END!
3141!  X= 621.050,   5193.950,   44.14,   0  !   !END!
3142!  X= 621.050,   5194.000,   44.41,   0  !   !END!
3143!  X= 621.050,   5194.050,   43.47,   0  !   !END!
3144!  X= 621.050,   5194.100,   39.64,   0  !   !END!
3145!  X= 621.050,   5194.150,   37.99,   0  !   !END!
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3146!  X= 621.050,   5194.200,   37.19,   0  !   !END!
3147!  X= 621.050,   5194.250,   33.22,   0  !   !END!
3148!  X= 621.050,   5194.300,   33.56,   0  !   !END!
3149!  X= 621.050,   5194.350,   30.69,   0  !   !END!
3150!  X= 621.050,   5194.400,   28.00,   0  !   !END!
3151!  X= 621.050,   5194.450,   26.22,   0  !   !END!
3152!  X= 621.050,   5194.500,   25.94,   0  !   !END!
3153!  X= 621.050,   5194.550,   25.96,   0  !   !END!
3154!  X= 621.050,   5194.600,   27.00,   0  !   !END!
3155!  X= 621.050,   5194.650,   28.00,   0  !   !END!
3156!  X= 621.050,   5194.700,   29.00,   0  !   !END!
3157!  X= 621.050,   5194.750,   30.27,   0  !   !END!
3158!  X= 621.050,   5194.800,   30.79,   0  !   !END!
3159!  X= 621.050,   5194.850,   32.07,   0  !   !END!
3160!  X= 621.050,   5194.900,   32.87,   0  !   !END!
3161!  X= 621.050,   5194.950,   33.02,   0  !   !END!
3162!  X= 621.050,   5195.000,   34.04,   0  !   !END!
3163!  X= 621.050,   5195.050,   34.07,   0  !   !END!
3164!  X= 621.050,   5195.100,   34.75,   0  !   !END!
3165!  X= 621.050,   5195.150,   35.68,   0  !   !END!
3166!  X= 621.050,   5195.200,   36.51,   0  !   !END!
3167!  X= 621.050,   5195.250,   37.22,   0  !   !END!
3168!  X= 621.050,   5195.300,   38.13,   0  !   !END!
3169!  X= 621.050,   5195.350,   40.79,   0  !   !END!
3170!  X= 621.050,   5195.400,   39.73,   0  !   !END!
3171!  X= 621.050,   5195.450,   40.32,   0  !   !END!
3172!  X= 621.050,   5195.500,   40.97,   0  !   !END!
3173!  X= 621.050,   5195.550,   41.30,   0  !   !END!
3174!  X= 621.050,   5195.600,   41.55,   0  !   !END!
3175!  X= 621.100,   5192.600,   39.29,   0  !   !END!
3176!  X= 621.100,   5192.700,   36.87,   0  !   !END!
3177!  X= 621.100,   5192.800,   34.86,   0  !   !END!
3178!  X= 621.100,   5192.900,   33.87,   0  !   !END!
3179!  X= 621.100,   5193.000,   32.87,   0  !   !END!
3180!  X= 621.100,   5193.100,   30.82,   0  !   !END!
3181!  X= 621.100,   5193.200,   29.04,   0  !   !END!
3182!  X= 621.100,   5193.300,   27.87,   0  !   !END!
3183!  X= 621.100,   5193.400,   26.64,   0  !   !END!
3184!  X= 621.100,   5193.500,   27.07,   0  !   !END!
3185!  X= 621.100,   5193.600,   31.42,   0  !   !END!
3186!  X= 621.100,   5193.650,   34.47,   0  !   !END!
3187!  X= 621.100,   5193.700,   38.72,   0  !   !END!
3188!  X= 621.100,   5193.750,   41.85,   0  !   !END!
3189!  X= 621.100,   5193.800,   43.27,   0  !   !END!
3190!  X= 621.100,   5193.850,   43.57,   0  !   !END!
3191!  X= 621.100,   5193.900,   44.12,   0  !   !END!
3192!  X= 621.100,   5193.950,   45.47,   0  !   !END!
3193!  X= 621.100,   5194.000,   45.18,   0  !   !END!
3194!  X= 621.100,   5194.050,   43.37,   0  !   !END!
3195!  X= 621.100,   5194.100,   42.11,   0  !   !END!
3196!  X= 621.100,   5194.150,   37.64,   0  !   !END!
3197!  X= 621.100,   5194.200,   34.78,   0  !   !END!
3198!  X= 621.100,   5194.250,   35.40,   0  !   !END!
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3199!  X= 621.100,   5194.300,   32.70,   0  !   !END!
3200!  X= 621.100,   5194.350,   29.47,   0  !   !END!
3201!  X= 621.100,   5194.400,   27.00,   0  !   !END!
3202!  X= 621.100,   5194.450,   26.57,   0  !   !END!
3203!  X= 621.100,   5194.500,   26.14,   0  !   !END!
3204!  X= 621.100,   5194.550,   26.85,   0  !   !END!
3205!  X= 621.100,   5194.600,   28.00,   0  !   !END!
3206!  X= 621.100,   5194.650,   28.82,   0  !   !END!
3207!  X= 621.100,   5194.700,   29.71,   0  !   !END!
3208!  X= 621.100,   5194.750,   30.58,   0  !   !END!
3209!  X= 621.100,   5194.800,   31.49,   0  !   !END!
3210!  X= 621.100,   5194.850,   31.93,   0  !   !END!
3211!  X= 621.100,   5194.900,   33.78,   0  !   !END!
3212!  X= 621.100,   5194.950,   33.56,   0  !   !END!
3213!  X= 621.100,   5195.000,   33.84,   0  !   !END!
3214!  X= 621.100,   5195.050,   34.43,   0  !   !END!
3215!  X= 621.100,   5195.100,   35.21,   0  !   !END!
3216!  X= 621.100,   5195.150,   35.55,   0  !   !END!
3217!  X= 621.100,   5195.200,   36.38,   0  !   !END!
3218!  X= 621.100,   5195.250,   37.50,   0  !   !END!
3219!  X= 621.100,   5195.300,   38.37,   0  !   !END!
3220!  X= 621.100,   5195.350,   40.67,   0  !   !END!
3221!  X= 621.100,   5195.400,   40.64,   0  !   !END!
3222!  X= 621.100,   5195.450,   41.22,   0  !   !END!
3223!  X= 621.100,   5195.500,   41.72,   0  !   !END!
3224!  X= 621.100,   5195.550,   42.23,   0  !   !END!
3225!  X= 621.100,   5195.600,   42.76,   0  !   !END!
3226!  X= 621.100,   5195.700,   43.34,   0  !   !END!
3227!  X= 621.100,   5195.800,   44.70,   0  !   !END!
3228!  X= 621.100,   5195.900,   45.49,   0  !   !END!
3229!  X= 621.100,   5196.000,   45.00,   0  !   !END!
3230!  X= 621.100,   5196.100,   45.73,   0  !   !END!
3231!  X= 621.100,   5196.200,   44.20,   0  !   !END!
3232!  X= 621.100,   5196.300,   44.43,   0  !   !END!
3233!  X= 621.100,   5196.400,   53.67,   0  !   !END!
3234!  X= 621.100,   5196.500,   50.21,   0  !   !END!
3235!  X= 621.100,   5196.600,   51.28,   0  !   !END!
3236!  X= 621.100,   5196.700,   53.64,   0  !   !END!
3237!  X= 621.100,   5196.800,   58.42,   0  !   !END!
3238!  X= 621.100,   5196.900,   62.17,   0  !   !END!
3239!  X= 621.100,   5197.000,   69.39,   0  !   !END!
3240!  X= 621.100,   5197.100,   69.89,   0  !   !END!
3241!  X= 621.100,   5197.200,   72.44,   0  !   !END!
3242!  X= 621.100,   5197.300,   74.57,   0  !   !END!
3243!  X= 621.100,   5197.400,   76.05,   0  !   !END!
3244!  X= 621.100,   5197.500,   76.48,   0  !   !END!
3245!  X= 621.100,   5197.600,   75.72,   0  !   !END!
3246!  X= 621.100,   5197.700,   74.36,   0  !   !END!
3247!  X= 621.100,   5197.800,   73.14,   0  !   !END!
3248!  X= 621.100,   5197.900,   72.55,   0  !   !END!
3249!  X= 621.100,   5198.000,   71.02,   0  !   !END!
3250!  X= 621.100,   5198.100,   71.53,   0  !   !END!
3251!  X= 621.100,   5198.200,   68.70,   0  !   !END!
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3252!  X= 621.100,   5198.300,   67.75,   0  !   !END!
3253!  X= 621.100,   5198.400,   68.24,   0  !   !END!
3254!  X= 621.100,   5198.500,   69.42,   0  !   !END!
3255!  X= 621.100,   5198.600,   71.34,   0  !   !END!
3256!  X= 621.100,   5198.700,   73.28,   0  !   !END!
3257!  X= 621.100,   5198.800,   75.27,   0  !   !END!
3258!  X= 621.100,   5198.900,   77.43,   0  !   !END!
3259!  X= 621.100,   5199.000,   78.87,   0  !   !END!
3260!  X= 621.150,   5193.600,   32.88,   0  !   !END!
3261!  X= 621.150,   5193.650,   38.78,   0  !   !END!
3262!  X= 621.150,   5193.700,   42.97,   0  !   !END!
3263!  X= 621.150,   5193.750,   43.28,   0  !   !END!
3264!  X= 621.150,   5193.800,   43.76,   0  !   !END!
3265!  X= 621.150,   5193.850,   45.59,   0  !   !END!
3266!  X= 621.150,   5193.900,   44.87,   0  !   !END!
3267!  X= 621.150,   5193.950,   42.02,   0  !   !END!
3268!  X= 621.150,   5194.000,   41.89,   0  !   !END!
3269!  X= 621.150,   5194.050,   39.95,   0  !   !END!
3270!  X= 621.150,   5194.100,   40.58,   0  !   !END!
3271!  X= 621.150,   5194.150,   38.56,   0  !   !END!
3272!  X= 621.150,   5194.200,   34.77,   0  !   !END!
3273!  X= 621.150,   5194.250,   32.80,   0  !   !END!
3274!  X= 621.150,   5194.300,   30.17,   0  !   !END!
3275!  X= 621.150,   5194.350,   29.04,   0  !   !END!
3276!  X= 621.150,   5194.400,   27.98,   0  !   !END!
3277!  X= 621.150,   5194.450,   27.80,   0  !   !END!
3278!  X= 621.150,   5194.500,   27.54,   0  !   !END!
3279!  X= 621.150,   5194.550,   27.23,   0  !   !END!
3280!  X= 621.150,   5194.600,   28.14,   0  !   !END!
3281!  X= 621.150,   5194.650,   29.00,   0  !   !END!
3282!  X= 621.150,   5194.700,   30.00,   0  !   !END!
3283!  X= 621.150,   5194.750,   31.00,   0  !   !END!
3284!  X= 621.150,   5194.800,   32.00,   0  !   !END!
3285!  X= 621.150,   5194.850,   31.95,   0  !   !END!
3286!  X= 621.150,   5194.900,   32.88,   0  !   !END!
3287!  X= 621.150,   5194.950,   33.67,   0  !   !END!
3288!  X= 621.150,   5195.000,   33.89,   0  !   !END!
3289!  X= 621.150,   5195.050,   34.35,   0  !   !END!
3290!  X= 621.150,   5195.100,   35.30,   0  !   !END!
3291!  X= 621.150,   5195.150,   35.84,   0  !   !END!
3292!  X= 621.150,   5195.200,   36.58,   0  !   !END!
3293!  X= 621.150,   5195.250,   38.00,   0  !   !END!
3294!  X= 621.150,   5195.300,   39.40,   0  !   !END!
3295!  X= 621.150,   5195.350,   41.00,   0  !   !END!
3296!  X= 621.150,   5195.400,   42.54,   0  !   !END!
3297!  X= 621.150,   5195.450,   42.18,   0  !   !END!
3298!  X= 621.150,   5195.500,   42.84,   0  !   !END!
3299!  X= 621.150,   5195.550,   43.77,   0  !   !END!
3300!  X= 621.150,   5195.600,   44.18,   0  !   !END!
3301!  X= 621.200,   5192.600,   36.50,   0  !   !END!
3302!  X= 621.200,   5192.700,   36.31,   0  !   !END!
3303!  X= 621.200,   5192.800,   33.31,   0  !   !END!
3304!  X= 621.200,   5192.900,   32.70,   0  !   !END!
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3305!  X= 621.200,   5193.000,   31.32,   0  !   !END!
3306!  X= 621.200,   5193.100,   30.00,   0  !   !END!
3307!  X= 621.200,   5193.200,   29.05,   0  !   !END!
3308!  X= 621.200,   5193.300,   28.95,   0  !   !END!
3309!  X= 621.200,   5193.400,   30.32,   0  !   !END!
3310!  X= 621.200,   5193.500,   31.42,   0  !   !END!
3311!  X= 621.200,   5193.600,   36.98,   0  !   !END!
3312!  X= 621.200,   5193.650,   40.44,   0  !   !END!
3313!  X= 621.200,   5193.700,   44.33,   0  !   !END!
3314!  X= 621.200,   5193.750,   45.44,   0  !   !END!
3315!  X= 621.200,   5193.800,   45.29,   0  !   !END!
3316!  X= 621.200,   5193.850,   45.17,   0  !   !END!
3317!  X= 621.200,   5193.900,   45.07,   0  !   !END!
3318!  X= 621.200,   5193.950,   44.74,   0  !   !END!
3319!  X= 621.200,   5194.000,   39.68,   0  !   !END!
3320!  X= 621.200,   5194.050,   37.67,   0  !   !END!
3321!  X= 621.200,   5194.100,   37.28,   0  !   !END!
3322!  X= 621.200,   5194.150,   35.07,   0  !   !END!
3323!  X= 621.200,   5194.200,   32.80,   0  !   !END!
3324!  X= 621.200,   5194.250,   31.00,   0  !   !END!
3325!  X= 621.200,   5194.300,   29.15,   0  !   !END!
3326!  X= 621.200,   5194.350,   29.00,   0  !   !END!
3327!  X= 621.200,   5194.400,   28.00,   0  !   !END!
3328!  X= 621.200,   5194.450,   27.24,   0  !   !END!
3329!  X= 621.200,   5194.500,   27.76,   0  !   !END!
3330!  X= 621.200,   5194.550,   28.00,   0  !   !END!
3331!  X= 621.200,   5194.600,   28.43,   0  !   !END!
3332!  X= 621.200,   5194.650,   29.18,   0  !   !END!
3333!  X= 621.200,   5194.700,   30.04,   0  !   !END!
3334!  X= 621.200,   5194.750,   31.00,   0  !   !END!
3335!  X= 621.200,   5194.800,   32.00,   0  !   !END!
3336!  X= 621.200,   5194.850,   32.90,   0  !   !END!
3337!  X= 621.200,   5194.900,   33.00,   0  !   !END!
3338!  X= 621.200,   5194.950,   33.87,   0  !   !END!
3339!  X= 621.200,   5195.000,   34.59,   0  !   !END!
3340!  X= 621.200,   5195.050,   36.26,   0  !   !END!
3341!  X= 621.200,   5195.100,   37.17,   0  !   !END!
3342!  X= 621.200,   5195.150,   37.84,   0  !   !END!
3343!  X= 621.200,   5195.200,   38.03,   0  !   !END!
3344!  X= 621.200,   5195.250,   39.16,   0  !   !END!
3345!  X= 621.200,   5195.300,   40.34,   0  !   !END!
3346!  X= 621.200,   5195.350,   41.63,   0  !   !END!
3347!  X= 621.200,   5195.400,   43.59,   0  !   !END!
3348!  X= 621.200,   5195.450,   43.41,   0  !   !END!
3349!  X= 621.200,   5195.500,   44.30,   0  !   !END!
3350!  X= 621.200,   5195.550,   44.72,   0  !   !END!
3351!  X= 621.200,   5195.600,   46.70,   0  !   !END!
3352!  X= 621.200,   5195.700,   48.08,   0  !   !END!
3353!  X= 621.200,   5195.800,   48.40,   0  !   !END!
3354!  X= 621.200,   5195.900,   49.54,   0  !   !END!
3355!  X= 621.200,   5196.000,   49.88,   0  !   !END!
3356!  X= 621.200,   5196.100,   51.15,   0  !   !END!
3357!  X= 621.200,   5196.200,   50.73,   0  !   !END!
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3358!  X= 621.200,   5196.300,   51.08,   0  !   !END!
3359!  X= 621.200,   5196.400,   54.82,   0  !   !END!
3360!  X= 621.200,   5196.500,   53.53,   0  !   !END!
3361!  X= 621.200,   5196.600,   56.05,   0  !   !END!
3362!  X= 621.200,   5196.700,   60.16,   0  !   !END!
3363!  X= 621.200,   5196.800,   65.73,   0  !   !END!
3364!  X= 621.200,   5196.900,   69.66,   0  !   !END!
3365!  X= 621.200,   5197.000,   71.31,   0  !   !END!
3366!  X= 621.200,   5197.100,   72.14,   0  !   !END!
3367!  X= 621.200,   5197.200,   73.70,   0  !   !END!
3368!  X= 621.200,   5197.300,   75.02,   0  !   !END!
3369!  X= 621.200,   5197.400,   75.90,   0  !   !END!
3370!  X= 621.200,   5197.500,   75.98,   0  !   !END!
3371!  X= 621.200,   5197.600,   74.75,   0  !   !END!
3372!  X= 621.200,   5197.700,   73.52,   0  !   !END!
3373!  X= 621.200,   5197.800,   70.71,   0  !   !END!
3374!  X= 621.200,   5197.900,   67.37,   0  !   !END!
3375!  X= 621.200,   5198.000,   67.61,   0  !   !END!
3376!  X= 621.200,   5198.100,   67.98,   0  !   !END!
3377!  X= 621.200,   5198.200,   67.27,   0  !   !END!
3378!  X= 621.200,   5198.300,   68.20,   0  !   !END!
3379!  X= 621.200,   5198.400,   70.06,   0  !   !END!
3380!  X= 621.200,   5198.500,   70.21,   0  !   !END!
3381!  X= 621.200,   5198.600,   71.36,   0  !   !END!
3382!  X= 621.200,   5198.700,   73.47,   0  !   !END!
3383!  X= 621.200,   5198.800,   75.86,   0  !   !END!
3384!  X= 621.200,   5198.900,   78.03,   0  !   !END!
3385!  X= 621.200,   5199.000,   79.78,   0  !   !END!
3386!  X= 621.250,   5193.600,   38.01,   0  !   !END!
3387!  X= 621.250,   5193.650,   41.93,   0  !   !END!
3388!  X= 621.250,   5193.700,   44.27,   0  !   !END!
3389!  X= 621.250,   5193.750,   45.54,   0  !   !END!
3390!  X= 621.250,   5193.800,   44.93,   0  !   !END!
3391!  X= 621.250,   5193.850,   44.26,   0  !   !END!
3392!  X= 621.250,   5193.900,   42.61,   0  !   !END!
3393!  X= 621.250,   5193.950,   41.18,   0  !   !END!
3394!  X= 621.250,   5194.000,   37.78,   0  !   !END!
3395!  X= 621.250,   5194.050,   36.64,   0  !   !END!
3396!  X= 621.250,   5194.100,   35.45,   0  !   !END!
3397!  X= 621.250,   5194.150,   32.67,   0  !   !END!
3398!  X= 621.250,   5194.200,   30.66,   0  !   !END!
3399!  X= 621.250,   5194.250,   29.81,   0  !   !END!
3400!  X= 621.250,   5194.300,   28.87,   0  !   !END!
3401!  X= 621.250,   5194.350,   28.00,   0  !   !END!
3402!  X= 621.250,   5194.400,   28.00,   0  !   !END!
3403!  X= 621.250,   5194.450,   27.79,   0  !   !END!
3404!  X= 621.250,   5194.500,   27.74,   0  !   !END!
3405!  X= 621.250,   5194.550,   28.00,   0  !   !END!
3406!  X= 621.250,   5194.600,   29.00,   0  !   !END!
3407!  X= 621.250,   5194.650,   30.00,   0  !   !END!
3408!  X= 621.250,   5194.700,   30.76,   0  !   !END!
3409!  X= 621.250,   5194.750,   31.83,   0  !   !END!
3410!  X= 621.250,   5194.800,   32.98,   0  !   !END!
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3411!  X= 621.250,   5194.850,   33.00,   0  !   !END!
3412!  X= 621.250,   5194.900,   34.95,   0  !   !END!
3413!  X= 621.250,   5194.950,   36.44,   0  !   !END!
3414!  X= 621.250,   5195.000,   36.78,   0  !   !END!
3415!  X= 621.250,   5195.050,   38.72,   0  !   !END!
3416!  X= 621.250,   5195.100,   39.59,   0  !   !END!
3417!  X= 621.250,   5195.150,   40.70,   0  !   !END!
3418!  X= 621.250,   5195.200,   41.43,   0  !   !END!
3419!  X= 621.250,   5195.250,   40.42,   0  !   !END!
3420!  X= 621.250,   5195.300,   41.69,   0  !   !END!
3421!  X= 621.250,   5195.350,   43.01,   0  !   !END!
3422!  X= 621.250,   5195.400,   45.34,   0  !   !END!
3423!  X= 621.250,   5195.450,   45.85,   0  !   !END!
3424!  X= 621.250,   5195.500,   47.02,   0  !   !END!
3425!  X= 621.250,   5195.550,   47.48,   0  !   !END!
3426!  X= 621.250,   5195.600,   48.28,   0  !   !END!
3427!  X= 621.300,   5192.600,   22.18,   0  !   !END!
3428!  X= 621.300,   5192.700,   27.94,   0  !   !END!
3429!  X= 621.300,   5192.800,   26.42,   0  !   !END!
3430!  X= 621.300,   5192.900,   25.91,   0  !   !END!
3431!  X= 621.300,   5193.000,   24.05,   0  !   !END!
3432!  X= 621.300,   5193.100,   22.06,   0  !   !END!
3433!  X= 621.300,   5193.200,   23.88,   0  !   !END!
3434!  X= 621.300,   5193.300,   28.88,   0  !   !END!
3435!  X= 621.300,   5193.400,   30.40,   0  !   !END!
3436!  X= 621.300,   5193.500,   35.14,   0  !   !END!
3437!  X= 621.300,   5193.600,   38.63,   0  !   !END!
3438!  X= 621.300,   5193.650,   41.84,   0  !   !END!
3439!  X= 621.300,   5193.700,   43.23,   0  !   !END!
3440!  X= 621.300,   5193.750,   42.83,   0  !   !END!
3441!  X= 621.300,   5193.800,   40.88,   0  !   !END!
3442!  X= 621.300,   5193.850,   38.63,   0  !   !END!
3443!  X= 621.300,   5193.900,   37.74,   0  !   !END!
3444!  X= 621.300,   5193.950,   37.49,   0  !   !END!
3445!  X= 621.300,   5194.000,   36.87,   0  !   !END!
3446!  X= 621.300,   5194.050,   34.32,   0  !   !END!
3447!  X= 621.300,   5194.100,   33.33,   0  !   !END!
3448!  X= 621.300,   5194.150,   31.80,   0  !   !END!
3449!  X= 621.300,   5194.200,   30.22,   0  !   !END!
3450!  X= 621.300,   5194.250,   29.00,   0  !   !END!
3451!  X= 621.300,   5194.300,   28.46,   0  !   !END!
3452!  X= 621.300,   5194.350,   28.00,   0  !   !END!
3453!  X= 621.300,   5194.400,   28.03,   0  !   !END!
3454!  X= 621.300,   5194.450,   28.13,   0  !   !END!
3455!  X= 621.300,   5194.500,   28.62,   0  !   !END!
3456!  X= 621.300,   5194.550,   29.00,   0  !   !END!
3457!  X= 621.300,   5194.600,   29.13,   0  !   !END!
3458!  X= 621.300,   5194.650,   30.00,   0  !   !END!
3459!  X= 621.300,   5194.700,   31.87,   0  !   !END!
3460!  X= 621.300,   5194.750,   32.29,   0  !   !END!
3461!  X= 621.300,   5194.800,   36.00,   0  !   !END!
3462!  X= 621.300,   5194.850,   38.36,   0  !   !END!
3463!  X= 621.300,   5194.900,   41.00,   0  !   !END!
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3464!  X= 621.300,   5194.950,   43.00,   0  !   !END!
3465!  X= 621.300,   5195.000,   43.54,   0  !   !END!
3466!  X= 621.300,   5195.050,   45.46,   0  !   !END!
3467!  X= 621.300,   5195.100,   44.00,   0  !   !END!
3468!  X= 621.300,   5195.150,   44.14,   0  !   !END!
3469!  X= 621.300,   5195.200,   46.00,   0  !   !END!
3470!  X= 621.300,   5195.250,   43.13,   0  !   !END!
3471!  X= 621.300,   5195.300,   43.68,   0  !   !END!
3472!  X= 621.300,   5195.350,   45.93,   0  !   !END!
3473!  X= 621.300,   5195.400,   49.00,   0  !   !END!
3474!  X= 621.300,   5195.450,   48.66,   0  !   !END!
3475!  X= 621.300,   5195.500,   48.34,   0  !   !END!
3476!  X= 621.300,   5195.550,   50.41,   0  !   !END!
3477!  X= 621.300,   5195.600,   51.40,   0  !   !END!
3478!  X= 621.300,   5195.700,   53.71,   0  !   !END!
3479!  X= 621.300,   5195.800,   56.16,   0  !   !END!
3480!  X= 621.300,   5195.900,   56.99,   0  !   !END!
3481!  X= 621.300,   5196.000,   56.77,   0  !   !END!
3482!  X= 621.300,   5196.100,   57.07,   0  !   !END!
3483!  X= 621.300,   5196.200,   55.88,   0  !   !END!
3484!  X= 621.300,   5196.300,   55.99,   0  !   !END!
3485!  X= 621.300,   5196.400,   55.64,   0  !   !END!
3486!  X= 621.300,   5196.500,   56.33,   0  !   !END!
3487!  X= 621.300,   5196.600,   60.85,   0  !   !END!
3488!  X= 621.300,   5196.700,   65.04,   0  !   !END!
3489!  X= 621.300,   5196.800,   67.97,   0  !   !END!
3490!  X= 621.300,   5196.900,   69.75,   0  !   !END!
3491!  X= 621.300,   5197.000,   67.88,   0  !   !END!
3492!  X= 621.300,   5197.100,   71.60,   0  !   !END!
3493!  X= 621.300,   5197.200,   71.53,   0  !   !END!
3494!  X= 621.300,   5197.300,   71.29,   0  !   !END!
3495!  X= 621.300,   5197.400,   67.92,   0  !   !END!
3496!  X= 621.300,   5197.500,   64.26,   0  !   !END!
3497!  X= 621.300,   5197.600,   61.40,   0  !   !END!
3498!  X= 621.300,   5197.700,   61.45,   0  !   !END!
3499!  X= 621.300,   5197.800,   61.34,   0  !   !END!
3500!  X= 621.300,   5197.900,   61.66,   0  !   !END!
3501!  X= 621.300,   5198.000,   62.46,   0  !   !END!
3502!  X= 621.300,   5198.100,   63.63,   0  !   !END!
3503!  X= 621.300,   5198.200,   64.48,   0  !   !END!
3504!  X= 621.300,   5198.300,   64.28,   0  !   !END!
3505!  X= 621.300,   5198.400,   66.53,   0  !   !END!
3506!  X= 621.300,   5198.500,   68.25,   0  !   !END!
3507!  X= 621.300,   5198.600,   69.94,   0  !   !END!
3508!  X= 621.300,   5198.700,   72.59,   0  !   !END!
3509!  X= 621.300,   5198.800,   75.23,   0  !   !END!
3510!  X= 621.300,   5198.900,   77.20,   0  !   !END!
3511!  X= 621.300,   5199.000,   78.58,   0  !   !END!
3512!  X= 621.350,   5193.600,   35.96,   0  !   !END!
3513!  X= 621.350,   5193.650,   36.93,   0  !   !END!
3514!  X= 621.350,   5193.700,   36.83,   0  !   !END!
3515!  X= 621.350,   5193.750,   36.98,   0  !   !END!
3516!  X= 621.350,   5193.800,   35.41,   0  !   !END!
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3517!  X= 621.350,   5193.850,   35.78,   0  !   !END!
3518!  X= 621.350,   5193.900,   35.38,   0  !   !END!
3519!  X= 621.350,   5193.950,   35.13,   0  !   !END!
3520!  X= 621.350,   5194.000,   33.37,   0  !   !END!
3521!  X= 621.350,   5194.050,   33.00,   0  !   !END!
3522!  X= 621.350,   5194.100,   31.85,   0  !   !END!
3523!  X= 621.350,   5194.150,   30.80,   0  !   !END!
3524!  X= 621.350,   5194.200,   29.80,   0  !   !END!
3525!  X= 621.350,   5194.250,   29.00,   0  !   !END!
3526!  X= 621.350,   5194.300,   28.81,   0  !   !END!
3527!  X= 621.350,   5194.350,   28.60,   0  !   !END!
3528!  X= 621.350,   5194.400,   28.72,   0  !   !END!
3529!  X= 621.350,   5194.450,   28.76,   0  !   !END!
3530!  X= 621.350,   5194.500,   29.00,   0  !   !END!
3531!  X= 621.350,   5194.550,   29.91,   0  !   !END!
3532!  X= 621.350,   5194.600,   31.15,   0  !   !END!
3533!  X= 621.350,   5194.650,   32.40,   0  !   !END!
3534!  X= 621.350,   5194.700,   39.12,   0  !   !END!
3535!  X= 621.350,   5194.750,   43.00,   0  !   !END!
3536!  X= 621.350,   5194.800,   45.00,   0  !   !END!
3537!  X= 621.350,   5194.850,   44.00,   0  !   !END!
3538!  X= 621.350,   5194.900,   45.79,   0  !   !END!
3539!  X= 621.350,   5194.950,   47.35,   0  !   !END!
3540!  X= 621.350,   5195.000,   49.22,   0  !   !END!
3541!  X= 621.350,   5195.050,   50.00,   0  !   !END!
3542!  X= 621.350,   5195.100,   49.00,   0  !   !END!
3543!  X= 621.350,   5195.150,   49.87,   0  !   !END!
3544!  X= 621.350,   5195.200,   50.59,   0  !   !END!
3545!  X= 621.350,   5195.250,   49.87,   0  !   !END!
3546!  X= 621.350,   5195.300,   47.33,   0  !   !END!
3547!  X= 621.350,   5195.350,   48.52,   0  !   !END!
3548!  X= 621.350,   5195.400,   54.56,   0  !   !END!
3549!  X= 621.350,   5195.450,   54.95,   0  !   !END!
3550!  X= 621.350,   5195.500,   51.36,   0  !   !END!
3551!  X= 621.350,   5195.550,   53.76,   0  !   !END!
3552!  X= 621.350,   5195.600,   55.36,   0  !   !END!
3553!  X= 621.400,   5192.600,   0.00,   0  !   !END!
3554!  X= 621.400,   5192.700,   3.42,   0  !   !END!
3555!  X= 621.400,   5192.800,   6.32,   0  !   !END!
3556!  X= 621.400,   5192.900,   11.12,   0  !   !END!
3557!  X= 621.400,   5193.000,   9.54,   0  !   !END!
3558!  X= 621.400,   5193.100,   12.56,   0  !   !END!
3559!  X= 621.400,   5193.200,   19.12,   0  !   !END!
3560!  X= 621.400,   5193.300,   22.56,   0  !   !END!
3561!  X= 621.400,   5193.400,   30.47,   0  !   !END!
3562!  X= 621.400,   5193.500,   34.07,   0  !   !END!
3563!  X= 621.400,   5193.600,   35.36,   0  !   !END!
3564!  X= 621.400,   5193.650,   34.18,   0  !   !END!
3565!  X= 621.400,   5193.700,   33.25,   0  !   !END!
3566!  X= 621.400,   5193.750,   34.03,   0  !   !END!
3567!  X= 621.400,   5193.800,   32.31,   0  !   !END!
3568!  X= 621.400,   5193.850,   32.02,   0  !   !END!
3569!  X= 621.400,   5193.900,   32.70,   0  !   !END!
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3570!  X= 621.400,   5193.950,   31.99,   0  !   !END!
3571!  X= 621.400,   5194.000,   31.91,   0  !   !END!
3572!  X= 621.400,   5194.050,   30.44,   0  !   !END!
3573!  X= 621.400,   5194.100,   30.00,   0  !   !END!
3574!  X= 621.400,   5194.150,   29.76,   0  !   !END!
3575!  X= 621.400,   5194.200,   29.00,   0  !   !END!
3576!  X= 621.400,   5194.250,   29.00,   0  !   !END!
3577!  X= 621.400,   5194.300,   29.00,   0  !   !END!
3578!  X= 621.400,   5194.350,   29.00,   0  !   !END!
3579!  X= 621.400,   5194.400,   29.00,   0  !   !END!
3580!  X= 621.400,   5194.450,   29.00,   0  !   !END!
3581!  X= 621.400,   5194.500,   30.81,   0  !   !END!
3582!  X= 621.400,   5194.550,   33.87,   0  !   !END!
3583!  X= 621.400,   5194.600,   36.76,   0  !   !END!
3584!  X= 621.400,   5194.650,   42.00,   0  !   !END!
3585!  X= 621.400,   5194.700,   46.11,   0  !   !END!
3586!  X= 621.400,   5194.750,   50.00,   0  !   !END!
3587!  X= 621.400,   5194.800,   49.00,   0  !   !END!
3588!  X= 621.400,   5194.850,   53.21,   0  !   !END!
3589!  X= 621.400,   5194.900,   52.00,   0  !   !END!
3590!  X= 621.400,   5194.950,   52.44,   0  !   !END!
3591!  X= 621.400,   5195.000,   53.00,   0  !   !END!
3592!  X= 621.400,   5195.050,   54.00,   0  !   !END!
3593!  X= 621.400,   5195.100,   53.25,   0  !   !END!
3594!  X= 621.400,   5195.150,   54.00,   0  !   !END!
3595!  X= 621.400,   5195.200,   53.59,   0  !   !END!
3596!  X= 621.400,   5195.250,   53.00,   0  !   !END!
3597!  X= 621.400,   5195.300,   52.16,   0  !   !END!
3598!  X= 621.400,   5195.350,   50.60,   0  !   !END!
3599!  X= 621.400,   5195.400,   50.16,   0  !   !END!
3600!  X= 621.400,   5195.450,   58.00,   0  !   !END!
3601!  X= 621.400,   5195.500,   54.66,   0  !   !END!
3602!  X= 621.400,   5195.550,   56.58,   0  !   !END!
3603!  X= 621.400,   5195.600,   58.05,   0  !   !END!
3604!  X= 621.400,   5195.700,   60.10,   0  !   !END!
3605!  X= 621.400,   5195.800,   63.80,   0  !   !END!
3606!  X= 621.400,   5195.900,   64.18,   0  !   !END!
3607!  X= 621.400,   5196.000,   62.70,   0  !   !END!
3608!  X= 621.400,   5196.100,   59.16,   0  !   !END!
3609!  X= 621.400,   5196.200,   57.49,   0  !   !END!
3610!  X= 621.400,   5196.300,   56.56,   0  !   !END!
3611!  X= 621.400,   5196.400,   56.34,   0  !   !END!
3612!  X= 621.400,   5196.500,   61.07,   0  !   !END!
3613!  X= 621.400,   5196.600,   63.16,   0  !   !END!
3614!  X= 621.400,   5196.700,   65.04,   0  !   !END!
3615!  X= 621.400,   5196.800,   63.85,   0  !   !END!
3616!  X= 621.400,   5196.900,   63.13,   0  !   !END!
3617!  X= 621.400,   5197.000,   62.76,   0  !   !END!
3618!  X= 621.400,   5197.100,   62.59,   0  !   !END!
3619!  X= 621.400,   5197.200,   64.69,   0  !   !END!
3620!  X= 621.400,   5197.300,   63.87,   0  !   !END!
3621!  X= 621.400,   5197.400,   59.76,   0  !   !END!
3622!  X= 621.400,   5197.500,   53.82,   0  !   !END!
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3623!  X= 621.400,   5197.600,   52.75,   0  !   !END!
3624!  X= 621.400,   5197.700,   54.54,   0  !   !END!
3625!  X= 621.400,   5197.800,   55.97,   0  !   !END!
3626!  X= 621.400,   5197.900,   57.36,   0  !   !END!
3627!  X= 621.400,   5198.000,   59.20,   0  !   !END!
3628!  X= 621.400,   5198.100,   59.89,   0  !   !END!
3629!  X= 621.400,   5198.200,   59.88,   0  !   !END!
3630!  X= 621.400,   5198.300,   59.94,   0  !   !END!
3631!  X= 621.400,   5198.400,   62.82,   0  !   !END!
3632!  X= 621.400,   5198.500,   65.37,   0  !   !END!
3633!  X= 621.400,   5198.600,   67.37,   0  !   !END!
3634!  X= 621.400,   5198.700,   71.17,   0  !   !END!
3635!  X= 621.400,   5198.800,   73.54,   0  !   !END!
3636!  X= 621.400,   5198.900,   74.66,   0  !   !END!
3637!  X= 621.400,   5199.000,   73.32,   0  !   !END!
3638!  X= 621.450,   5193.600,   28.71,   0  !   !END!
3639!  X= 621.450,   5193.650,   28.52,   0  !   !END!
3640!  X= 621.450,   5193.700,   28.66,   0  !   !END!
3641!  X= 621.450,   5193.750,   28.90,   0  !   !END!
3642!  X= 621.450,   5193.800,   28.09,   0  !   !END!
3643!  X= 621.450,   5193.850,   29.70,   0  !   !END!
3644!  X= 621.450,   5193.900,   30.00,   0  !   !END!
3645!  X= 621.450,   5193.950,   29.30,   0  !   !END!
3646!  X= 621.450,   5194.000,   28.77,   0  !   !END!
3647!  X= 621.450,   5194.050,   28.81,   0  !   !END!
3648!  X= 621.450,   5194.100,   29.12,   0  !   !END!
3649!  X= 621.450,   5194.150,   29.85,   0  !   !END!
3650!  X= 621.450,   5194.200,   29.00,   0  !   !END!
3651!  X= 621.450,   5194.250,   29.00,   0  !   !END!
3652!  X= 621.450,   5194.300,   29.48,   0  !   !END!
3653!  X= 621.450,   5194.350,   31.00,   0  !   !END!
3654!  X= 621.450,   5194.400,   33.14,   0  !   !END!
3655!  X= 621.450,   5194.450,   35.36,   0  !   !END!
3656!  X= 621.450,   5194.500,   36.76,   0  !   !END!
3657!  X= 621.450,   5194.550,   40.00,   0  !   !END!
3658!  X= 621.450,   5194.600,   42.15,   0  !   !END!
3659!  X= 621.450,   5194.650,   46.00,   0  !   !END!
3660!  X= 621.450,   5194.700,   52.00,   0  !   !END!
3661!  X= 621.450,   5194.750,   55.75,   0  !   !END!
3662!  X= 621.450,   5194.800,   55.12,   0  !   !END!
3663!  X= 621.450,   5194.850,   54.06,   0  !   !END!
3664!  X= 621.450,   5194.900,   56.91,   0  !   !END!
3665!  X= 621.450,   5194.950,   57.00,   0  !   !END!
3666!  X= 621.450,   5195.000,   57.42,   0  !   !END!
3667!  X= 621.450,   5195.050,   57.00,   0  !   !END!
3668!  X= 621.450,   5195.100,   58.00,   0  !   !END!
3669!  X= 621.450,   5195.150,   55.00,   0  !   !END!
3670!  X= 621.450,   5195.200,   55.00,   0  !   !END!
3671!  X= 621.450,   5195.250,   54.32,   0  !   !END!
3672!  X= 621.450,   5195.300,   54.00,   0  !   !END!
3673!  X= 621.450,   5195.350,   52.42,   0  !   !END!
3674!  X= 621.450,   5195.400,   52.50,   0  !   !END!
3675!  X= 621.450,   5195.450,   57.00,   0  !   !END!
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3676!  X= 621.450,   5195.500,   55.79,   0  !   !END!
3677!  X= 621.450,   5195.550,   58.38,   0  !   !END!
3678!  X= 621.450,   5195.600,   59.77,   0  !   !END!
3679!  X= 621.500,   5192.000,   0.00,   0  !   !END!
3680!  X= 621.500,   5192.500,   0.00,   0  !   !END!
3681!  X= 621.500,   5192.600,   0.00,   0  !   !END!
3682!  X= 621.500,   5192.700,   0.00,   0  !   !END!
3683!  X= 621.500,   5192.800,   0.00,   0  !   !END!
3684!  X= 621.500,   5192.900,   0.00,   0  !   !END!
3685!  X= 621.500,   5193.000,   0.00,   0  !   !END!
3686!  X= 621.500,   5193.100,   1.04,   0  !   !END!
3687!  X= 621.500,   5193.200,   14.21,   0  !   !END!
3688!  X= 621.500,   5193.300,   20.05,   0  !   !END!
3689!  X= 621.500,   5193.400,   25.73,   0  !   !END!
3690!  X= 621.500,   5193.500,   25.59,   0  !   !END!
3691!  X= 621.500,   5193.600,   23.97,   0  !   !END!
3692!  X= 621.500,   5193.650,   24.07,   0  !   !END!
3693!  X= 621.500,   5193.700,   25.14,   0  !   !END!
3694!  X= 621.500,   5193.750,   26.39,   0  !   !END!
3695!  X= 621.500,   5193.800,   26.79,   0  !   !END!
3696!  X= 621.500,   5193.850,   28.01,   0  !   !END!
3697!  X= 621.500,   5193.900,   27.88,   0  !   !END!
3698!  X= 621.500,   5193.950,   27.98,   0  !   !END!
3699!  X= 621.500,   5194.000,   27.98,   0  !   !END!
3700!  X= 621.500,   5194.050,   28.02,   0  !   !END!
3701!  X= 621.500,   5194.100,   29.00,   0  !   !END!
3702!  X= 621.500,   5194.150,   29.70,   0  !   !END!
3703!  X= 621.500,   5194.200,   30.16,   0  !   !END!
3704!  X= 621.500,   5194.250,   32.00,   0  !   !END!
3705!  X= 621.500,   5194.300,   34.00,   0  !   !END!
3706!  X= 621.500,   5194.350,   36.00,   0  !   !END!
3707!  X= 621.500,   5194.400,   37.30,   0  !   !END!
3708!  X= 621.500,   5194.450,   41.00,   0  !   !END!
3709!  X= 621.500,   5194.500,   43.42,   0  !   !END!
3710!  X= 621.500,   5194.550,   48.00,   0  !   !END!
3711!  X= 621.500,   5194.600,   49.00,   0  !   !END!
3712!  X= 621.500,   5194.650,   53.00,   0  !   !END!
3713!  X= 621.500,   5194.700,   56.00,   0  !   !END!
3714!  X= 621.500,   5194.750,   57.75,   0  !   !END!
3715!  X= 621.500,   5194.800,   58.00,   0  !   !END!
3716!  X= 621.500,   5194.850,   57.00,   0  !   !END!
3717!  X= 621.500,   5194.900,   58.85,   0  !   !END!
3718!  X= 621.500,   5194.950,   59.42,   0  !   !END!
3719!  X= 621.500,   5195.000,   58.47,   0  !   !END!
3720!  X= 621.500,   5195.050,   57.00,   0  !   !END!
3721!  X= 621.500,   5195.100,   57.41,   0  !   !END!
3722!  X= 621.500,   5195.150,   55.98,   0  !   !END!
3723!  X= 621.500,   5195.200,   54.62,   0  !   !END!
3724!  X= 621.500,   5195.250,   54.00,   0  !   !END!
3725!  X= 621.500,   5195.300,   53.85,   0  !   !END!
3726!  X= 621.500,   5195.350,   56.00,   0  !   !END!
3727!  X= 621.500,   5195.400,   52.48,   0  !   !END!
3728!  X= 621.500,   5195.450,   58.00,   0  !   !END!
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3729!  X= 621.500,   5195.500,   56.36,   0  !   !END!
3730!  X= 621.500,   5195.550,   57.76,   0  !   !END!
3731!  X= 621.500,   5195.600,   61.44,   0  !   !END!
3732!  X= 621.500,   5195.700,   68.87,   0  !   !END!
3733!  X= 621.500,   5195.800,   70.46,   0  !   !END!
3734!  X= 621.500,   5195.900,   64.38,   0  !   !END!
3735!  X= 621.500,   5196.000,   58.17,   0  !   !END!
3736!  X= 621.500,   5196.100,   55.58,   0  !   !END!
3737!  X= 621.500,   5196.200,   55.42,   0  !   !END!
3738!  X= 621.500,   5196.300,   52.39,   0  !   !END!
3739!  X= 621.500,   5196.400,   53.75,   0  !   !END!
3740!  X= 621.500,   5196.500,   57.87,   0  !   !END!
3741!  X= 621.500,   5196.600,   53.71,   0  !   !END!
3742!  X= 621.500,   5196.700,   53.74,   0  !   !END!
3743!  X= 621.500,   5196.800,   55.30,   0  !   !END!
3744!  X= 621.500,   5196.900,   59.51,   0  !   !END!
3745!  X= 621.500,   5197.000,   58.38,   0  !   !END!
3746!  X= 621.500,   5197.100,   57.97,   0  !   !END!
3747!  X= 621.500,   5197.200,   55.25,   0  !   !END!
3748!  X= 621.500,   5197.300,   53.05,   0  !   !END!
3749!  X= 621.500,   5197.400,   49.62,   0  !   !END!
3750!  X= 621.500,   5197.500,   48.75,   0  !   !END!
3751!  X= 621.500,   5197.600,   46.93,   0  !   !END!
3752!  X= 621.500,   5197.700,   48.10,   0  !   !END!
3753!  X= 621.500,   5197.800,   50.93,   0  !   !END!
3754!  X= 621.500,   5197.900,   53.30,   0  !   !END!
3755!  X= 621.500,   5198.000,   54.94,   0  !   !END!
3756!  X= 621.500,   5198.100,   55.82,   0  !   !END!
3757!  X= 621.500,   5198.200,   56.49,   0  !   !END!
3758!  X= 621.500,   5198.300,   55.78,   0  !   !END!
3759!  X= 621.500,   5198.400,   59.11,   0  !   !END!
3760!  X= 621.500,   5198.500,   62.54,   0  !   !END!
3761!  X= 621.500,   5198.600,   64.33,   0  !   !END!
3762!  X= 621.500,   5198.700,   65.95,   0  !   !END!
3763!  X= 621.500,   5198.800,   67.58,   0  !   !END!
3764!  X= 621.500,   5198.900,   65.59,   0  !   !END!
3765!  X= 621.500,   5199.000,   64.80,   0  !   !END!
3766!  X= 621.500,   5199.500,   100.03,   0  !   !END!
3767!  X= 621.500,   5200.000,   161.72,   0  !   !END!
3768!  X= 621.550,   5193.600,   21.68,   0  !   !END!
3769!  X= 621.550,   5193.650,   22.29,   0  !   !END!
3770!  X= 621.550,   5193.700,   22.61,   0  !   !END!
3771!  X= 621.550,   5193.750,   24.31,   0  !   !END!
3772!  X= 621.550,   5193.800,   25.00,   0  !   !END!
3773!  X= 621.550,   5193.850,   26.26,   0  !   !END!
3774!  X= 621.550,   5193.900,   27.00,   0  !   !END!
3775!  X= 621.550,   5193.950,   27.35,   0  !   !END!
3776!  X= 621.550,   5194.000,   27.53,   0  !   !END!
3777!  X= 621.550,   5194.050,   28.75,   0  !   !END!
3778!  X= 621.550,   5194.100,   30.84,   0  !   !END!
3779!  X= 621.550,   5194.150,   32.08,   0  !   !END!
3780!  X= 621.550,   5194.200,   35.00,   0  !   !END!
3781!  X= 621.550,   5194.250,   36.58,   0  !   !END!
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3782!  X= 621.550,   5194.300,   38.00,   0  !   !END!
3783!  X= 621.550,   5194.350,   39.77,   0  !   !END!
3784!  X= 621.550,   5194.400,   42.25,   0  !   !END!
3785!  X= 621.550,   5194.450,   44.49,   0  !   !END!
3786!  X= 621.550,   5194.500,   47.38,   0  !   !END!
3787!  X= 621.550,   5194.550,   49.57,   0  !   !END!
3788!  X= 621.550,   5194.600,   53.00,   0  !   !END!
3789!  X= 621.550,   5194.650,   56.26,   0  !   !END!
3790!  X= 621.550,   5194.700,   57.52,   0  !   !END!
3791!  X= 621.550,   5194.750,   58.42,   0  !   !END!
3792!  X= 621.550,   5194.800,   57.00,   0  !   !END!
3793!  X= 621.550,   5194.850,   58.44,   0  !   !END!
3794!  X= 621.550,   5194.900,   59.00,   0  !   !END!
3795!  X= 621.550,   5194.950,   60.50,   0  !   !END!
3796!  X= 621.550,   5195.000,   60.08,   0  !   !END!
3797!  X= 621.550,   5195.050,   57.00,   0  !   !END!
3798!  X= 621.550,   5195.100,   55.78,   0  !   !END!
3799!  X= 621.550,   5195.150,   54.94,   0  !   !END!
3800!  X= 621.550,   5195.200,   52.53,   0  !   !END!
3801!  X= 621.550,   5195.250,   52.00,   0  !   !END!
3802!  X= 621.550,   5195.300,   52.68,   0  !   !END!
3803!  X= 621.550,   5195.350,   53.75,   0  !   !END!
3804!  X= 621.550,   5195.400,   55.27,   0  !   !END!
3805!  X= 621.550,   5195.450,   60.70,   0  !   !END!
3806!  X= 621.550,   5195.500,   57.63,   0  !   !END!
3807!  X= 621.550,   5195.550,   59.27,   0  !   !END!
3808!  X= 621.550,   5195.600,   68.00,   0  !   !END!
3809!  X= 621.600,   5192.600,   0.00,   0  !   !END!
3810!  X= 621.600,   5192.700,   0.00,   0  !   !END!
3811!  X= 621.600,   5192.800,   0.00,   0  !   !END!
3812!  X= 621.600,   5192.900,   0.00,   0  !   !END!
3813!  X= 621.600,   5193.000,   0.00,   0  !   !END!
3814!  X= 621.600,   5193.100,   0.00,   0  !   !END!
3815!  X= 621.600,   5193.200,   0.30,   0  !   !END!
3816!  X= 621.600,   5193.300,   12.93,   0  !   !END!
3817!  X= 621.600,   5193.400,   16.91,   0  !   !END!
3818!  X= 621.600,   5193.500,   15.90,   0  !   !END!
3819!  X= 621.600,   5193.600,   16.50,   0  !   !END!
3820!  X= 621.600,   5193.650,   17.56,   0  !   !END!
3821!  X= 621.600,   5193.700,   19.25,   0  !   !END!
3822!  X= 621.600,   5193.750,   22.47,   0  !   !END!
3823!  X= 621.600,   5193.800,   25.33,   0  !   !END!
3824!  X= 621.600,   5193.850,   26.54,   0  !   !END!
3825!  X= 621.600,   5193.900,   27.36,   0  !   !END!
3826!  X= 621.600,   5193.950,   30.31,   0  !   !END!
3827!  X= 621.600,   5194.000,   31.04,   0  !   !END!
3828!  X= 621.600,   5194.050,   32.12,   0  !   !END!
3829!  X= 621.600,   5194.100,   33.73,   0  !   !END!
3830!  X= 621.600,   5194.150,   36.00,   0  !   !END!
3831!  X= 621.600,   5194.200,   37.48,   0  !   !END!
3832!  X= 621.600,   5194.250,   39.43,   0  !   !END!
3833!  X= 621.600,   5194.300,   40.00,   0  !   !END!
3834!  X= 621.600,   5194.350,   44.00,   0  !   !END!
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3835!  X= 621.600,   5194.400,   45.67,   0  !   !END!
3836!  X= 621.600,   5194.450,   49.00,   0  !   !END!
3837!  X= 621.600,   5194.500,   49.00,   0  !   !END!
3838!  X= 621.600,   5194.550,   52.51,   0  !   !END!
3839!  X= 621.600,   5194.600,   56.00,   0  !   !END!
3840!  X= 621.600,   5194.650,   56.00,   0  !   !END!
3841!  X= 621.600,   5194.700,   57.23,   0  !   !END!
3842!  X= 621.600,   5194.750,   57.00,   0  !   !END!
3843!  X= 621.600,   5194.800,   57.00,   0  !   !END!
3844!  X= 621.600,   5194.850,   56.72,   0  !   !END!
3845!  X= 621.600,   5194.900,   57.26,   0  !   !END!
3846!  X= 621.600,   5194.950,   57.00,   0  !   !END!
3847!  X= 621.600,   5195.000,   57.47,   0  !   !END!
3848!  X= 621.600,   5195.050,   53.39,   0  !   !END!
3849!  X= 621.600,   5195.100,   53.00,   0  !   !END!
3850!  X= 621.600,   5195.150,   50.39,   0  !   !END!
3851!  X= 621.600,   5195.200,   49.52,   0  !   !END!
3852!  X= 621.600,   5195.250,   49.41,   0  !   !END!
3853!  X= 621.600,   5195.300,   52.00,   0  !   !END!
3854!  X= 621.600,   5195.350,   53.82,   0  !   !END!
3855!  X= 621.600,   5195.400,   57.20,   0  !   !END!
3856!  X= 621.600,   5195.450,   62.42,   0  !   !END!
3857!  X= 621.600,   5195.500,   63.28,   0  !   !END!
3858!  X= 621.600,   5195.550,   65.00,   0  !   !END!
3859!  X= 621.600,   5195.600,   67.00,   0  !   !END!
3860!  X= 621.600,   5195.700,   68.02,   0  !   !END!
3861!  X= 621.600,   5195.800,   66.00,   0  !   !END!
3862!  X= 621.600,   5195.900,   61.44,   0  !   !END!
3863!  X= 621.600,   5196.000,   52.87,   0  !   !END!
3864!  X= 621.600,   5196.100,   51.39,   0  !   !END!
3865!  X= 621.600,   5196.200,   48.53,   0  !   !END!
3866!  X= 621.600,   5196.300,   47.48,   0  !   !END!
3867!  X= 621.600,   5196.400,   47.50,   0  !   !END!
3868!  X= 621.600,   5196.500,   50.91,   0  !   !END!
3869!  X= 621.600,   5196.600,   46.76,   0  !   !END!
3870!  X= 621.600,   5196.700,   47.54,   0  !   !END!
3871!  X= 621.600,   5196.800,   48.77,   0  !   !END!
3872!  X= 621.600,   5196.900,   49.25,   0  !   !END!
3873!  X= 621.600,   5197.000,   49.73,   0  !   !END!
3874!  X= 621.600,   5197.100,   48.26,   0  !   !END!
3875!  X= 621.600,   5197.200,   47.81,   0  !   !END!
3876!  X= 621.600,   5197.300,   45.79,   0  !   !END!
3877!  X= 621.600,   5197.400,   43.95,   0  !   !END!
3878!  X= 621.600,   5197.500,   44.15,   0  !   !END!
3879!  X= 621.600,   5197.600,   44.35,   0  !   !END!
3880!  X= 621.600,   5197.700,   45.32,   0  !   !END!
3881!  X= 621.600,   5197.800,   46.53,   0  !   !END!
3882!  X= 621.600,   5197.900,   48.01,   0  !   !END!
3883!  X= 621.600,   5198.000,   48.56,   0  !   !END!
3884!  X= 621.600,   5198.100,   52.27,   0  !   !END!
3885!  X= 621.600,   5198.200,   50.48,   0  !   !END!
3886!  X= 621.600,   5198.300,   45.92,   0  !   !END!
3887!  X= 621.600,   5198.400,   47.41,   0  !   !END!
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3888!  X= 621.600,   5198.500,   51.40,   0  !   !END!
3889!  X= 621.600,   5198.600,   52.54,   0  !   !END!
3890!  X= 621.600,   5198.700,   53.40,   0  !   !END!
3891!  X= 621.600,   5198.800,   54.78,   0  !   !END!
3892!  X= 621.600,   5198.900,   55.85,   0  !   !END!
3893!  X= 621.600,   5199.000,   57.69,   0  !   !END!
3894!  X= 621.650,   5193.600,   14.36,   0  !   !END!
3895!  X= 621.650,   5193.650,   15.69,   0  !   !END!
3896!  X= 621.650,   5193.700,   18.81,   0  !   !END!
3897!  X= 621.650,   5193.750,   24.96,   0  !   !END!
3898!  X= 621.650,   5193.800,   27.00,   0  !   !END!
3899!  X= 621.650,   5193.850,   29.21,   0  !   !END!
3900!  X= 621.650,   5193.900,   30.43,   0  !   !END!
3901!  X= 621.650,   5193.950,   32.76,   0  !   !END!
3902!  X= 621.650,   5194.000,   33.96,   0  !   !END!
3903!  X= 621.650,   5194.050,   33.61,   0  !   !END!
3904!  X= 621.650,   5194.100,   35.00,   0  !   !END!
3905!  X= 621.650,   5194.150,   36.46,   0  !   !END!
3906!  X= 621.650,   5194.200,   39.00,   0  !   !END!
3907!  X= 621.650,   5194.250,   41.80,   0  !   !END!
3908!  X= 621.650,   5194.300,   41.66,   0  !   !END!
3909!  X= 621.650,   5194.350,   45.00,   0  !   !END!
3910!  X= 621.650,   5194.400,   47.35,   0  !   !END!
3911!  X= 621.650,   5194.450,   48.60,   0  !   !END!
3912!  X= 621.650,   5194.500,   49.00,   0  !   !END!
3913!  X= 621.650,   5194.550,   52.00,   0  !   !END!
3914!  X= 621.650,   5194.600,   53.00,   0  !   !END!
3915!  X= 621.650,   5194.650,   56.00,   0  !   !END!
3916!  X= 621.650,   5194.700,   57.00,   0  !   !END!
3917!  X= 621.650,   5194.750,   55.00,   0  !   !END!
3918!  X= 621.650,   5194.800,   54.00,   0  !   !END!
3919!  X= 621.650,   5194.850,   54.30,   0  !   !END!
3920!  X= 621.650,   5194.900,   53.78,   0  !   !END!
3921!  X= 621.650,   5194.950,   52.92,   0  !   !END!
3922!  X= 621.650,   5195.000,   53.64,   0  !   !END!
3923!  X= 621.650,   5195.050,   54.00,   0  !   !END!
3924!  X= 621.650,   5195.100,   51.00,   0  !   !END!
3925!  X= 621.650,   5195.150,   47.51,   0  !   !END!
3926!  X= 621.650,   5195.200,   47.00,   0  !   !END!
3927!  X= 621.650,   5195.250,   48.62,   0  !   !END!
3928!  X= 621.650,   5195.300,   50.00,   0  !   !END!
3929!  X= 621.650,   5195.350,   53.67,   0  !   !END!
3930!  X= 621.650,   5195.400,   57.28,   0  !   !END!
3931!  X= 621.650,   5195.450,   61.00,   0  !   !END!
3932!  X= 621.650,   5195.500,   62.00,   0  !   !END!
3933!  X= 621.650,   5195.550,   64.77,   0  !   !END!
3934!  X= 621.650,   5195.600,   64.00,   0  !   !END!
3935!  X= 621.700,   5192.600,   0.00,   0  !   !END!
3936!  X= 621.700,   5192.700,   0.00,   0  !   !END!
3937!  X= 621.700,   5192.800,   0.00,   0  !   !END!
3938!  X= 621.700,   5192.900,   0.00,   0  !   !END!
3939!  X= 621.700,   5193.000,   0.00,   0  !   !END!
3940!  X= 621.700,   5193.100,   0.00,   0  !   !END!
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3941!  X= 621.700,   5193.200,   0.00,   0  !   !END!
3942!  X= 621.700,   5193.300,   0.00,   0  !   !END!
3943!  X= 621.700,   5193.400,   2.60,   0  !   !END!
3944!  X= 621.700,   5193.500,   7.79,   0  !   !END!
3945!  X= 621.700,   5193.600,   12.82,   0  !   !END!
3946!  X= 621.700,   5193.650,   15.17,   0  !   !END!
3947!  X= 621.700,   5193.700,   18.08,   0  !   !END!
3948!  X= 621.700,   5193.750,   26.78,   0  !   !END!
3949!  X= 621.700,   5193.800,   28.45,   0  !   !END!
3950!  X= 621.700,   5193.850,   29.92,   0  !   !END!
3951!  X= 621.700,   5193.900,   31.39,   0  !   !END!
3952!  X= 621.700,   5193.950,   32.27,   0  !   !END!
3953!  X= 621.700,   5194.000,   33.46,   0  !   !END!
3954!  X= 621.700,   5194.050,   33.51,   0  !   !END!
3955!  X= 621.700,   5194.100,   35.00,   0  !   !END!
3956!  X= 621.700,   5194.150,   37.00,   0  !   !END!
3957!  X= 621.700,   5194.200,   40.00,   0  !   !END!
3958!  X= 621.700,   5194.250,   40.00,   0  !   !END!
3959!  X= 621.700,   5194.300,   42.76,   0  !   !END!
3960!  X= 621.700,   5194.350,   43.00,   0  !   !END!
3961!  X= 621.700,   5194.400,   45.00,   0  !   !END!
3962!  X= 621.700,   5194.450,   46.02,   0  !   !END!
3963!  X= 621.700,   5194.500,   48.49,   0  !   !END!
3964!  X= 621.700,   5194.550,   50.25,   0  !   !END!
3965!  X= 621.700,   5194.600,   51.67,   0  !   !END!
3966!  X= 621.700,   5194.650,   51.97,   0  !   !END!
3967!  X= 621.700,   5194.700,   50.65,   0  !   !END!
3968!  X= 621.700,   5194.750,   54.00,   0  !   !END!
3969!  X= 621.700,   5194.800,   52.56,   0  !   !END!
3970!  X= 621.700,   5194.850,   50.58,   0  !   !END!
3971!  X= 621.700,   5194.900,   51.00,   0  !   !END!
3972!  X= 621.700,   5194.950,   49.00,   0  !   !END!
3973!  X= 621.700,   5195.000,   45.54,   0  !   !END!
3974!  X= 621.700,   5195.050,   46.00,   0  !   !END!
3975!  X= 621.700,   5195.100,   43.08,   0  !   !END!
3976!  X= 621.700,   5195.150,   45.18,   0  !   !END!
3977!  X= 621.700,   5195.200,   47.00,   0  !   !END!
3978!  X= 621.700,   5195.250,   47.66,   0  !   !END!
3979!  X= 621.700,   5195.300,   49.00,   0  !   !END!
3980!  X= 621.700,   5195.350,   52.15,   0  !   !END!
3981!  X= 621.700,   5195.400,   55.39,   0  !   !END!
3982!  X= 621.700,   5195.450,   58.00,   0  !   !END!
3983!  X= 621.700,   5195.500,   57.39,   0  !   !END!
3984!  X= 621.700,   5195.550,   61.00,   0  !   !END!
3985!  X= 621.700,   5195.600,   59.50,   0  !   !END!
3986!  X= 621.700,   5195.700,   58.23,   0  !   !END!
3987!  X= 621.700,   5195.800,   57.00,   0  !   !END!
3988!  X= 621.700,   5195.900,   55.00,   0  !   !END!
3989!  X= 621.700,   5196.000,   47.90,   0  !   !END!
3990!  X= 621.700,   5196.100,   44.63,   0  !   !END!
3991!  X= 621.700,   5196.200,   40.13,   0  !   !END!
3992!  X= 621.700,   5196.300,   41.00,   0  !   !END!
3993!  X= 621.700,   5196.400,   42.40,   0  !   !END!
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3994!  X= 621.700,   5196.500,   41.71,   0  !   !END!
3995!  X= 621.700,   5196.600,   42.29,   0  !   !END!
3996!  X= 621.700,   5196.700,   43.36,   0  !   !END!
3997!  X= 621.700,   5196.800,   44.69,   0  !   !END!
3998!  X= 621.700,   5196.900,   45.53,   0  !   !END!
3999!  X= 621.700,   5197.000,   45.83,   0  !   !END!
4000!  X= 621.700,   5197.100,   45.24,   0  !   !END!
4001!  X= 621.700,   5197.200,   44.07,   0  !   !END!
4002!  X= 621.700,   5197.300,   43.29,   0  !   !END!
4003!  X= 621.700,   5197.400,   42.74,   0  !   !END!
4004!  X= 621.700,   5197.500,   42.04,   0  !   !END!
4005!  X= 621.700,   5197.600,   41.53,   0  !   !END!
4006!  X= 621.700,   5197.700,   42.29,   0  !   !END!
4007!  X= 621.700,   5197.800,   43.59,   0  !   !END!
4008!  X= 621.700,   5197.900,   43.72,   0  !   !END!
4009!  X= 621.700,   5198.000,   43.44,   0  !   !END!
4010!  X= 621.700,   5198.100,   44.44,   0  !   !END!
4011!  X= 621.700,   5198.200,   43.88,   0  !   !END!
4012!  X= 621.700,   5198.300,   38.29,   0  !   !END!
4013!  X= 621.700,   5198.400,   39.09,   0  !   !END!
4014!  X= 621.700,   5198.500,   41.91,   0  !   !END!
4015!  X= 621.700,   5198.600,   42.04,   0  !   !END!
4016!  X= 621.700,   5198.700,   43.96,   0  !   !END!
4017!  X= 621.700,   5198.800,   45.55,   0  !   !END!
4018!  X= 621.700,   5198.900,   46.29,   0  !   !END!
4019!  X= 621.700,   5199.000,   47.55,   0  !   !END!
4020!  X= 621.750,   5193.600,   12.93,   0  !   !END!
4021!  X= 621.750,   5193.650,   16.23,   0  !   !END!
4022!  X= 621.750,   5193.700,   18.57,   0  !   !END!
4023!  X= 621.750,   5193.750,   23.00,   0  !   !END!
4024!  X= 621.750,   5193.800,   28.02,   0  !   !END!
4025!  X= 621.750,   5193.850,   29.30,   0  !   !END!
4026!  X= 621.750,   5193.900,   30.70,   0  !   !END!
4027!  X= 621.750,   5193.950,   31.60,   0  !   !END!
4028!  X= 621.750,   5194.000,   32.53,   0  !   !END!
4029!  X= 621.750,   5194.050,   33.95,   0  !   !END!
4030!  X= 621.750,   5194.100,   34.26,   0  !   !END!
4031!  X= 621.750,   5194.150,   36.00,   0  !   !END!
4032!  X= 621.750,   5194.200,   37.00,   0  !   !END!
4033!  X= 621.750,   5194.250,   38.00,   0  !   !END!
4034!  X= 621.750,   5194.300,   39.00,   0  !   !END!
4035!  X= 621.750,   5194.350,   40.00,   0  !   !END!
4036!  X= 621.750,   5194.400,   41.00,   0  !   !END!
4037!  X= 621.750,   5194.450,   44.34,   0  !   !END!
4038!  X= 621.750,   5194.500,   45.09,   0  !   !END!
4039!  X= 621.750,   5194.550,   47.00,   0  !   !END!
4040!  X= 621.750,   5194.600,   48.00,   0  !   !END!
4041!  X= 621.750,   5194.650,   47.00,   0  !   !END!
4042!  X= 621.750,   5194.700,   48.28,   0  !   !END!
4043!  X= 621.750,   5194.750,   47.92,   0  !   !END!
4044!  X= 621.750,   5194.800,   46.82,   0  !   !END!
4045!  X= 621.750,   5194.850,   45.37,   0  !   !END!
4046!  X= 621.750,   5194.900,   42.00,   0  !   !END!
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4047!  X= 621.750,   5194.950,   39.39,   0  !   !END!
4048!  X= 621.750,   5195.000,   39.00,   0  !   !END!
4049!  X= 621.750,   5195.050,   39.23,   0  !   !END!
4050!  X= 621.750,   5195.100,   42.00,   0  !   !END!
4051!  X= 621.750,   5195.150,   45.00,   0  !   !END!
4052!  X= 621.750,   5195.200,   46.44,   0  !   !END!
4053!  X= 621.750,   5195.250,   47.41,   0  !   !END!
4054!  X= 621.750,   5195.300,   49.05,   0  !   !END!
4055!  X= 621.750,   5195.350,   52.19,   0  !   !END!
4056!  X= 621.750,   5195.400,   52.00,   0  !   !END!
4057!  X= 621.750,   5195.450,   54.55,   0  !   !END!
4058!  X= 621.750,   5195.500,   54.00,   0  !   !END!
4059!  X= 621.750,   5195.550,   56.45,   0  !   !END!
4060!  X= 621.750,   5195.600,   55.00,   0  !   !END!
4061!  X= 621.776,   5196.763,   44.00,   0  !   !END!
4062!  X= 621.800,   5192.600,   0.00,   0  !   !END!
4063!  X= 621.800,   5192.700,   0.00,   0  !   !END!
4064!  X= 621.800,   5192.800,   0.00,   0  !   !END!
4065!  X= 621.800,   5192.900,   0.00,   0  !   !END!
4066!  X= 621.800,   5193.000,   0.00,   0  !   !END!
4067!  X= 621.800,   5193.100,   0.00,   0  !   !END!
4068!  X= 621.800,   5193.200,   0.00,   0  !   !END!
4069!  X= 621.800,   5193.300,   0.00,   0  !   !END!
4070!  X= 621.800,   5193.400,   0.00,   0  !   !END!
4071!  X= 621.800,   5193.500,   5.71,   0  !   !END!
4072!  X= 621.800,   5193.600,   12.37,   0  !   !END!
4073!  X= 621.800,   5193.650,   16.20,   0  !   !END!
4074!  X= 621.800,   5193.700,   18.71,   0  !   !END!
4075!  X= 621.800,   5193.750,   20.77,   0  !   !END!
4076!  X= 621.800,   5193.800,   24.31,   0  !   !END!
4077!  X= 621.800,   5193.850,   28.04,   0  !   !END!
4078!  X= 621.800,   5193.900,   28.79,   0  !   !END!
4079!  X= 621.800,   5193.950,   29.37,   0  !   !END!
4080!  X= 621.800,   5194.000,   29.84,   0  !   !END!
4081!  X= 621.800,   5194.050,   30.01,   0  !   !END!
4082!  X= 621.800,   5194.100,   31.97,   0  !   !END!
4083!  X= 621.800,   5194.150,   33.62,   0  !   !END!
4084!  X= 621.800,   5194.200,   33.00,   0  !   !END!
4085!  X= 621.800,   5194.250,   35.00,   0  !   !END!
4086!  X= 621.800,   5194.300,   35.56,   0  !   !END!
4087!  X= 621.800,   5194.350,   36.54,   0  !   !END!
4088!  X= 621.800,   5194.400,   38.00,   0  !   !END!
4089!  X= 621.800,   5194.450,   40.90,   0  !   !END!
4090!  X= 621.800,   5194.500,   41.76,   0  !   !END!
4091!  X= 621.800,   5194.550,   42.53,   0  !   !END!
4092!  X= 621.800,   5194.600,   41.00,   0  !   !END!
4093!  X= 621.800,   5194.650,   41.00,   0  !   !END!
4094!  X= 621.800,   5194.700,   41.65,   0  !   !END!
4095!  X= 621.800,   5194.750,   40.83,   0  !   !END!
4096!  X= 621.800,   5194.800,   39.01,   0  !   !END!
4097!  X= 621.800,   5194.850,   37.51,   0  !   !END!
4098!  X= 621.800,   5194.900,   35.04,   0  !   !END!
4099!  X= 621.800,   5194.950,   35.50,   0  !   !END!
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4100!  X= 621.800,   5195.000,   36.19,   0  !   !END!
4101!  X= 621.800,   5195.050,   38.75,   0  !   !END!
4102!  X= 621.800,   5195.100,   39.88,   0  !   !END!
4103!  X= 621.800,   5195.150,   43.00,   0  !   !END!
4104!  X= 621.800,   5195.200,   45.52,   0  !   !END!
4105!  X= 621.800,   5195.250,   45.26,   0  !   !END!
4106!  X= 621.800,   5195.300,   48.00,   0  !   !END!
4107!  X= 621.800,   5195.350,   46.00,   0  !   !END!
4108!  X= 621.800,   5195.400,   49.13,   0  !   !END!
4109!  X= 621.800,   5195.450,   51.41,   0  !   !END!
4110!  X= 621.800,   5195.500,   53.48,   0  !   !END!
4111!  X= 621.800,   5195.550,   55.00,   0  !   !END!
4112!  X= 621.800,   5195.600,   51.82,   0  !   !END!
4113!  X= 621.800,   5195.700,   50.00,   0  !   !END!
4114!  X= 621.800,   5195.800,   47.89,   0  !   !END!
4115!  X= 621.800,   5195.900,   46.00,   0  !   !END!
4116!  X= 621.800,   5196.000,   38.25,   0  !   !END!
4117!  X= 621.800,   5196.100,   35.53,   0  !   !END!
4118!  X= 621.800,   5196.200,   36.00,   0  !   !END!
4119!  X= 621.800,   5196.300,   36.00,   0  !   !END!
4120!  X= 621.800,   5196.400,   36.19,   0  !   !END!
4121!  X= 621.800,   5196.500,   38.66,   0  !   !END!
4122!  X= 621.800,   5196.600,   41.36,   0  !   !END!
4123!  X= 621.800,   5196.700,   43.68,   0  !   !END!
4124!  X= 621.800,   5196.800,   44.52,   0  !   !END!
4125!  X= 621.800,   5196.900,   44.44,   0  !   !END!
4126!  X= 621.800,   5197.000,   43.60,   0  !   !END!
4127!  X= 621.800,   5197.100,   42.62,   0  !   !END!
4128!  X= 621.800,   5197.200,   41.90,   0  !   !END!
4129!  X= 621.800,   5197.300,   40.24,   0  !   !END!
4130!  X= 621.800,   5197.400,   38.98,   0  !   !END!
4131!  X= 621.800,   5197.500,   38.57,   0  !   !END!
4132!  X= 621.800,   5197.600,   38.96,   0  !   !END!
4133!  X= 621.800,   5197.700,   37.96,   0  !   !END!
4134!  X= 621.800,   5197.800,   37.29,   0  !   !END!
4135!  X= 621.800,   5197.900,   36.46,   0  !   !END!
4136!  X= 621.800,   5198.000,   35.69,   0  !   !END!
4137!  X= 621.800,   5198.100,   35.92,   0  !   !END!
4138!  X= 621.800,   5198.200,   36.14,   0  !   !END!
4139!  X= 621.800,   5198.300,   32.26,   0  !   !END!
4140!  X= 621.800,   5198.400,   29.92,   0  !   !END!
4141!  X= 621.800,   5198.500,   30.86,   0  !   !END!
4142!  X= 621.800,   5198.600,   31.38,   0  !   !END!
4143!  X= 621.800,   5198.700,   33.51,   0  !   !END!
4144!  X= 621.800,   5198.800,   37.26,   0  !   !END!
4145!  X= 621.800,   5198.900,   38.34,   0  !   !END!
4146!  X= 621.800,   5199.000,   39.32,   0  !   !END!
4147!  X= 621.850,   5193.600,   12.16,   0  !   !END!
4148!  X= 621.850,   5193.650,   15.21,   0  !   !END!
4149!  X= 621.850,   5193.700,   17.24,   0  !   !END!
4150!  X= 621.850,   5193.750,   19.00,   0  !   !END!
4151!  X= 621.850,   5193.800,   20.73,   0  !   !END!
4152!  X= 621.850,   5193.850,   22.29,   0  !   !END!
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4153!  X= 621.850,   5193.900,   25.66,   0  !   !END!
4154!  X= 621.850,   5193.950,   25.16,   0  !   !END!
4155!  X= 621.850,   5194.000,   25.80,   0  !   !END!
4156!  X= 621.850,   5194.050,   26.78,   0  !   !END!
4157!  X= 621.850,   5194.100,   28.39,   0  !   !END!
4158!  X= 621.850,   5194.150,   28.00,   0  !   !END!
4159!  X= 621.850,   5194.200,   30.41,   0  !   !END!
4160!  X= 621.850,   5194.250,   30.45,   0  !   !END!
4161!  X= 621.850,   5194.300,   31.81,   0  !   !END!
4162!  X= 621.850,   5194.350,   32.97,   0  !   !END!
4163!  X= 621.850,   5194.400,   33.99,   0  !   !END!
4164!  X= 621.850,   5194.450,   36.00,   0  !   !END!
4165!  X= 621.850,   5194.500,   36.58,   0  !   !END!
4166!  X= 621.850,   5194.550,   36.87,   0  !   !END!
4167!  X= 621.850,   5194.600,   36.00,   0  !   !END!
4168!  X= 621.850,   5194.650,   34.64,   0  !   !END!
4169!  X= 621.850,   5194.700,   36.00,   0  !   !END!
4170!  X= 621.850,   5194.750,   32.00,   0  !   !END!
4171!  X= 621.850,   5194.800,   32.59,   0  !   !END!
4172!  X= 621.850,   5194.850,   32.14,   0  !   !END!
4173!  X= 621.850,   5194.900,   32.92,   0  !   !END!
4174!  X= 621.850,   5194.950,   32.05,   0  !   !END!
4175!  X= 621.850,   5195.000,   33.00,   0  !   !END!
4176!  X= 621.850,   5195.050,   37.00,   0  !   !END!
4177!  X= 621.850,   5195.100,   37.39,   0  !   !END!
4178!  X= 621.850,   5195.150,   38.75,   0  !   !END!
4179!  X= 621.850,   5195.200,   41.51,   0  !   !END!
4180!  X= 621.850,   5195.250,   41.83,   0  !   !END!
4181!  X= 621.850,   5195.300,   42.45,   0  !   !END!
4182!  X= 621.850,   5195.350,   45.69,   0  !   !END!
4183!  X= 621.850,   5195.400,   51.00,   0  !   !END!
4184!  X= 621.850,   5195.450,   50.00,   0  !   !END!
4185!  X= 621.850,   5195.500,   49.00,   0  !   !END!
4186!  X= 621.850,   5195.550,   48.99,   0  !   !END!
4187!  X= 621.850,   5195.600,   47.24,   0  !   !END!
4188!  X= 621.900,   5192.600,   0.00,   0  !   !END!
4189!  X= 621.900,   5192.700,   0.00,   0  !   !END!
4190!  X= 621.900,   5192.800,   0.00,   0  !   !END!
4191!  X= 621.900,   5192.900,   0.00,   0  !   !END!
4192!  X= 621.900,   5193.000,   0.00,   0  !   !END!
4193!  X= 621.900,   5193.100,   0.00,   0  !   !END!
4194!  X= 621.900,   5193.200,   0.00,   0  !   !END!
4195!  X= 621.900,   5193.300,   0.00,   0  !   !END!
4196!  X= 621.900,   5193.400,   0.00,   0  !   !END!
4197!  X= 621.900,   5193.500,   4.74,   0  !   !END!
4198!  X= 621.900,   5193.600,   7.54,   0  !   !END!
4199!  X= 621.900,   5193.650,   14.48,   0  !   !END!
4200!  X= 621.900,   5193.700,   16.46,   0  !   !END!
4201!  X= 621.900,   5193.750,   16.95,   0  !   !END!
4202!  X= 621.900,   5193.800,   18.08,   0  !   !END!
4203!  X= 621.900,   5193.850,   19.29,   0  !   !END!
4204!  X= 621.900,   5193.900,   20.04,   0  !   !END!
4205!  X= 621.900,   5193.950,   21.37,   0  !   !END!
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4206!  X= 621.900,   5194.000,   21.79,   0  !   !END!
4207!  X= 621.900,   5194.050,   22.04,   0  !   !END!
4208!  X= 621.900,   5194.100,   24.73,   0  !   !END!
4209!  X= 621.900,   5194.150,   25.60,   0  !   !END!
4210!  X= 621.900,   5194.200,   27.00,   0  !   !END!
4211!  X= 621.900,   5194.250,   27.90,   0  !   !END!
4212!  X= 621.900,   5194.300,   27.00,   0  !   !END!
4213!  X= 621.900,   5194.350,   28.18,   0  !   !END!
4214!  X= 621.900,   5194.400,   31.00,   0  !   !END!
4215!  X= 621.900,   5194.450,   29.72,   0  !   !END!
4216!  X= 621.900,   5194.500,   31.88,   0  !   !END!
4217!  X= 621.900,   5194.550,   31.00,   0  !   !END!
4218!  X= 621.900,   5194.600,   27.83,   0  !   !END!
4219!  X= 621.900,   5194.650,   27.29,   0  !   !END!
4220!  X= 621.900,   5194.700,   30.57,   0  !   !END!
4221!  X= 621.900,   5194.750,   28.41,   0  !   !END!
4222!  X= 621.900,   5194.800,   28.39,   0  !   !END!
4223!  X= 621.900,   5194.850,   28.11,   0  !   !END!
4224!  X= 621.900,   5194.900,   30.00,   0  !   !END!
4225!  X= 621.900,   5194.950,   29.65,   0  !   !END!
4226!  X= 621.900,   5195.000,   31.12,   0  !   !END!
4227!  X= 621.900,   5195.050,   30.71,   0  !   !END!
4228!  X= 621.900,   5195.100,   33.27,   0  !   !END!
4229!  X= 621.900,   5195.150,   34.36,   0  !   !END!
4230!  X= 621.900,   5195.200,   35.16,   0  !   !END!
4231!  X= 621.900,   5195.250,   34.47,   0  !   !END!
4232!  X= 621.900,   5195.300,   38.00,   0  !   !END!
4233!  X= 621.900,   5195.350,   38.73,   0  !   !END!
4234!  X= 621.900,   5195.400,   44.24,   0  !   !END!
4235!  X= 621.900,   5195.450,   42.86,   0  !   !END!
4236!  X= 621.900,   5195.500,   43.09,   0  !   !END!
4237!  X= 621.900,   5195.550,   47.00,   0  !   !END!
4238!  X= 621.900,   5195.600,   45.38,   0  !   !END!
4239!  X= 621.900,   5195.700,   41.00,   0  !   !END!
4240!  X= 621.900,   5195.800,   37.89,   0  !   !END!
4241!  X= 621.900,   5195.900,   36.00,   0  !   !END!
4242!  X= 621.900,   5196.000,   36.17,   0  !   !END!
4243!  X= 621.900,   5196.100,   36.00,   0  !   !END!
4244!  X= 621.900,   5196.200,   36.00,   0  !   !END!
4245!  X= 621.900,   5196.300,   37.47,   0  !   !END!
4246!  X= 621.900,   5196.400,   39.43,   0  !   !END!
4247!  X= 621.900,   5196.500,   42.60,   0  !   !END!
4248!  X= 621.900,   5196.600,   44.43,   0  !   !END!
4249!  X= 621.900,   5196.700,   44.88,   0  !   !END!
4250!  X= 621.900,   5196.800,   44.24,   0  !   !END!
4251!  X= 621.900,   5196.900,   43.52,   0  !   !END!
4252!  X= 621.900,   5197.000,   41.93,   0  !   !END!
4253!  X= 621.900,   5197.100,   39.86,   0  !   !END!
4254!  X= 621.900,   5197.200,   37.65,   0  !   !END!
4255!  X= 621.900,   5197.300,   35.77,   0  !   !END!
4256!  X= 621.900,   5197.400,   34.88,   0  !   !END!
4257!  X= 621.900,   5197.500,   32.67,   0  !   !END!
4258!  X= 621.900,   5197.600,   31.54,   0  !   !END!
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4259!  X= 621.900,   5197.700,   30.46,   0  !   !END!
4260!  X= 621.900,   5197.800,   30.04,   0  !   !END!
4261!  X= 621.900,   5197.900,   28.75,   0  !   !END!
4262!  X= 621.900,   5198.000,   27.80,   0  !   !END!
4263!  X= 621.900,   5198.100,   27.87,   0  !   !END!
4264!  X= 621.900,   5198.200,   27.17,   0  !   !END!
4265!  X= 621.900,   5198.300,   23.19,   0  !   !END!
4266!  X= 621.900,   5198.400,   23.21,   0  !   !END!
4267!  X= 621.900,   5198.500,   24.96,   0  !   !END!
4268!  X= 621.900,   5198.600,   28.54,   0  !   !END!
4269!  X= 621.900,   5198.700,   30.24,   0  !   !END!
4270!  X= 621.900,   5198.800,   32.14,   0  !   !END!
4271!  X= 621.900,   5198.900,   36.73,   0  !   !END!
4272!  X= 621.900,   5199.000,   38.19,   0  !   !END!
4273!  X= 621.950,   5193.600,   5.71,   0  !   !END!
4274!  X= 621.950,   5193.650,   7.23,   0  !   !END!
4275!  X= 621.950,   5193.700,   11.54,   0  !   !END!
4276!  X= 621.950,   5193.750,   14.03,   0  !   !END!
4277!  X= 621.950,   5193.800,   15.28,   0  !   !END!
4278!  X= 621.950,   5193.850,   16.34,   0  !   !END!
4279!  X= 621.950,   5193.900,   17.24,   0  !   !END!
4280!  X= 621.950,   5193.950,   17.80,   0  !   !END!
4281!  X= 621.950,   5194.000,   19.31,   0  !   !END!
4282!  X= 621.950,   5194.050,   19.77,   0  !   !END!
4283!  X= 621.950,   5194.100,   21.99,   0  !   !END!
4284!  X= 621.950,   5194.150,   21.79,   0  !   !END!
4285!  X= 621.950,   5194.200,   24.00,   0  !   !END!
4286!  X= 621.950,   5194.250,   24.30,   0  !   !END!
4287!  X= 621.950,   5194.300,   24.10,   0  !   !END!
4288!  X= 621.950,   5194.350,   25.14,   0  !   !END!
4289!  X= 621.950,   5194.400,   25.48,   0  !   !END!
4290!  X= 621.950,   5194.450,   24.53,   0  !   !END!
4291!  X= 621.950,   5194.500,   25.00,   0  !   !END!
4292!  X= 621.950,   5194.550,   23.00,   0  !   !END!
4293!  X= 621.950,   5194.600,   23.02,   0  !   !END!
4294!  X= 621.950,   5194.650,   24.40,   0  !   !END!
4295!  X= 621.950,   5194.700,   24.59,   0  !   !END!
4296!  X= 621.950,   5194.750,   24.05,   0  !   !END!
4297!  X= 621.950,   5194.800,   24.75,   0  !   !END!
4298!  X= 621.950,   5194.850,   26.97,   0  !   !END!
4299!  X= 621.950,   5194.900,   27.27,   0  !   !END!
4300!  X= 621.950,   5194.950,   28.00,   0  !   !END!
4301!  X= 621.950,   5195.000,   27.24,   0  !   !END!
4302!  X= 621.950,   5195.050,   28.16,   0  !   !END!
4303!  X= 621.950,   5195.100,   35.11,   0  !   !END!
4304!  X= 621.950,   5195.150,   32.23,   0  !   !END!
4305!  X= 621.950,   5195.200,   33.85,   0  !   !END!
4306!  X= 621.950,   5195.250,   33.67,   0  !   !END!
4307!  X= 621.950,   5195.300,   34.00,   0  !   !END!
4308!  X= 621.950,   5195.350,   35.19,   0  !   !END!
4309!  X= 621.950,   5195.400,   39.41,   0  !   !END!
4310!  X= 621.950,   5195.450,   42.00,   0  !   !END!
4311!  X= 621.950,   5195.500,   41.00,   0  !   !END!
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4312!  X= 621.950,   5195.550,   41.04,   0  !   !END!
4313!  X= 621.950,   5195.600,   42.00,   0  !   !END!
4314!  X= 622.000,   5192.000,   0.00,   0  !   !END!
4315!  X= 622.000,   5192.500,   0.00,   0  !   !END!
4316!  X= 622.000,   5192.600,   0.00,   0  !   !END!
4317!  X= 622.000,   5192.700,   0.00,   0  !   !END!
4318!  X= 622.000,   5192.800,   0.00,   0  !   !END!
4319!  X= 622.000,   5192.900,   0.00,   0  !   !END!
4320!  X= 622.000,   5193.000,   0.00,   0  !   !END!
4321!  X= 622.000,   5193.100,   0.00,   0  !   !END!
4322!  X= 622.000,   5193.200,   0.00,   0  !   !END!
4323!  X= 622.000,   5193.300,   0.00,   0  !   !END!
4324!  X= 622.000,   5193.400,   0.74,   0  !   !END!
4325!  X= 622.000,   5193.500,   5.44,   0  !   !END!
4326!  X= 622.000,   5193.600,   4.84,   0  !   !END!
4327!  X= 622.000,   5193.650,   7.33,   0  !   !END!
4328!  X= 622.000,   5193.700,   10.25,   0  !   !END!
4329!  X= 622.000,   5193.750,   10.96,   0  !   !END!
4330!  X= 622.000,   5193.800,   12.35,   0  !   !END!
4331!  X= 622.000,   5193.850,   14.42,   0  !   !END!
4332!  X= 622.000,   5193.900,   15.41,   0  !   !END!
4333!  X= 622.000,   5193.950,   16.70,   0  !   !END!
4334!  X= 622.000,   5194.000,   17.72,   0  !   !END!
4335!  X= 622.000,   5194.050,   17.82,   0  !   !END!
4336!  X= 622.000,   5194.100,   18.64,   0  !   !END!
4337!  X= 622.000,   5194.150,   20.00,   0  !   !END!
4338!  X= 622.000,   5194.200,   20.87,   0  !   !END!
4339!  X= 622.000,   5194.250,   20.64,   0  !   !END!
4340!  X= 622.000,   5194.300,   21.00,   0  !   !END!
4341!  X= 622.000,   5194.350,   20.54,   0  !   !END!
4342!  X= 622.000,   5194.400,   20.00,   0  !   !END!
4343!  X= 622.000,   5194.450,   18.90,   0  !   !END!
4344!  X= 622.000,   5194.500,   17.96,   0  !   !END!
4345!  X= 622.000,   5194.550,   17.90,   0  !   !END!
4346!  X= 622.000,   5194.600,   19.99,   0  !   !END!
4347!  X= 622.000,   5194.650,   20.51,   0  !   !END!
4348!  X= 622.000,   5194.700,   21.35,   0  !   !END!
4349!  X= 622.000,   5194.750,   21.78,   0  !   !END!
4350!  X= 622.000,   5194.800,   22.25,   0  !   !END!
4351!  X= 622.000,   5194.850,   23.53,   0  !   !END!
4352!  X= 622.000,   5194.900,   25.00,   0  !   !END!
4353!  X= 622.000,   5194.950,   25.09,   0  !   !END!
4354!  X= 622.000,   5195.000,   26.00,   0  !   !END!
4355!  X= 622.000,   5195.050,   31.22,   0  !   !END!
4356!  X= 622.000,   5195.100,   35.00,   0  !   !END!
4357!  X= 622.000,   5195.150,   33.00,   0  !   !END!
4358!  X= 622.000,   5195.200,   33.19,   0  !   !END!
4359!  X= 622.000,   5195.250,   33.89,   0  !   !END!
4360!  X= 622.000,   5195.300,   34.89,   0  !   !END!
4361!  X= 622.000,   5195.350,   34.89,   0  !   !END!
4362!  X= 622.000,   5195.400,   35.00,   0  !   !END!
4363!  X= 622.000,   5195.450,   37.00,   0  !   !END!
4364!  X= 622.000,   5195.500,   39.00,   0  !   !END!
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4365!  X= 622.000,   5195.550,   39.00,   0  !   !END!
4366!  X= 622.000,   5195.600,   40.00,   0  !   !END!
4367!  X= 622.000,   5195.700,   39.52,   0  !   !END!
4368!  X= 622.000,   5195.800,   42.33,   0  !   !END!
4369!  X= 622.000,   5195.900,   42.04,   0  !   !END!
4370!  X= 622.000,   5196.000,   40.40,   0  !   !END!
4371!  X= 622.000,   5196.100,   42.34,   0  !   !END!
4372!  X= 622.000,   5196.200,   43.60,   0  !   !END!
4373!  X= 622.000,   5196.300,   47.09,   0  !   !END!
4374!  X= 622.000,   5196.400,   48.47,   0  !   !END!
4375!  X= 622.000,   5196.500,   48.88,   0  !   !END!
4376!  X= 622.000,   5196.600,   47.86,   0  !   !END!
4377!  X= 622.000,   5196.700,   46.99,   0  !   !END!
4378!  X= 622.000,   5196.800,   44.82,   0  !   !END!
4379!  X= 622.000,   5196.900,   43.27,   0  !   !END!
4380!  X= 622.000,   5197.000,   40.48,   0  !   !END!
4381!  X= 622.000,   5197.100,   37.10,   0  !   !END!
4382!  X= 622.000,   5197.200,   33.23,   0  !   !END!
4383!  X= 622.000,   5197.300,   30.95,   0  !   !END!
4384!  X= 622.000,   5197.400,   28.71,   0  !   !END!
4385!  X= 622.000,   5197.500,   27.28,   0  !   !END!
4386!  X= 622.000,   5197.600,   25.24,   0  !   !END!
4387!  X= 622.000,   5197.700,   23.78,   0  !   !END!
4388!  X= 622.000,   5197.800,   22.61,   0  !   !END!
4389!  X= 622.000,   5197.900,   20.94,   0  !   !END!
4390!  X= 622.000,   5198.000,   19.49,   0  !   !END!
4391!  X= 622.000,   5198.100,   15.87,   0  !   !END!
4392!  X= 622.000,   5198.200,   14.77,   0  !   !END!
4393!  X= 622.000,   5198.300,   15.56,   0  !   !END!
4394!  X= 622.000,   5198.400,   16.22,   0  !   !END!
4395!  X= 622.000,   5198.500,   15.54,   0  !   !END!
4396!  X= 622.000,   5198.600,   19.26,   0  !   !END!
4397!  X= 622.000,   5198.700,   27.20,   0  !   !END!
4398!  X= 622.000,   5198.800,   31.94,   0  !   !END!
4399!  X= 622.000,   5198.900,   34.69,   0  !   !END!
4400!  X= 622.000,   5199.000,   36.11,   0  !   !END!
4401!  X= 622.000,   5199.500,   62.56,   0  !   !END!
4402!  X= 622.000,   5200.000,   106.10,   0  !   !END!
4403!  X= 622.050,   5193.600,   8.33,   0  !   !END!
4404!  X= 622.050,   5193.650,   9.91,   0  !   !END!
4405!  X= 622.050,   5193.700,   11.31,   0  !   !END!
4406!  X= 622.050,   5193.750,   13.12,   0  !   !END!
4407!  X= 622.050,   5193.800,   12.83,   0  !   !END!
4408!  X= 622.050,   5193.850,   13.93,   0  !   !END!
4409!  X= 622.050,   5193.900,   15.68,   0  !   !END!
4410!  X= 622.050,   5193.950,   16.96,   0  !   !END!
4411!  X= 622.050,   5194.000,   17.86,   0  !   !END!
4412!  X= 622.050,   5194.050,   18.47,   0  !   !END!
4413!  X= 622.050,   5194.100,   17.85,   0  !   !END!
4414!  X= 622.050,   5194.150,   17.19,   0  !   !END!
4415!  X= 622.050,   5194.200,   17.31,   0  !   !END!
4416!  X= 622.050,   5194.250,   17.59,   0  !   !END!
4417!  X= 622.050,   5194.300,   17.58,   0  !   !END!
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4418!  X= 622.050,   5194.350,   17.34,   0  !   !END!
4419!  X= 622.050,   5194.400,   17.00,   0  !   !END!
4420!  X= 622.050,   5194.450,   17.17,   0  !   !END!
4421!  X= 622.050,   5194.500,   17.00,   0  !   !END!
4422!  X= 622.050,   5194.550,   17.00,   0  !   !END!
4423!  X= 622.050,   5194.600,   17.37,   0  !   !END!
4424!  X= 622.050,   5194.650,   17.00,   0  !   !END!
4425!  X= 622.050,   5194.700,   19.85,   0  !   !END!
4426!  X= 622.050,   5194.750,   20.83,   0  !   !END!
4427!  X= 622.050,   5194.800,   20.29,   0  !   !END!
4428!  X= 622.050,   5194.850,   22.19,   0  !   !END!
4429!  X= 622.050,   5194.900,   21.37,   0  !   !END!
4430!  X= 622.050,   5194.950,   22.69,   0  !   !END!
4431!  X= 622.050,   5195.000,   24.00,   0  !   !END!
4432!  X= 622.050,   5195.050,   28.21,   0  !   !END!
4433!  X= 622.050,   5195.100,   35.00,   0  !   !END!
4434!  X= 622.050,   5195.150,   35.00,   0  !   !END!
4435!  X= 622.050,   5195.200,   35.00,   0  !   !END!
4436!  X= 622.050,   5195.250,   34.00,   0  !   !END!
4437!  X= 622.050,   5195.300,   34.88,   0  !   !END!
4438!  X= 622.050,   5195.350,   35.81,   0  !   !END!
4439!  X= 622.050,   5195.400,   36.00,   0  !   !END!
4440!  X= 622.050,   5195.450,   36.00,   0  !   !END!
4441!  X= 622.050,   5195.500,   36.40,   0  !   !END!
4442!  X= 622.050,   5195.550,   36.26,   0  !   !END!
4443!  X= 622.050,   5195.600,   38.00,   0  !   !END!
4444!  X= 622.100,   5192.600,   0.00,   0  !   !END!
4445!  X= 622.100,   5192.700,   0.00,   0  !   !END!
4446!  X= 622.100,   5192.800,   0.00,   0  !   !END!
4447!  X= 622.100,   5192.900,   0.00,   0  !   !END!
4448!  X= 622.100,   5193.000,   3.93,   0  !   !END!
4449!  X= 622.100,   5193.100,   8.32,   0  !   !END!
4450!  X= 622.100,   5193.200,   10.72,   0  !   !END!
4451!  X= 622.100,   5193.300,   12.43,   0  !   !END!
4452!  X= 622.100,   5193.400,   13.73,   0  !   !END!
4453!  X= 622.100,   5193.500,   15.45,   0  !   !END!
4454!  X= 622.100,   5193.600,   15.30,   0  !   !END!
4455!  X= 622.100,   5193.650,   17.35,   0  !   !END!
4456!  X= 622.100,   5193.700,   18.69,   0  !   !END!
4457!  X= 622.100,   5193.750,   18.45,   0  !   !END!
4458!  X= 622.100,   5193.800,   17.79,   0  !   !END!
4459!  X= 622.100,   5193.850,   17.74,   0  !   !END!
4460!  X= 622.100,   5193.900,   18.39,   0  !   !END!
4461!  X= 622.100,   5193.950,   20.02,   0  !   !END!
4462!  X= 622.100,   5194.000,   21.13,   0  !   !END!
4463!  X= 622.100,   5194.050,   20.97,   0  !   !END!
4464!  X= 622.100,   5194.100,   20.43,   0  !   !END!
4465!  X= 622.100,   5194.150,   19.73,   0  !   !END!
4466!  X= 622.100,   5194.200,   20.00,   0  !   !END!
4467!  X= 622.100,   5194.250,   17.00,   0  !   !END!
4468!  X= 622.100,   5194.300,   17.00,   0  !   !END!
4469!  X= 622.100,   5194.350,   17.00,   0  !   !END!
4470!  X= 622.100,   5194.400,   17.00,   0  !   !END!
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4471!  X= 622.100,   5194.450,   17.00,   0  !   !END!
4472!  X= 622.100,   5194.500,   17.00,   0  !   !END!
4473!  X= 622.100,   5194.550,   17.00,   0  !   !END!
4474!  X= 622.100,   5194.600,   17.00,   0  !   !END!
4475!  X= 622.100,   5194.650,   17.00,   0  !   !END!
4476!  X= 622.100,   5194.700,   17.00,   0  !   !END!
4477!  X= 622.100,   5194.750,   17.60,   0  !   !END!
4478!  X= 622.100,   5194.800,   18.00,   0  !   !END!
4479!  X= 622.100,   5194.850,   19.69,   0  !   !END!
4480!  X= 622.100,   5194.900,   21.04,   0  !   !END!
4481!  X= 622.100,   5194.950,   21.54,   0  !   !END!
4482!  X= 622.100,   5195.000,   23.48,   0  !   !END!
4483!  X= 622.100,   5195.050,   23.52,   0  !   !END!
4484!  X= 622.100,   5195.100,   25.45,   0  !   !END!
4485!  X= 622.100,   5195.150,   31.43,   0  !   !END!
4486!  X= 622.100,   5195.200,   35.00,   0  !   !END!
4487!  X= 622.100,   5195.250,   35.00,   0  !   !END!
4488!  X= 622.100,   5195.300,   34.63,   0  !   !END!
4489!  X= 622.100,   5195.350,   34.29,   0  !   !END!
4490!  X= 622.100,   5195.400,   30.00,   0  !   !END!
4491!  X= 622.100,   5195.450,   31.50,   0  !   !END!
4492!  X= 622.100,   5195.500,   34.00,   0  !   !END!
4493!  X= 622.100,   5195.550,   34.56,   0  !   !END!
4494!  X= 622.100,   5195.600,   38.97,   0  !   !END!
4495!  X= 622.100,   5195.700,   46.00,   0  !   !END!
4496!  X= 622.100,   5195.800,   47.14,   0  !   !END!
4497!  X= 622.100,   5195.900,   47.00,   0  !   !END!
4498!  X= 622.100,   5196.000,   46.10,   0  !   !END!
4499!  X= 622.100,   5196.100,   50.41,   0  !   !END!
4500!  X= 622.100,   5196.200,   50.44,   0  !   !END!
4501!  X= 622.100,   5196.300,   53.25,   0  !   !END!
4502!  X= 622.100,   5196.400,   54.12,   0  !   !END!
4503!  X= 622.100,   5196.500,   52.23,   0  !   !END!
4504!  X= 622.100,   5196.600,   50.35,   0  !   !END!
4505!  X= 622.100,   5196.700,   47.61,   0  !   !END!
4506!  X= 622.100,   5196.800,   46.25,   0  !   !END!
4507!  X= 622.100,   5196.900,   41.03,   0  !   !END!
4508!  X= 622.100,   5197.000,   37.30,   0  !   !END!
4509!  X= 622.100,   5197.100,   32.68,   0  !   !END!
4510!  X= 622.100,   5197.200,   27.59,   0  !   !END!
4511!  X= 622.100,   5197.300,   25.18,   0  !   !END!
4512!  X= 622.100,   5197.400,   19.64,   0  !   !END!
4513!  X= 622.100,   5197.500,   17.37,   0  !   !END!
4514!  X= 622.100,   5197.600,   16.22,   0  !   !END!
4515!  X= 622.100,   5197.700,   15.70,   0  !   !END!
4516!  X= 622.100,   5197.800,   15.29,   0  !   !END!
4517!  X= 622.100,   5197.900,   9.21,    0  !   !END!
4518!  X= 622.100,   5198.000,   6.86,    0  !   !END!
4519!  X= 622.100,   5198.100,   9.52,    0  !   !END!
4520!  X= 622.100,   5198.200,   10.56,    0  !   !END!
4521!  X= 622.100,   5198.300,   12.03,    0  !   !END!
4522!  X= 622.100,   5198.400,   13.08,    0  !   !END!
4523!  X= 622.100,   5198.500,   16.25,    0  !   !END!
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4524!  X= 622.100,   5198.600,   23.20,   0  !   !END!
4525!  X= 622.100,   5198.700,   26.90,   0  !   !END!
4526!  X= 622.100,   5198.800,   29.77,   0  !   !END!
4527!  X= 622.100,   5198.900,   33.74,   0  !   !END!
4528!  X= 622.100,   5199.000,   35.27,   0  !   !END!
4529!  X= 622.150,   5193.600,   22.08,   0  !   !END!
4530!  X= 622.150,   5193.650,   22.06,   0  !   !END!
4531!  X= 622.150,   5193.700,   20.99,   0  !   !END!
4532!  X= 622.150,   5193.750,   21.36,   0  !   !END!
4533!  X= 622.150,   5193.800,   21.66,   0  !   !END!
4534!  X= 622.150,   5193.850,   23.58,   0  !   !END!
4535!  X= 622.150,   5193.900,   23.80,   0  !   !END!
4536!  X= 622.150,   5193.950,   23.85,   0  !   !END!
4537!  X= 622.150,   5194.000,   23.31,   0  !   !END!
4538!  X= 622.150,   5194.050,   22.77,   0  !   !END!
4539!  X= 622.150,   5194.100,   22.04,   0  !   !END!
4540!  X= 622.150,   5194.150,   21.29,   0  !   !END!
4541!  X= 622.150,   5194.200,   20.02,   0  !   !END!
4542!  X= 622.150,   5194.250,   19.73,   0  !   !END!
4543!  X= 622.150,   5194.300,   17.00,   0  !   !END!
4544!  X= 622.150,   5194.350,   17.00,   0  !   !END!
4545!  X= 622.150,   5194.400,   17.00,   0  !   !END!
4546!  X= 622.150,   5194.450,   17.00,   0  !   !END!
4547!  X= 622.150,   5194.500,   17.00,   0  !   !END!
4548!  X= 622.150,   5194.550,   17.00,   0  !   !END!
4549!  X= 622.150,   5194.600,   17.00,   0  !   !END!
4550!  X= 622.150,   5194.650,   17.00,   0  !   !END!
4551!  X= 622.150,   5194.700,   17.00,   0  !   !END!
4552!  X= 622.150,   5194.750,   17.00,   0  !   !END!
4553!  X= 622.150,   5194.800,   17.15,   0  !   !END!
4554!  X= 622.150,   5194.850,   17.86,   0  !   !END!
4555!  X= 622.150,   5194.900,   18.10,   0  !   !END!
4556!  X= 622.150,   5194.950,   20.15,   0  !   !END!
4557!  X= 622.150,   5195.000,   23.00,   0  !   !END!
4558!  X= 622.150,   5195.050,   23.14,   0  !   !END!
4559!  X= 622.150,   5195.100,   24.00,   0  !   !END!
4560!  X= 622.150,   5195.150,   25.94,   0  !   !END!
4561!  X= 622.150,   5195.200,   25.05,   0  !   !END!
4562!  X= 622.150,   5195.250,   25.90,   0  !   !END!
4563!  X= 622.150,   5195.300,   27.00,   0  !   !END!
4564!  X= 622.150,   5195.350,   27.92,   0  !   !END!
4565!  X= 622.150,   5195.400,   29.44,   0  !   !END!
4566!  X= 622.150,   5195.450,   33.75,   0  !   !END!
4567!  X= 622.150,   5195.500,   39.00,   0  !   !END!
4568!  X= 622.150,   5195.550,   41.59,   0  !   !END!
4569!  X= 622.150,   5195.600,   40.48,   0  !   !END!
4570!  X= 622.200,   5192.600,   0.00,   0  !   !END!
4571!  X= 622.200,   5192.700,   0.00,   0  !   !END!
4572!  X= 622.200,   5192.800,   0.00,   0  !   !END!
4573!  X= 622.200,   5192.900,   14.29,   0  !   !END!
4574!  X= 622.200,   5193.000,   32.06,   0  !   !END!
4575!  X= 622.200,   5193.100,   32.08,   0  !   !END!
4576!  X= 622.200,   5193.200,   27.62,   0  !   !END!
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4577!  X= 622.200,   5193.300,   27.64,   0  !   !END!
4578!  X= 622.200,   5193.400,   31.23,   0  !   !END!
4579!  X= 622.200,   5193.500,   31.70,   0  !   !END!
4580!  X= 622.200,   5193.600,   32.72,   0  !   !END!
4581!  X= 622.200,   5193.650,   31.62,   0  !   !END!
4582!  X= 622.200,   5193.700,   26.92,   0  !   !END!
4583!  X= 622.200,   5193.750,   27.76,   0  !   !END!
4584!  X= 622.200,   5193.800,   27.51,   0  !   !END!
4585!  X= 622.200,   5193.850,   25.62,   0  !   !END!
4586!  X= 622.200,   5193.900,   25.94,   0  !   !END!
4587!  X= 622.200,   5193.950,   25.89,   0  !   !END!
4588!  X= 622.200,   5194.000,   25.24,   0  !   !END!
4589!  X= 622.200,   5194.050,   24.54,   0  !   !END!
4590!  X= 622.200,   5194.100,   23.29,   0  !   !END!
4591!  X= 622.200,   5194.150,   22.06,   0  !   !END!
4592!  X= 622.200,   5194.200,   20.93,   0  !   !END!
4593!  X= 622.200,   5194.250,   19.40,   0  !   !END!
4594!  X= 622.200,   5194.300,   18.02,   0  !   !END!
4595!  X= 622.200,   5194.350,   17.00,   0  !   !END!
4596!  X= 622.200,   5194.400,   17.00,   0  !   !END!
4597!  X= 622.200,   5194.450,   17.00,   0  !   !END!
4598!  X= 622.200,   5194.500,   17.00,   0  !   !END!
4599!  X= 622.200,   5194.550,   17.00,   0  !   !END!
4600!  X= 622.200,   5194.600,   17.00,   0  !   !END!
4601!  X= 622.200,   5194.650,   17.00,   0  !   !END!
4602!  X= 622.200,   5194.700,   17.00,   0  !   !END!
4603!  X= 622.200,   5194.750,   17.00,   0  !   !END!
4604!  X= 622.200,   5194.800,   17.00,   0  !   !END!
4605!  X= 622.200,   5194.850,   17.97,   0  !   !END!
4606!  X= 622.200,   5194.900,   17.85,   0  !   !END!
4607!  X= 622.200,   5194.950,   19.54,   0  !   !END!
4608!  X= 622.200,   5195.000,   20.00,   0  !   !END!
4609!  X= 622.200,   5195.050,   21.00,   0  !   !END!
4610!  X= 622.200,   5195.100,   22.44,   0  !   !END!
4611!  X= 622.200,   5195.150,   24.00,   0  !   !END!
4612!  X= 622.200,   5195.200,   25.02,   0  !   !END!
4613!  X= 622.200,   5195.250,   26.13,   0  !   !END!
4614!  X= 622.200,   5195.300,   29.98,   0  !   !END!
4615!  X= 622.200,   5195.350,   33.00,   0  !   !END!
4616!  X= 622.200,   5195.400,   36.36,   0  !   !END!
4617!  X= 622.200,   5195.450,   39.00,   0  !   !END!
4618!  X= 622.200,   5195.500,   41.00,   0  !   !END!
4619!  X= 622.200,   5195.550,   43.60,   0  !   !END!
4620!  X= 622.200,   5195.600,   42.00,   0  !   !END!
4621!  X= 622.200,   5195.650,   40.78,   0  !   !END!
4622!  X= 622.200,   5195.700,   44.00,   0  !   !END!
4623!  X= 622.200,   5195.750,   47.00,   0  !   !END!
4624!  X= 622.200,   5195.800,   49.00,   0  !   !END!
4625!  X= 622.200,   5195.900,   54.19,   0  !   !END!
4626!  X= 622.200,   5196.000,   47.68,   0  !   !END!
4627!  X= 622.200,   5196.100,   49.19,   0  !   !END!
4628!  X= 622.200,   5196.200,   52.31,   0  !   !END!
4629!  X= 622.200,   5196.300,   54.86,   0  !   !END!
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4630!  X= 622.200,   5196.400,   54.19,   0  !   !END!
4631!  X= 622.200,   5196.500,   52.73,   0  !   !END!
4632!  X= 622.200,   5196.600,   50.83,   0  !   !END!
4633!  X= 622.200,   5196.700,   44.72,   0  !   !END!
4634!  X= 622.200,   5196.800,   39.02,   0  !   !END!
4635!  X= 622.200,   5196.900,   34.29,   0  !   !END!
4636!  X= 622.200,   5197.000,   31.12,   0  !   !END!
4637!  X= 622.200,   5197.100,   25.16,   0  !   !END!
4638!  X= 622.200,   5197.200,   21.09,   0  !   !END!
4639!  X= 622.200,   5197.300,   15.66,   0  !   !END!
4640!  X= 622.200,   5197.400,   9.74,   0  !   !END!
4641!  X= 622.200,   5197.500,   4.75,   0  !   !END!
4642!  X= 622.200,   5197.600,   6.55,   0  !   !END!
4643!  X= 622.200,   5197.700,   6.29,   0  !   !END!
4644!  X= 622.200,   5197.800,   2.62,   0  !   !END!
4645!  X= 622.200,   5197.900,   3.23,   0  !   !END!
4646!  X= 622.200,   5198.000,   4.40,   0  !   !END!
4647!  X= 622.200,   5198.100,   6.52,   0  !   !END!
4648!  X= 622.200,   5198.200,   8.81,   0  !   !END!
4649!  X= 622.200,   5198.300,   10.80,   0  !   !END!
4650!  X= 622.200,   5198.400,   14.28,   0  !   !END!
4651!  X= 622.200,   5198.500,   20.34,   0  !   !END!
4652!  X= 622.200,   5198.600,   25.58,   0  !   !END!
4653!  X= 622.200,   5198.700,   30.26,   0  !   !END!
4654!  X= 622.200,   5198.800,   34.69,   0  !   !END!
4655!  X= 622.200,   5198.900,   40.99,   0  !   !END!
4656!  X= 622.200,   5199.000,   43.09,   0  !   !END!
4657!  X= 622.250,   5193.600,   37.28,   0  !   !END!
4658!  X= 622.250,   5193.650,   36.31,   0  !   !END!
4659!  X= 622.250,   5193.700,   34.44,   0  !   !END!
4660!  X= 622.250,   5193.750,   32.86,   0  !   !END!
4661!  X= 622.250,   5193.800,   32.91,   0  !   !END!
4662!  X= 622.250,   5193.850,   31.62,   0  !   !END!
4663!  X= 622.250,   5193.900,   29.64,   0  !   !END!
4664!  X= 622.250,   5193.950,   28.18,   0  !   !END!
4665!  X= 622.250,   5194.000,   27.35,   0  !   !END!
4666!  X= 622.250,   5194.050,   26.16,   0  !   !END!
4667!  X= 622.250,   5194.100,   23.97,   0  !   !END!
4668!  X= 622.250,   5194.150,   22.42,   0  !   !END!
4669!  X= 622.250,   5194.200,   21.06,   0  !   !END!
4670!  X= 622.250,   5194.250,   19.74,   0  !   !END!
4671!  X= 622.250,   5194.300,   19.02,   0  !   !END!
4672!  X= 622.250,   5194.350,   17.00,   0  !   !END!
4673!  X= 622.250,   5194.400,   17.00,   0  !   !END!
4674!  X= 622.250,   5194.450,   17.42,   0  !   !END!
4675!  X= 622.250,   5194.500,   19.60,   0  !   !END!
4676!  X= 622.250,   5194.550,   18.23,   0  !   !END!
4677!  X= 622.250,   5194.600,   17.71,   0  !   !END!
4678!  X= 622.250,   5194.650,   17.03,   0  !   !END!
4679!  X= 622.250,   5194.700,   17.00,   0  !   !END!
4680!  X= 622.250,   5194.750,   17.00,   0  !   !END!
4681!  X= 622.250,   5194.800,   17.00,   0  !   !END!
4682!  X= 622.250,   5194.850,   17.94,   0  !   !END!
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4683!  X= 622.250,   5194.900,   18.10,   0  !   !END!
4684!  X= 622.250,   5194.950,   18.34,   0  !   !END!
4685!  X= 622.250,   5195.000,   19.85,   0  !   !END!
4686!  X= 622.250,   5195.050,   21.00,   0  !   !END!
4687!  X= 622.250,   5195.100,   22.00,   0  !   !END!
4688!  X= 622.250,   5195.150,   24.15,   0  !   !END!
4689!  X= 622.250,   5195.200,   25.65,   0  !   !END!
4690!  X= 622.250,   5195.250,   29.62,   0  !   !END!
4691!  X= 622.250,   5195.300,   32.30,   0  !   !END!
4692!  X= 622.250,   5195.350,   37.00,   0  !   !END!
4693!  X= 622.250,   5195.400,   37.18,   0  !   !END!
4694!  X= 622.250,   5195.450,   40.19,   0  !   !END!
4695!  X= 622.250,   5195.500,   42.39,   0  !   !END!
4696!  X= 622.250,   5195.550,   42.00,   0  !   !END!
4697!  X= 622.250,   5195.600,   42.22,   0  !   !END!
4698!  X= 622.250,   5195.650,   44.82,   0  !   !END!
4699!  X= 622.250,   5195.700,   44.00,   0  !   !END!
4700!  X= 622.250,   5195.750,   45.34,   0  !   !END!
4701!  X= 622.250,   5195.800,   47.64,   0  !   !END!
4702!  X= 622.300,   5192.600,   0.00,   0  !   !END!
4703!  X= 622.300,   5192.700,   0.00,   0  !   !END!
4704!  X= 622.300,   5192.800,   15.49,   0  !   !END!
4705!  X= 622.300,   5192.900,   40.87,   0  !   !END!
4706!  X= 622.300,   5193.000,   42.72,   0  !   !END!
4707!  X= 622.300,   5193.100,   38.83,   0  !   !END!
4708!  X= 622.300,   5193.200,   36.39,   0  !   !END!
4709!  X= 622.300,   5193.300,   37.00,   0  !   !END!
4710!  X= 622.300,   5193.400,   41.15,   0  !   !END!
4711!  X= 622.300,   5193.500,   43.88,   0  !   !END!
4712!  X= 622.300,   5193.600,   43.57,   0  !   !END!
4713!  X= 622.300,   5193.650,   40.67,   0  !   !END!
4714!  X= 622.300,   5193.700,   37.51,   0  !   !END!
4715!  X= 622.300,   5193.750,   35.38,   0  !   !END!
4716!  X= 622.300,   5193.800,   34.49,   0  !   !END!
4717!  X= 622.300,   5193.850,   33.15,   0  !   !END!
4718!  X= 622.300,   5193.900,   32.39,   0  !   !END!
4719!  X= 622.300,   5193.950,   30.69,   0  !   !END!
4720!  X= 622.300,   5194.000,   28.51,   0  !   !END!
4721!  X= 622.300,   5194.050,   26.00,   0  !   !END!
4722!  X= 622.300,   5194.100,   23.25,   0  !   !END!
4723!  X= 622.300,   5194.150,   22.25,   0  !   !END!
4724!  X= 622.300,   5194.200,   21.14,   0  !   !END!
4725!  X= 622.300,   5194.250,   19.93,   0  !   !END!
4726!  X= 622.300,   5194.300,   19.23,   0  !   !END!
4727!  X= 622.300,   5194.350,   19.59,   0  !   !END!
4728!  X= 622.300,   5194.400,   17.00,   0  !   !END!
4729!  X= 622.300,   5194.450,   18.25,   0  !   !END!
4730!  X= 622.300,   5194.500,   21.00,   0  !   !END!
4731!  X= 622.300,   5194.550,   21.03,   0  !   !END!
4732!  X= 622.300,   5194.600,   22.00,   0  !   !END!
4733!  X= 622.300,   5194.650,   21.00,   0  !   !END!
4734!  X= 622.300,   5194.700,   18.00,   0  !   !END!
4735!  X= 622.300,   5194.750,   17.00,   0  !   !END!
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4736!  X= 622.300,   5194.800,   17.00,   0  !   !END!
4737!  X= 622.300,   5194.850,   17.60,   0  !   !END!
4738!  X= 622.300,   5194.900,   17.98,   0  !   !END!
4739!  X= 622.300,   5194.950,   18.76,   0  !   !END!
4740!  X= 622.300,   5195.000,   20.95,   0  !   !END!
4741!  X= 622.300,   5195.050,   22.35,   0  !   !END!
4742!  X= 622.300,   5195.100,   23.41,   0  !   !END!
4743!  X= 622.300,   5195.150,   24.23,   0  !   !END!
4744!  X= 622.300,   5195.200,   26.27,   0  !   !END!
4745!  X= 622.300,   5195.250,   30.46,   0  !   !END!
4746!  X= 622.300,   5195.300,   33.00,   0  !   !END!
4747!  X= 622.300,   5195.350,   37.00,   0  !   !END!
4748!  X= 622.300,   5195.400,   38.00,   0  !   !END!
4749!  X= 622.300,   5195.450,   41.00,   0  !   !END!
4750!  X= 622.300,   5195.500,   40.00,   0  !   !END!
4751!  X= 622.300,   5195.550,   42.00,   0  !   !END!
4752!  X= 622.300,   5195.600,   43.00,   0  !   !END!
4753!  X= 622.300,   5195.650,   43.00,   0  !   !END!
4754!  X= 622.300,   5195.700,   43.00,   0  !   !END!
4755!  X= 622.300,   5195.750,   43.22,   0  !   !END!
4756!  X= 622.300,   5195.800,   44.00,   0  !   !END!
4757!  X= 622.300,   5195.900,   44.67,   0  !   !END!
4758!  X= 622.300,   5196.000,   46.14,   0  !   !END!
4759!  X= 622.300,   5196.100,   48.80,   0  !   !END!
4760!  X= 622.300,   5196.200,   51.15,   0  !   !END!
4761!  X= 622.300,   5196.300,   51.41,   0  !   !END!
4762!  X= 622.300,   5196.400,   53.24,   0  !   !END!
4763!  X= 622.300,   5196.500,   51.67,   0  !   !END!
4764!  X= 622.300,   5196.600,   42.05,   0  !   !END!
4765!  X= 622.300,   5196.700,   39.01,   0  !   !END!
4766!  X= 622.300,   5196.800,   33.63,   0  !   !END!
4767!  X= 622.300,   5196.900,   28.41,   0  !   !END!
4768!  X= 622.300,   5197.000,   23.35,   0  !   !END!
4769!  X= 622.300,   5197.100,   17.84,   0  !   !END!
4770!  X= 622.300,   5197.200,   11.18,   0  !   !END!
4771!  X= 622.300,   5197.300,   4.96,   0  !   !END!
4772!  X= 622.300,   5197.400,   0.17,   0  !   !END!
4773!  X= 622.300,   5197.500,   0.64,   0  !   !END!
4774!  X= 622.300,   5197.600,   1.50,   0  !   !END!
4775!  X= 622.300,   5197.700,   1.74,   0  !   !END!
4776!  X= 622.300,   5197.800,   2.02,   0  !   !END!
4777!  X= 622.300,   5197.900,   2.95,   0  !   !END!
4778!  X= 622.300,   5198.000,   4.94,   0  !   !END!
4779!  X= 622.300,   5198.100,   9.51,   0  !   !END!
4780!  X= 622.300,   5198.200,   9.73,   0  !   !END!
4781!  X= 622.300,   5198.300,   11.50,   0  !   !END!
4782!  X= 622.300,   5198.400,   16.26,   0  !   !END!
4783!  X= 622.300,   5198.500,   23.86,   0  !   !END!
4784!  X= 622.300,   5198.600,   30.08,   0  !   !END!
4785!  X= 622.300,   5198.700,   36.78,   0  !   !END!
4786!  X= 622.300,   5198.800,   40.61,   0  !   !END!
4787!  X= 622.300,   5198.900,   45.23,   0  !   !END!
4788!  X= 622.300,   5199.000,   48.21,   0  !   !END!
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4789!  X= 622.350,   5193.600,   46.57,   0  !   !END!
4790!  X= 622.350,   5193.650,   41.84,   0  !   !END!
4791!  X= 622.350,   5193.700,   37.45,   0  !   !END!
4792!  X= 622.350,   5193.750,   35.31,   0  !   !END!
4793!  X= 622.350,   5193.800,   34.77,   0  !   !END!
4794!  X= 622.350,   5193.850,   33.66,   0  !   !END!
4795!  X= 622.350,   5193.900,   31.92,   0  !   !END!
4796!  X= 622.350,   5193.950,   29.82,   0  !   !END!
4797!  X= 622.350,   5194.000,   26.94,   0  !   !END!
4798!  X= 622.350,   5194.050,   24.28,   0  !   !END!
4799!  X= 622.350,   5194.100,   23.01,   0  !   !END!
4800!  X= 622.350,   5194.150,   22.21,   0  !   !END!
4801!  X= 622.350,   5194.200,   21.54,   0  !   !END!
4802!  X= 622.350,   5194.250,   20.96,   0  !   !END!
4803!  X= 622.350,   5194.300,   20.08,   0  !   !END!
4804!  X= 622.350,   5194.350,   19.60,   0  !   !END!
4805!  X= 622.350,   5194.400,   20.00,   0  !   !END!
4806!  X= 622.350,   5194.450,   19.62,   0  !   !END!
4807!  X= 622.350,   5194.500,   19.43,   0  !   !END!
4808!  X= 622.350,   5194.550,   20.00,   0  !   !END!
4809!  X= 622.350,   5194.600,   20.91,   0  !   !END!
4810!  X= 622.350,   5194.650,   20.44,   0  !   !END!
4811!  X= 622.350,   5194.700,   20.00,   0  !   !END!
4812!  X= 622.350,   5194.750,   17.00,   0  !   !END!
4813!  X= 622.350,   5194.800,   17.00,   0  !   !END!
4814!  X= 622.350,   5194.850,   17.31,   0  !   !END!
4815!  X= 622.350,   5194.900,   19.03,   0  !   !END!
4816!  X= 622.350,   5194.950,   21.44,   0  !   !END!
4817!  X= 622.350,   5195.000,   22.61,   0  !   !END!
4818!  X= 622.350,   5195.050,   23.39,   0  !   !END!
4819!  X= 622.350,   5195.100,   23.00,   0  !   !END!
4820!  X= 622.350,   5195.150,   24.40,   0  !   !END!
4821!  X= 622.350,   5195.200,   29.27,   0  !   !END!
4822!  X= 622.350,   5195.250,   31.19,   0  !   !END!
4823!  X= 622.350,   5195.300,   35.00,   0  !   !END!
4824!  X= 622.350,   5195.350,   36.86,   0  !   !END!
4825!  X= 622.350,   5195.400,   38.50,   0  !   !END!
4826!  X= 622.350,   5195.450,   39.00,   0  !   !END!
4827!  X= 622.350,   5195.500,   39.04,   0  !   !END!
4828!  X= 622.350,   5195.550,   39.76,   0  !   !END!
4829!  X= 622.350,   5195.600,   40.00,   0  !   !END!
4830!  X= 622.350,   5195.650,   40.84,   0  !   !END!
4831!  X= 622.350,   5195.700,   41.00,   0  !   !END!
4832!  X= 622.350,   5195.750,   41.00,   0  !   !END!
4833!  X= 622.350,   5195.800,   41.00,   0  !   !END!
4834!  X= 622.400,   5192.600,   0.00,   0  !   !END!
4835!  X= 622.400,   5192.700,   0.00,   0  !   !END!
4836!  X= 622.400,   5192.800,   41.41,   0  !   !END!
4837!  X= 622.400,   5192.900,   54.39,   0  !   !END!
4838!  X= 622.400,   5193.000,   43.96,   0  !   !END!
4839!  X= 622.400,   5193.100,   38.36,   0  !   !END!
4840!  X= 622.400,   5193.200,   36.53,   0  !   !END!
4841!  X= 622.400,   5193.300,   39.36,   0  !   !END!
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4842!  X= 622.400,   5193.400,   45.95,   0  !   !END!
4843!  X= 622.400,   5193.500,   50.22,   0  !   !END!
4844!  X= 622.400,   5193.600,   43.04,   0  !   !END!
4845!  X= 622.400,   5193.650,   39.11,   0  !   !END!
4846!  X= 622.400,   5193.700,   36.25,   0  !   !END!
4847!  X= 622.400,   5193.750,   33.61,   0  !   !END!
4848!  X= 622.400,   5193.800,   33.01,   0  !   !END!
4849!  X= 622.400,   5193.850,   31.80,   0  !   !END!
4850!  X= 622.400,   5193.900,   29.80,   0  !   !END!
4851!  X= 622.400,   5193.950,   26.51,   0  !   !END!
4852!  X= 622.400,   5194.000,   24.13,   0  !   !END!
4853!  X= 622.400,   5194.050,   23.15,   0  !   !END!
4854!  X= 622.400,   5194.100,   22.63,   0  !   !END!
4855!  X= 622.400,   5194.150,   22.43,   0  !   !END!
4856!  X= 622.400,   5194.200,   22.14,   0  !   !END!
4857!  X= 622.400,   5194.250,   21.76,   0  !   !END!
4858!  X= 622.400,   5194.300,   21.64,   0  !   !END!
4859!  X= 622.400,   5194.350,   20.99,   0  !   !END!
4860!  X= 622.400,   5194.400,   20.96,   0  !   !END!
4861!  X= 622.400,   5194.450,   21.29,   0  !   !END!
4862!  X= 622.400,   5194.500,   20.49,   0  !   !END!
4863!  X= 622.400,   5194.550,   19.48,   0  !   !END!
4864!  X= 622.400,   5194.600,   19.54,   0  !   !END!
4865!  X= 622.400,   5194.650,   19.86,   0  !   !END!
4866!  X= 622.400,   5194.700,   18.82,   0  !   !END!
4867!  X= 622.400,   5194.750,   20.66,   0  !   !END!
4868!  X= 622.400,   5194.800,   20.00,   0  !   !END!
4869!  X= 622.400,   5194.850,   20.28,   0  !   !END!
4870!  X= 622.400,   5194.900,   20.56,   0  !   !END!
4871!  X= 622.400,   5194.950,   21.55,   0  !   !END!
4872!  X= 622.400,   5195.000,   23.41,   0  !   !END!
4873!  X= 622.400,   5195.050,   24.33,   0  !   !END!
4874!  X= 622.400,   5195.100,   26.28,   0  !   !END!
4875!  X= 622.400,   5195.150,   27.42,   0  !   !END!
4876!  X= 622.400,   5195.200,   31.43,   0  !   !END!
4877!  X= 622.400,   5195.250,   31.44,   0  !   !END!
4878!  X= 622.400,   5195.300,   33.00,   0  !   !END!
4879!  X= 622.400,   5195.350,   35.00,   0  !   !END!
4880!  X= 622.400,   5195.400,   37.00,   0  !   !END!
4881!  X= 622.400,   5195.450,   38.00,   0  !   !END!
4882!  X= 622.400,   5195.500,   38.00,   0  !   !END!
4883!  X= 622.400,   5195.550,   38.50,   0  !   !END!
4884!  X= 622.400,   5195.600,   38.64,   0  !   !END!
4885!  X= 622.400,   5195.650,   38.77,   0  !   !END!
4886!  X= 622.400,   5195.700,   39.37,   0  !   !END!
4887!  X= 622.400,   5195.750,   38.54,   0  !   !END!
4888!  X= 622.400,   5195.800,   40.00,   0  !   !END!
4889!  X= 622.400,   5195.900,   39.60,   0  !   !END!
4890!  X= 622.400,   5196.000,   43.17,   0  !   !END!
4891!  X= 622.400,   5196.100,   45.91,   0  !   !END!
4892!  X= 622.400,   5196.200,   52.39,   0  !   !END!
4893!  X= 622.400,   5196.300,   48.91,   0  !   !END!
4894!  X= 622.400,   5196.400,   46.10,   0  !   !END!
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4895!  X= 622.400,   5196.500,   45.02,   0  !   !END!
4896!  X= 622.400,   5196.600,   38.55,   0  !   !END!
4897!  X= 622.400,   5196.700,   32.64,   0  !   !END!
4898!  X= 622.400,   5196.800,   26.25,   0  !   !END!
4899!  X= 622.400,   5196.900,   20.97,   0  !   !END!
4900!  X= 622.400,   5197.000,   13.92,   0  !   !END!
4901!  X= 622.400,   5197.100,   8.43,   0  !   !END!
4902!  X= 622.400,   5197.200,   4.51,   0  !   !END!
4903!  X= 622.400,   5197.300,   0.00,   0  !   !END!
4904!  X= 622.400,   5197.400,   0.00,   0  !   !END!
4905!  X= 622.400,   5197.500,   0.00,   0  !   !END!
4906!  X= 622.400,   5197.600,   0.39,   0  !   !END!
4907!  X= 622.400,   5197.700,   1.68,   0  !   !END!
4908!  X= 622.400,   5197.800,   4.58,   0  !   !END!
4909!  X= 622.400,   5197.900,   9.16,   0  !   !END!
4910!  X= 622.400,   5198.000,   14.14,   0  !   !END!
4911!  X= 622.400,   5198.100,   17.66,   0  !   !END!
4912!  X= 622.400,   5198.200,   20.01,   0  !   !END!
4913!  X= 622.400,   5198.300,   18.26,   0  !   !END!
4914!  X= 622.400,   5198.400,   21.38,   0  !   !END!
4915!  X= 622.400,   5198.500,   26.96,   0  !   !END!
4916!  X= 622.400,   5198.600,   32.07,   0  !   !END!
4917!  X= 622.400,   5198.700,   39.16,   0  !   !END!
4918!  X= 622.400,   5198.800,   42.68,   0  !   !END!
4919!  X= 622.400,   5198.900,   45.94,   0  !   !END!
4920!  X= 622.400,   5199.000,   48.64,   0  !   !END!
4921!  X= 622.450,   5193.600,   38.29,   0  !   !END!
4922!  X= 622.450,   5193.650,   36.30,   0  !   !END!
4923!  X= 622.450,   5193.700,   33.08,   0  !   !END!
4924!  X= 622.450,   5193.750,   31.41,   0  !   !END!
4925!  X= 622.450,   5193.800,   29.49,   0  !   !END!
4926!  X= 622.450,   5193.850,   27.73,   0  !   !END!
4927!  X= 622.450,   5193.900,   26.28,   0  !   !END!
4928!  X= 622.450,   5193.950,   24.68,   0  !   !END!
4929!  X= 622.450,   5194.000,   23.77,   0  !   !END!
4930!  X= 622.450,   5194.050,   23.19,   0  !   !END!
4931!  X= 622.450,   5194.100,   23.03,   0  !   !END!
4932!  X= 622.450,   5194.150,   23.16,   0  !   !END!
4933!  X= 622.450,   5194.200,   22.92,   0  !   !END!
4934!  X= 622.450,   5194.250,   22.83,   0  !   !END!
4935!  X= 622.450,   5194.300,   22.89,   0  !   !END!
4936!  X= 622.450,   5194.350,   22.38,   0  !   !END!
4937!  X= 622.450,   5194.400,   21.82,   0  !   !END!
4938!  X= 622.450,   5194.450,   23.00,   0  !   !END!
4939!  X= 622.450,   5194.500,   21.70,   0  !   !END!
4940!  X= 622.450,   5194.550,   20.64,   0  !   !END!
4941!  X= 622.450,   5194.600,   20.10,   0  !   !END!
4942!  X= 622.450,   5194.650,   19.92,   0  !   !END!
4943!  X= 622.450,   5194.700,   19.82,   0  !   !END!
4944!  X= 622.450,   5194.750,   19.31,   0  !   !END!
4945!  X= 622.450,   5194.800,   21.59,   0  !   !END!
4946!  X= 622.450,   5194.850,   20.00,   0  !   !END!
4947!  X= 622.450,   5194.900,   22.27,   0  !   !END!
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4948!  X= 622.450,   5194.950,   23.66,   0  !   !END!
4949!  X= 622.450,   5195.000,   25.04,   0  !   !END!
4950!  X= 622.450,   5195.050,   27.60,   0  !   !END!
4951!  X= 622.450,   5195.100,   28.91,   0  !   !END!
4952!  X= 622.450,   5195.150,   30.30,   0  !   !END!
4953!  X= 622.450,   5195.200,   29.00,   0  !   !END!
4954!  X= 622.450,   5195.250,   32.00,   0  !   !END!
4955!  X= 622.450,   5195.300,   34.68,   0  !   !END!
4956!  X= 622.450,   5195.350,   37.12,   0  !   !END!
4957!  X= 622.450,   5195.400,   36.24,   0  !   !END!
4958!  X= 622.450,   5195.450,   37.00,   0  !   !END!
4959!  X= 622.450,   5195.500,   37.19,   0  !   !END!
4960!  X= 622.450,   5195.550,   37.00,   0  !   !END!
4961!  X= 622.450,   5195.600,   37.00,   0  !   !END!
4962!  X= 622.450,   5195.650,   36.19,   0  !   !END!
4963!  X= 622.450,   5195.700,   36.18,   0  !   !END!
4964!  X= 622.450,   5195.750,   36.68,   0  !   !END!
4965!  X= 622.450,   5195.800,   35.57,   0  !   !END!
4966!  X= 622.500,   5192.000,   0.00,   0  !   !END!
4967!  X= 622.500,   5192.500,   0.00,   0  !   !END!
4968!  X= 622.500,   5192.600,   0.00,   0  !   !END!
4969!  X= 622.500,   5192.700,   18.75,   0  !   !END!
4970!  X= 622.500,   5192.800,   58.63,   0  !   !END!
4971!  X= 622.500,   5192.900,   60.38,   0  !   !END!
4972!  X= 622.500,   5193.000,   41.63,   0  !   !END!
4973!  X= 622.500,   5193.100,   35.95,   0  !   !END!
4974!  X= 622.500,   5193.200,   35.62,   0  !   !END!
4975!  X= 622.500,   5193.300,   39.90,   0  !   !END!
4976!  X= 622.500,   5193.400,   42.86,   0  !   !END!
4977!  X= 622.500,   5193.500,   38.24,   0  !   !END!
4978!  X= 622.500,   5193.600,   33.47,   0  !   !END!
4979!  X= 622.500,   5193.650,   31.41,   0  !   !END!
4980!  X= 622.500,   5193.700,   29.82,   0  !   !END!
4981!  X= 622.500,   5193.750,   28.54,   0  !   !END!
4982!  X= 622.500,   5193.800,   27.08,   0  !   !END!
4983!  X= 622.500,   5193.850,   26.05,   0  !   !END!
4984!  X= 622.500,   5193.900,   25.20,   0  !   !END!
4985!  X= 622.500,   5193.950,   24.45,   0  !   !END!
4986!  X= 622.500,   5194.000,   24.15,   0  !   !END!
4987!  X= 622.500,   5194.050,   24.01,   0  !   !END!
4988!  X= 622.500,   5194.100,   24.12,   0  !   !END!
4989!  X= 622.500,   5194.150,   24.16,   0  !   !END!
4990!  X= 622.500,   5194.200,   24.17,   0  !   !END!
4991!  X= 622.500,   5194.250,   24.77,   0  !   !END!
4992!  X= 622.500,   5194.300,   24.72,   0  !   !END!
4993!  X= 622.500,   5194.350,   24.48,   0  !   !END!
4994!  X= 622.500,   5194.400,   23.86,   0  !   !END!
4995!  X= 622.500,   5194.450,   22.83,   0  !   !END!
4996!  X= 622.500,   5194.500,   22.61,   0  !   !END!
4997!  X= 622.500,   5194.550,   21.74,   0  !   !END!
4998!  X= 622.500,   5194.600,   21.41,   0  !   !END!
4999!  X= 622.500,   5194.650,   20.75,   0  !   !END!
5000!  X= 622.500,   5194.700,   21.24,   0  !   !END!
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5001!  X= 622.500,   5194.750,   19.78,   0  !   !END!
5002!  X= 622.500,   5194.800,   21.05,   0  !   !END!
5003!  X= 622.500,   5194.850,   21.67,   0  !   !END!
5004!  X= 622.500,   5194.900,   23.26,   0  !   !END!
5005!  X= 622.500,   5194.950,   24.53,   0  !   !END!
5006!  X= 622.500,   5195.000,   25.61,   0  !   !END!
5007!  X= 622.500,   5195.050,   28.48,   0  !   !END!
5008!  X= 622.500,   5195.100,   29.62,   0  !   !END!
5009!  X= 622.500,   5195.150,   31.00,   0  !   !END!
5010!  X= 622.500,   5195.200,   32.08,   0  !   !END!
5011!  X= 622.500,   5195.250,   31.68,   0  !   !END!
5012!  X= 622.500,   5195.300,   33.00,   0  !   !END!
5013!  X= 622.500,   5195.350,   36.46,   0  !   !END!
5014!  X= 622.500,   5195.400,   36.00,   0  !   !END!
5015!  X= 622.500,   5195.450,   36.96,   0  !   !END!
5016!  X= 622.500,   5195.500,   37.00,   0  !   !END!
5017!  X= 622.500,   5195.550,   36.00,   0  !   !END!
5018!  X= 622.500,   5195.600,   35.35,   0  !   !END!
5019!  X= 622.500,   5195.650,   33.42,   0  !   !END!
5020!  X= 622.500,   5195.700,   32.53,   0  !   !END!
5021!  X= 622.500,   5195.750,   32.97,   0  !   !END!
5022!  X= 622.500,   5195.800,   33.87,   0  !   !END!
5023!  X= 622.500,   5195.900,   35.02,   0  !   !END!
5024!  X= 622.500,   5196.000,   39.91,   0  !   !END!
5025!  X= 622.500,   5196.100,   43.17,   0  !   !END!
5026!  X= 622.500,   5196.200,   44.41,   0  !   !END!
5027!  X= 622.500,   5196.300,   45.13,   0  !   !END!
5028!  X= 622.500,   5196.400,   40.55,   0  !   !END!
5029!  X= 622.500,   5196.500,   35.22,   0  !   !END!
5030!  X= 622.500,   5196.600,   30.49,   0  !   !END!
5031!  X= 622.500,   5196.700,   25.34,   0  !   !END!
5032!  X= 622.500,   5196.800,   17.94,   0  !   !END!
5033!  X= 622.500,   5196.900,   10.20,   0  !   !END!
5034!  X= 622.500,   5197.000,   2.70,   0  !   !END!
5035!  X= 622.500,   5197.100,   0.01,   0  !   !END!
5036!  X= 622.500,   5197.200,   0.00,   0  !   !END!
5037!  X= 622.500,   5197.300,   0.00,   0  !   !END!
5038!  X= 622.500,   5197.400,   0.00,   0  !   !END!
5039!  X= 622.500,   5197.500,   0.00,   0  !   !END!
5040!  X= 622.500,   5197.600,   1.65,   0  !   !END!
5041!  X= 622.500,   5197.700,   6.75,   0  !   !END!
5042!  X= 622.500,   5197.800,   14.72,   0  !   !END!
5043!  X= 622.500,   5197.900,   20.03,   0  !   !END!
5044!  X= 622.500,   5198.000,   25.28,   0  !   !END!
5045!  X= 622.500,   5198.100,   25.06,   0  !   !END!
5046!  X= 622.500,   5198.200,   28.05,   0  !   !END!
5047!  X= 622.500,   5198.300,   20.66,   0  !   !END!
5048!  X= 622.500,   5198.400,   22.60,   0  !   !END!
5049!  X= 622.500,   5198.500,   28.22,   0  !   !END!
5050!  X= 622.500,   5198.600,   31.24,   0  !   !END!
5051!  X= 622.500,   5198.700,   36.78,   0  !   !END!
5052!  X= 622.500,   5198.800,   40.53,   0  !   !END!
5053!  X= 622.500,   5198.900,   44.30,   0  !   !END!
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5054!  X= 622.500,   5199.000,   50.26,   0  !   !END!
5055!  X= 622.500,   5199.500,   62.64,   0  !   !END!
5056!  X= 622.500,   5200.000,   58.93,   0  !   !END!
5057!  X= 622.550,   5194.900,   23.85,   0  !   !END!
5058!  X= 622.550,   5194.950,   24.24,   0  !   !END!
5059!  X= 622.550,   5195.000,   26.07,   0  !   !END!
5060!  X= 622.550,   5195.050,   29.00,   0  !   !END!
5061!  X= 622.550,   5195.100,   30.35,   0  !   !END!
5062!  X= 622.550,   5195.150,   33.00,   0  !   !END!
5063!  X= 622.550,   5195.200,   36.00,   0  !   !END!
5064!  X= 622.550,   5195.250,   35.40,   0  !   !END!
5065!  X= 622.550,   5195.300,   36.00,   0  !   !END!
5066!  X= 622.550,   5195.350,   34.17,   0  !   !END!
5067!  X= 622.550,   5195.400,   36.00,   0  !   !END!
5068!  X= 622.550,   5195.450,   36.00,   0  !   !END!
5069!  X= 622.550,   5195.500,   36.00,   0  !   !END!
5070!  X= 622.550,   5195.550,   34.30,   0  !   !END!
5071!  X= 622.550,   5195.600,   32.00,   0  !   !END!
5072!  X= 622.550,   5195.650,   29.42,   0  !   !END!
5073!  X= 622.550,   5195.700,   29.55,   0  !   !END!
5074!  X= 622.550,   5195.750,   29.83,   0  !   !END!
5075!  X= 622.550,   5195.800,   30.59,   0  !   !END!
5076!  X= 622.600,   5192.600,   0.00,   0  !   !END!
5077!  X= 622.600,   5192.700,   23.11,   0  !   !END!
5078!  X= 622.600,   5192.800,   59.09,   0  !   !END!
5079!  X= 622.600,   5192.900,   51.12,   0  !   !END!
5080!  X= 622.600,   5193.000,   34.05,   0  !   !END!
5081!  X= 622.600,   5193.100,   32.45,   0  !   !END!
5082!  X= 622.600,   5193.200,   34.61,   0  !   !END!
5083!  X= 622.600,   5193.300,   36.32,   0  !   !END!
5084!  X= 622.600,   5193.400,   33.10,   0  !   !END!
5085!  X= 622.600,   5193.500,   28.60,   0  !   !END!
5086!  X= 622.600,   5193.600,   27.21,   0  !   !END!
5087!  X= 622.600,   5193.700,   26.64,   0  !   !END!
5088!  X= 622.600,   5193.800,   26.25,   0  !   !END!
5089!  X= 622.600,   5193.900,   26.92,   0  !   !END!
5090!  X= 622.600,   5194.000,   27.53,   0  !   !END!
5091!  X= 622.600,   5194.100,   27.74,   0  !   !END!
5092!  X= 622.600,   5194.200,   28.75,   0  !   !END!
5093!  X= 622.600,   5194.300,   28.80,   0  !   !END!
5094!  X= 622.600,   5194.400,   26.75,   0  !   !END!
5095!  X= 622.600,   5194.500,   24.20,   0  !   !END!
5096!  X= 622.600,   5194.600,   22.56,   0  !   !END!
5097!  X= 622.600,   5194.700,   22.33,   0  !   !END!
5098!  X= 622.600,   5194.800,   25.00,   0  !   !END!
5099!  X= 622.600,   5194.900,   24.52,   0  !   !END!
5100!  X= 622.600,   5194.950,   25.59,   0  !   !END!
5101!  X= 622.600,   5195.000,   28.24,   0  !   !END!
5102!  X= 622.600,   5195.050,   29.09,   0  !   !END!
5103!  X= 622.600,   5195.100,   31.72,   0  !   !END!
5104!  X= 622.600,   5195.150,   34.00,   0  !   !END!
5105!  X= 622.600,   5195.200,   35.25,   0  !   !END!
5106!  X= 622.600,   5195.250,   36.00,   0  !   !END!
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5107!  X= 622.600,   5195.300,   38.00,   0  !   !END!
5108!  X= 622.600,   5195.350,   37.05,   0  !   !END!
5109!  X= 622.600,   5195.400,   36.22,   0  !   !END!
5110!  X= 622.600,   5195.450,   34.64,   0  !   !END!
5111!  X= 622.600,   5195.500,   34.94,   0  !   !END!
5112!  X= 622.600,   5195.550,   31.00,   0  !   !END!
5113!  X= 622.600,   5195.600,   30.00,   0  !   !END!
5114!  X= 622.600,   5195.650,   27.00,   0  !   !END!
5115!  X= 622.600,   5195.700,   25.00,   0  !   !END!
5116!  X= 622.600,   5195.750,   27.00,   0  !   !END!
5117!  X= 622.600,   5195.800,   29.05,   0  !   !END!
5118!  X= 622.600,   5195.900,   31.69,   0  !   !END!
5119!  X= 622.600,   5196.000,   34.41,   0  !   !END!
5120!  X= 622.600,   5196.100,   34.90,   0  !   !END!
5121!  X= 622.600,   5196.200,   33.61,   0  !   !END!
5122!  X= 622.600,   5196.300,   35.21,   0  !   !END!
5123!  X= 622.600,   5196.400,   31.63,   0  !   !END!
5124!  X= 622.600,   5196.500,   27.08,   0  !   !END!
5125!  X= 622.600,   5196.600,   18.16,   0  !   !END!
5126!  X= 622.600,   5196.700,   10.95,   0  !   !END!
5127!  X= 622.600,   5196.800,   8.58,   0  !   !END!
5128!  X= 622.600,   5196.900,   0.31,   0  !   !END!
5129!  X= 622.600,   5197.000,   0.51,   0  !   !END!
5130!  X= 622.600,   5197.100,   0.37,   0  !   !END!
5131!  X= 622.600,   5197.200,   0.00,   0  !   !END!
5132!  X= 622.600,   5197.300,   0.00,   0  !   !END!
5133!  X= 622.600,   5197.400,   0.00,   0  !   !END!
5134!  X= 622.600,   5197.500,   1.53,   0  !   !END!
5135!  X= 622.600,   5197.600,   7.55,   0  !   !END!
5136!  X= 622.600,   5197.700,   18.21,   0  !   !END!
5137!  X= 622.600,   5197.800,   22.52,   0  !   !END!
5138!  X= 622.600,   5197.900,   30.42,   0  !   !END!
5139!  X= 622.600,   5198.000,   34.99,   0  !   !END!
5140!  X= 622.600,   5198.100,   31.61,   0  !   !END!
5141!  X= 622.600,   5198.200,   32.12,   0  !   !END!
5142!  X= 622.600,   5198.300,   29.28,   0  !   !END!
5143!  X= 622.600,   5198.400,   33.65,   0  !   !END!
5144!  X= 622.600,   5198.500,   35.49,   0  !   !END!
5145!  X= 622.600,   5198.600,   39.18,   0  !   !END!
5146!  X= 622.600,   5198.700,   41.13,   0  !   !END!
5147!  X= 622.600,   5198.800,   41.60,   0  !   !END!
5148!  X= 622.600,   5198.900,   44.42,   0  !   !END!
5149!  X= 622.600,   5199.000,   47.52,   0  !   !END!
5150!  X= 622.650,   5194.900,   26.47,   0  !   !END!
5151!  X= 622.650,   5194.950,   27.07,   0  !   !END!
5152!  X= 622.650,   5195.000,   28.47,   0  !   !END!
5153!  X= 622.650,   5195.050,   29.88,   0  !   !END!
5154!  X= 622.650,   5195.100,   31.86,   0  !   !END!
5155!  X= 622.650,   5195.150,   33.54,   0  !   !END!
5156!  X= 622.650,   5195.200,   36.00,   0  !   !END!
5157!  X= 622.650,   5195.250,   36.06,   0  !   !END!
5158!  X= 622.650,   5195.300,   37.00,   0  !   !END!
5159!  X= 622.650,   5195.350,   36.00,   0  !   !END!
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5160!  X= 622.650,   5195.400,   35.50,   0  !   !END!
5161!  X= 622.650,   5195.450,   34.00,   0  !   !END!
5162!  X= 622.650,   5195.500,   30.07,   0  !   !END!
5163!  X= 622.650,   5195.550,   28.65,   0  !   !END!
5164!  X= 622.650,   5195.600,   24.14,   0  !   !END!
5165!  X= 622.650,   5195.650,   21.18,   0  !   !END!
5166!  X= 622.650,   5195.700,   22.38,   0  !   !END!
5167!  X= 622.650,   5195.750,   24.16,   0  !   !END!
5168!  X= 622.650,   5195.800,   24.91,   0  !   !END!
5169!  X= 622.700,   5192.600,   0.00,   0  !   !END!
5170!  X= 622.700,   5192.700,   0.00,   0  !   !END!
5171!  X= 622.700,   5192.800,   30.60,   0  !   !END!
5172!  X= 622.700,   5192.900,   34.29,   0  !   !END!
5173!  X= 622.700,   5193.000,   31.60,   0  !   !END!
5174!  X= 622.700,   5193.100,   31.64,   0  !   !END!
5175!  X= 622.700,   5193.200,   31.15,   0  !   !END!
5176!  X= 622.700,   5193.300,   29.91,   0  !   !END!
5177!  X= 622.700,   5193.400,   28.93,   0  !   !END!
5178!  X= 622.700,   5193.500,   27.76,   0  !   !END!
5179!  X= 622.700,   5193.600,   28.09,   0  !   !END!
5180!  X= 622.700,   5193.700,   29.38,   0  !   !END!
5181!  X= 622.700,   5193.800,   31.46,   0  !   !END!
5182!  X= 622.700,   5193.900,   32.36,   0  !   !END!
5183!  X= 622.700,   5194.000,   35.12,   0  !   !END!
5184!  X= 622.700,   5194.100,   36.30,   0  !   !END!
5185!  X= 622.700,   5194.200,   33.31,   0  !   !END!
5186!  X= 622.700,   5194.300,   33.37,   0  !   !END!
5187!  X= 622.700,   5194.400,   30.76,   0  !   !END!
5188!  X= 622.700,   5194.500,   27.58,   0  !   !END!
5189!  X= 622.700,   5194.600,   25.36,   0  !   !END!
5190!  X= 622.700,   5194.700,   25.30,   0  !   !END!
5191!  X= 622.700,   5194.800,   27.61,   0  !   !END!
5192!  X= 622.700,   5194.900,   28.30,   0  !   !END!
5193!  X= 622.700,   5194.950,   29.41,   0  !   !END!
5194!  X= 622.700,   5195.000,   30.13,   0  !   !END!
5195!  X= 622.700,   5195.050,   31.14,   0  !   !END!
5196!  X= 622.700,   5195.100,   32.55,   0  !   !END!
5197!  X= 622.700,   5195.150,   33.82,   0  !   !END!
5198!  X= 622.700,   5195.200,   35.81,   0  !   !END!
5199!  X= 622.700,   5195.250,   39.00,   0  !   !END!
5200!  X= 622.700,   5195.300,   38.42,   0  !   !END!
5201!  X= 622.700,   5195.350,   35.48,   0  !   !END!
5202!  X= 622.700,   5195.400,   33.00,   0  !   !END!
5203!  X= 622.700,   5195.450,   29.00,   0  !   !END!
5204!  X= 622.700,   5195.500,   27.00,   0  !   !END!
5205!  X= 622.700,   5195.550,   22.76,   0  !   !END!
5206!  X= 622.700,   5195.600,   21.00,   0  !   !END!
5207!  X= 622.700,   5195.650,   19.00,   0  !   !END!
5208!  X= 622.700,   5195.700,   19.79,   0  !   !END!
5209!  X= 622.700,   5195.750,   21.91,   0  !   !END!
5210!  X= 622.700,   5195.800,   24.20,   0  !   !END!
5211!  X= 622.700,   5195.900,   25.01,   0  !   !END!
5212!  X= 622.700,   5196.000,   28.55,   0  !   !END!
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5213!  X= 622.700,   5196.100,   28.05,   0  !   !END!
5214!  X= 622.700,   5196.200,   29.06,   0  !   !END!
5215!  X= 622.700,   5196.300,   29.52,   0  !   !END!
5216!  X= 622.700,   5196.400,   27.39,   0  !   !END!
5217!  X= 622.700,   5196.500,   16.31,   0  !   !END!
5218!  X= 622.700,   5196.600,   11.95,   0  !   !END!
5219!  X= 622.700,   5196.700,   1.31,   0  !   !END!
5220!  X= 622.700,   5196.800,   0.00,   0  !   !END!
5221!  X= 622.700,   5196.900,   0.00,   0  !   !END!
5222!  X= 622.700,   5197.000,   0.00,   0  !   !END!
5223!  X= 622.700,   5197.100,   0.00,   0  !   !END!
5224!  X= 622.700,   5197.200,   0.00,   0  !   !END!
5225!  X= 622.700,   5197.300,   0.00,   0  !   !END!
5226!  X= 622.700,   5197.400,   2.59,   0  !   !END!
5227!  X= 622.700,   5197.500,   11.79,   0  !   !END!
5228!  X= 622.700,   5197.600,   22.47,   0  !   !END!
5229!  X= 622.700,   5197.700,   29.52,   0  !   !END!
5230!  X= 622.700,   5197.800,   37.11,   0  !   !END!
5231!  X= 622.700,   5197.900,   40.90,   0  !   !END!
5232!  X= 622.700,   5198.000,   35.77,   0  !   !END!
5233!  X= 622.700,   5198.100,   37.18,   0  !   !END!
5234!  X= 622.700,   5198.200,   36.22,   0  !   !END!
5235!  X= 622.700,   5198.300,   36.55,   0  !   !END!
5236!  X= 622.700,   5198.400,   37.78,   0  !   !END!
5237!  X= 622.700,   5198.500,   39.69,   0  !   !END!
5238!  X= 622.700,   5198.600,   42.16,   0  !   !END!
5239!  X= 622.700,   5198.700,   44.13,   0  !   !END!
5240!  X= 622.700,   5198.800,   44.61,   0  !   !END!
5241!  X= 622.700,   5198.900,   43.75,   0  !   !END!
5242!  X= 622.700,   5199.000,   48.45,   0  !   !END!
5243!  X= 622.750,   5194.900,   31.04,   0  !   !END!
5244!  X= 622.750,   5194.950,   31.68,   0  !   !END!
5245!  X= 622.750,   5195.000,   31.47,   0  !   !END!
5246!  X= 622.750,   5195.050,   32.69,   0  !   !END!
5247!  X= 622.750,   5195.100,   34.73,   0  !   !END!
5248!  X= 622.750,   5195.150,   35.29,   0  !   !END!
5249!  X= 622.750,   5195.200,   35.32,   0  !   !END!
5250!  X= 622.750,   5195.250,   34.46,   0  !   !END!
5251!  X= 622.750,   5195.300,   35.91,   0  !   !END!
5252!  X= 622.750,   5195.350,   33.23,   0  !   !END!
5253!  X= 622.750,   5195.400,   28.19,   0  !   !END!
5254!  X= 622.750,   5195.450,   24.60,   0  !   !END!
5255!  X= 622.750,   5195.500,   20.09,   0  !   !END!
5256!  X= 622.750,   5195.550,   19.00,   0  !   !END!
5257!  X= 622.750,   5195.600,   15.39,   0  !   !END!
5258!  X= 622.750,   5195.650,   15.05,   0  !   !END!
5259!  X= 622.750,   5195.700,   14.76,   0  !   !END!
5260!  X= 622.750,   5195.750,   15.29,   0  !   !END!
5261!  X= 622.750,   5195.800,   16.81,   0  !   !END!
5262!  X= 622.800,   5192.600,   0.00,   0  !   !END!
5263!  X= 622.800,   5192.700,   0.00,   0  !   !END!
5264!  X= 622.800,   5192.800,   0.00,   0  !   !END!
5265!  X= 622.800,   5192.900,   23.43,   0  !   !END!
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5266!  X= 622.800,   5193.000,   33.54,   0  !   !END!
5267!  X= 622.800,   5193.100,   34.49,   0  !   !END!
5268!  X= 622.800,   5193.200,   32.15,   0  !   !END!
5269!  X= 622.800,   5193.300,   33.35,   0  !   !END!
5270!  X= 622.800,   5193.400,   36.26,   0  !   !END!
5271!  X= 622.800,   5193.500,   37.89,   0  !   !END!
5272!  X= 622.800,   5193.600,   37.91,   0  !   !END!
5273!  X= 622.800,   5193.700,   40.69,   0  !   !END!
5274!  X= 622.800,   5193.800,   41.11,   0  !   !END!
5275!  X= 622.800,   5193.900,   40.58,   0  !   !END!
5276!  X= 622.800,   5194.000,   43.00,   0  !   !END!
5277!  X= 622.800,   5194.100,   42.48,   0  !   !END!
5278!  X= 622.800,   5194.200,   43.95,   0  !   !END!
5279!  X= 622.800,   5194.300,   39.45,   0  !   !END!
5280!  X= 622.800,   5194.400,   35.21,   0  !   !END!
5281!  X= 622.800,   5194.500,   32.86,   0  !   !END!
5282!  X= 622.800,   5194.600,   29.20,   0  !   !END!
5283!  X= 622.800,   5194.700,   28.52,   0  !   !END!
5284!  X= 622.800,   5194.800,   29.99,   0  !   !END!
5285!  X= 622.800,   5194.900,   33.65,   0  !   !END!
5286!  X= 622.800,   5194.950,   35.65,   0  !   !END!
5287!  X= 622.800,   5195.000,   35.40,   0  !   !END!
5288!  X= 622.800,   5195.050,   36.05,   0  !   !END!
5289!  X= 622.800,   5195.100,   36.25,   0  !   !END!
5290!  X= 622.800,   5195.150,   35.89,   0  !   !END!
5291!  X= 622.800,   5195.200,   35.95,   0  !   !END!
5292!  X= 622.800,   5195.250,   33.67,   0  !   !END!
5293!  X= 622.800,   5195.300,   32.73,   0  !   !END!
5294!  X= 622.800,   5195.350,   27.13,   0  !   !END!
5295!  X= 622.800,   5195.400,   24.00,   0  !   !END!
5296!  X= 622.800,   5195.450,   18.00,   0  !   !END!
5297!  X= 622.800,   5195.500,   11.49,   0  !   !END!
5298!  X= 622.800,   5195.550,   12.00,   0  !   !END!
5299!  X= 622.800,   5195.600,   10.62,   0  !   !END!
5300!  X= 622.800,   5195.650,   10.30,   0  !   !END!
5301!  X= 622.800,   5195.700,   10.81,   0  !   !END!
5302!  X= 622.800,   5195.750,   11.73,   0  !   !END!
5303!  X= 622.800,   5195.800,   12.72,   0  !   !END!
5304!  X= 622.800,   5195.900,   15.80,   0  !   !END!
5305!  X= 622.800,   5196.000,   19.27,   0  !   !END!
5306!  X= 622.800,   5196.100,   22.72,   0  !   !END!
5307!  X= 622.800,   5196.200,   24.59,   0  !   !END!
5308!  X= 622.800,   5196.300,   24.72,   0  !   !END!
5309!  X= 622.800,   5196.400,   18.72,   0  !   !END!
5310!  X= 622.800,   5196.500,   8.65,   0  !   !END!
5311!  X= 622.800,   5196.600,   0.00,   0  !   !END!
5312!  X= 622.800,   5196.700,   0.00,   0  !   !END!
5313!  X= 622.800,   5196.800,   0.00,   0  !   !END!
5314!  X= 622.800,   5196.900,   0.00,   0  !   !END!
5315!  X= 622.800,   5197.000,   0.00,   0  !   !END!
5316!  X= 622.800,   5197.100,   0.00,   0  !   !END!
5317!  X= 622.800,   5197.200,   0.00,   0  !   !END!
5318!  X= 622.800,   5197.300,   1.48,   0  !   !END!
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5319!  X= 622.800,   5197.400,   9.19,   0  !   !END!
5320!  X= 622.800,   5197.500,   21.12,   0  !   !END!
5321!  X= 622.800,   5197.600,   31.52,   0  !   !END!
5322!  X= 622.800,   5197.700,   37.07,   0  !   !END!
5323!  X= 622.800,   5197.800,   39.83,   0  !   !END!
5324!  X= 622.800,   5197.900,   40.23,   0  !   !END!
5325!  X= 622.800,   5198.000,   36.70,   0  !   !END!
5326!  X= 622.800,   5198.100,   36.23,   0  !   !END!
5327!  X= 622.800,   5198.200,   36.20,   0  !   !END!
5328!  X= 622.800,   5198.300,   36.52,   0  !   !END!
5329!  X= 622.800,   5198.400,   38.85,   0  !   !END!
5330!  X= 622.800,   5198.500,   41.76,   0  !   !END!
5331!  X= 622.800,   5198.600,   45.85,   0  !   !END!
5332!  X= 622.800,   5198.700,   50.26,   0  !   !END!
5333!  X= 622.800,   5198.800,   50.92,   0  !   !END!
5334!  X= 622.800,   5198.900,   50.95,   0  !   !END!
5335!  X= 622.800,   5199.000,   53.23,   0  !   !END!
5336!  X= 622.850,   5194.900,   34.48,   0  !   !END!
5337!  X= 622.850,   5194.950,   35.24,   0  !   !END!
5338!  X= 622.850,   5195.000,   38.42,   0  !   !END!
5339!  X= 622.850,   5195.050,   38.73,   0  !   !END!
5340!  X= 622.850,   5195.100,   39.16,   0  !   !END!
5341!  X= 622.850,   5195.150,   37.00,   0  !   !END!
5342!  X= 622.850,   5195.200,   34.60,   0  !   !END!
5343!  X= 622.850,   5195.250,   30.91,   0  !   !END!
5344!  X= 622.850,   5195.300,   26.28,   0  !   !END!
5345!  X= 622.850,   5195.350,   22.12,   0  !   !END!
5346!  X= 622.850,   5195.400,   20.00,   0  !   !END!
5347!  X= 622.850,   5195.450,   10.22,   0  !   !END!
5348!  X= 622.850,   5195.500,   0.73,   0  !   !END!
5349!  X= 622.850,   5195.550,   0.00,   0  !   !END!
5350!  X= 622.850,   5195.600,   1.99,   0  !   !END!
5351!  X= 622.850,   5195.650,   2.65,   0  !   !END!
5352!  X= 622.850,   5195.700,   4.98,   0  !   !END!
5353!  X= 622.850,   5195.750,   6.22,   0  !   !END!
5354!  X= 622.850,   5195.800,   8.78,   0  !   !END!
5355!  X= 622.900,   5192.600,   0.00,   0  !   !END!
5356!  X= 622.900,   5192.700,   0.00,   0  !   !END!
5357!  X= 622.900,   5192.800,   0.00,   0  !   !END!
5358!  X= 622.900,   5192.900,   24.78,   0  !   !END!
5359!  X= 622.900,   5193.000,   39.40,   0  !   !END!
5360!  X= 622.900,   5193.100,   43.46,   0  !   !END!
5361!  X= 622.900,   5193.200,   45.12,   0  !   !END!
5362!  X= 622.900,   5193.300,   49.24,   0  !   !END!
5363!  X= 622.900,   5193.400,   49.12,   0  !   !END!
5364!  X= 622.900,   5193.500,   50.40,   0  !   !END!
5365!  X= 622.900,   5193.600,   56.23,   0  !   !END!
5366!  X= 622.900,   5193.700,   58.99,   0  !   !END!
5367!  X= 622.900,   5193.800,   59.58,   0  !   !END!
5368!  X= 622.900,   5193.900,   55.31,   0  !   !END!
5369!  X= 622.900,   5194.000,   51.53,   0  !   !END!
5370!  X= 622.900,   5194.100,   49.20,   0  !   !END!
5371!  X= 622.900,   5194.200,   46.13,   0  !   !END!
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5372!  X= 622.900,   5194.300,   44.18,   0  !   !END!
5373!  X= 622.900,   5194.400,   40.10,   0  !   !END!
5374!  X= 622.900,   5194.500,   34.79,   0  !   !END!
5375!  X= 622.900,   5194.600,   31.78,   0  !   !END!
5376!  X= 622.900,   5194.700,   35.43,   0  !   !END!
5377!  X= 622.900,   5194.800,   37.10,   0  !   !END!
5378!  X= 622.900,   5194.900,   41.50,   0  !   !END!
5379!  X= 622.900,   5194.950,   41.12,   0  !   !END!
5380!  X= 622.900,   5195.000,   41.23,   0  !   !END!
5381!  X= 622.900,   5195.050,   41.00,   0  !   !END!
5382!  X= 622.900,   5195.100,   38.00,   0  !   !END!
5383!  X= 622.900,   5195.150,   34.68,   0  !   !END!
5384!  X= 622.900,   5195.200,   31.17,   0  !   !END!
5385!  X= 622.900,   5195.250,   25.75,   0  !   !END!
5386!  X= 622.900,   5195.300,   21.53,   0  !   !END!
5387!  X= 622.900,   5195.350,   17.00,   0  !   !END!
5388!  X= 622.900,   5195.400,   3.50,   0  !   !END!
5389!  X= 622.900,   5195.450,   0.00,   0  !   !END!
5390!  X= 622.900,   5195.500,   0.00,   0  !   !END!
5391!  X= 622.900,   5195.550,   0.00,   0  !   !END!
5392!  X= 622.900,   5195.600,   0.00,   0  !   !END!
5393!  X= 622.900,   5195.650,   0.00,   0  !   !END!
5394!  X= 622.900,   5195.700,   0.00,   0  !   !END!
5395!  X= 622.900,   5195.750,   0.24,   0  !   !END!
5396!  X= 622.900,   5195.800,   5.47,   0  !   !END!
5397!  X= 622.900,   5195.900,   11.37,   0  !   !END!
5398!  X= 622.900,   5196.000,   16.25,   0  !   !END!
5399!  X= 622.900,   5196.100,   19.38,   0  !   !END!
5400!  X= 622.900,   5196.200,   19.80,   0  !   !END!
5401!  X= 622.900,   5196.300,   17.49,   0  !   !END!
5402!  X= 622.900,   5196.400,   0.00,   0  !   !END!
5403!  X= 622.900,   5196.500,   0.00,   0  !   !END!
5404!  X= 622.900,   5196.600,   0.00,   0  !   !END!
5405!  X= 622.900,   5196.700,   0.00,   0  !   !END!
5406!  X= 622.900,   5196.800,   0.00,   0  !   !END!
5407!  X= 622.900,   5196.900,   0.00,   0  !   !END!
5408!  X= 622.900,   5197.000,   0.00,   0  !   !END!
5409!  X= 622.900,   5197.100,   0.00,   0  !   !END!
5410!  X= 622.900,   5197.200,   0.07,   0  !   !END!
5411!  X= 622.900,   5197.300,   6.16,   0  !   !END!
5412!  X= 622.900,   5197.400,   14.36,   0  !   !END!
5413!  X= 622.900,   5197.500,   22.53,   0  !   !END!
5414!  X= 622.900,   5197.600,   29.23,   0  !   !END!
5415!  X= 622.900,   5197.700,   31.44,   0  !   !END!
5416!  X= 622.900,   5197.800,   32.98,   0  !   !END!
5417!  X= 622.900,   5197.900,   35.46,   0  !   !END!
5418!  X= 622.900,   5198.000,   36.63,   0  !   !END!
5419!  X= 622.900,   5198.100,   37.27,   0  !   !END!
5420!  X= 622.900,   5198.200,   37.48,   0  !   !END!
5421!  X= 622.900,   5198.300,   40.84,   0  !   !END!
5422!  X= 622.900,   5198.400,   46.14,   0  !   !END!
5423!  X= 622.900,   5198.500,   50.65,   0  !   !END!
5424!  X= 622.900,   5198.600,   55.24,   0  !   !END!
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5425!  X= 622.900,   5198.700,   58.57,   0  !   !END!
5426!  X= 622.900,   5198.800,   59.65,   0  !   !END!
5427!  X= 622.900,   5198.900,   60.04,   0  !   !END!
5428!  X= 622.900,   5199.000,   56.13,   0  !   !END!
5429!  X= 622.950,   5194.900,   45.87,   0  !   !END!
5430!  X= 622.950,   5194.950,   44.33,   0  !   !END!
5431!  X= 622.950,   5195.000,   42.00,   0  !   !END!
5432!  X= 622.950,   5195.050,   39.19,   0  !   !END!
5433!  X= 622.950,   5195.100,   35.19,   0  !   !END!
5434!  X= 622.950,   5195.150,   30.68,   0  !   !END!
5435!  X= 622.950,   5195.200,   25.95,   0  !   !END!
5436!  X= 622.950,   5195.250,   19.00,   0  !   !END!
5437!  X= 622.950,   5195.300,   16.21,   0  !   !END!
5438!  X= 622.950,   5195.350,   4.00,   0  !   !END!
5439!  X= 622.950,   5195.400,   0.00,   0  !   !END!
5440!  X= 622.950,   5195.450,   0.00,   0  !   !END!
5441!  X= 622.950,   5195.500,   0.00,   0  !   !END!
5442!  X= 622.950,   5195.550,   0.00,   0  !   !END!
5443!  X= 622.950,   5195.600,   0.00,   0  !   !END!
5444!  X= 622.950,   5195.650,   0.00,   0  !   !END!
5445!  X= 622.950,   5195.700,   0.00,   0  !   !END!
5446!  X= 622.950,   5195.750,   0.00,   0  !   !END!
5447!  X= 622.950,   5195.800,   0.00,   0  !   !END!
5448!  X= 623.000,   5192.000,   0.00,   0  !   !END!
5449!  X= 623.000,   5192.500,   0.00,   0  !   !END!
5450!  X= 623.000,   5192.600,   0.00,   0  !   !END!
5451!  X= 623.000,   5192.700,   0.00,   0  !   !END!
5452!  X= 623.000,   5192.800,   12.14,   0  !   !END!
5453!  X= 623.000,   5192.900,   40.31,   0  !   !END!
5454!  X= 623.000,   5193.000,   48.44,   0  !   !END!
5455!  X= 623.000,   5193.100,   54.81,   0  !   !END!
5456!  X= 623.000,   5193.200,   60.64,   0  !   !END!
5457!  X= 623.000,   5193.300,   62.93,   0  !   !END!
5458!  X= 623.000,   5193.400,   63.97,   0  !   !END!
5459!  X= 623.000,   5193.500,   65.18,   0  !   !END!
5460!  X= 623.000,   5193.600,   65.72,   0  !   !END!
5461!  X= 623.000,   5193.700,   69.64,   0  !   !END!
5462!  X= 623.000,   5193.800,   68.97,   0  !   !END!
5463!  X= 623.000,   5193.900,   61.72,   0  !   !END!
5464!  X= 623.000,   5194.000,   55.95,   0  !   !END!
5465!  X= 623.000,   5194.100,   51.04,   0  !   !END!
5466!  X= 623.000,   5194.200,   48.26,   0  !   !END!
5467!  X= 623.000,   5194.300,   45.43,   0  !   !END!
5468!  X= 623.000,   5194.400,   43.34,   0  !   !END!
5469!  X= 623.000,   5194.500,   43.20,   0  !   !END!
5470!  X= 623.000,   5194.600,   45.70,   0  !   !END!
5471!  X= 623.000,   5194.700,   43.66,   0  !   !END!
5472!  X= 623.000,   5194.800,   44.45,   0  !   !END!
5473!  X= 623.000,   5194.900,   47.36,   0  !   !END!
5474!  X= 623.000,   5194.950,   45.00,   0  !   !END!
5475!  X= 623.000,   5195.000,   41.00,   0  !   !END!
5476!  X= 623.000,   5195.050,   37.37,   0  !   !END!
5477!  X= 623.000,   5195.100,   32.52,   0  !   !END!
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5478!  X= 623.000,   5195.150,   26.30,   0  !   !END!
5479!  X= 623.000,   5195.200,   20.96,   0  !   !END!
5480!  X= 623.000,   5195.250,   16.63,   0  !   !END!
5481!  X= 623.000,   5195.300,   0.30,   0  !   !END!
5482!  X= 623.000,   5195.350,   0.00,   0  !   !END!
5483!  X= 623.000,   5195.400,   0.00,   0  !   !END!
5484!  X= 623.000,   5195.450,   0.00,   0  !   !END!
5485!  X= 623.000,   5195.500,   0.00,   0  !   !END!
5486!  X= 623.000,   5195.550,   0.00,   0  !   !END!
5487!  X= 623.000,   5195.600,   0.00,   0  !   !END!
5488!  X= 623.000,   5195.650,   0.00,   0  !   !END!
5489!  X= 623.000,   5195.700,   0.00,   0  !   !END!
5490!  X= 623.000,   5195.750,   0.00,   0  !   !END!
5491!  X= 623.000,   5195.800,   0.00,   0  !   !END!
5492!  X= 623.000,   5195.900,   4.19,   0  !   !END!
5493!  X= 623.000,   5196.000,   10.84,   0  !   !END!
5494!  X= 623.000,   5196.100,   13.14,   0  !   !END!
5495!  X= 623.000,   5196.200,   3.61,   0  !   !END!
5496!  X= 623.000,   5196.300,   0.00,   0  !   !END!
5497!  X= 623.000,   5196.400,   0.00,   0  !   !END!
5498!  X= 623.000,   5196.500,   0.00,   0  !   !END!
5499!  X= 623.000,   5196.600,   0.00,   0  !   !END!
5500!  X= 623.000,   5196.700,   0.00,   0  !   !END!
5501!  X= 623.000,   5196.800,   0.00,   0  !   !END!
5502!  X= 623.000,   5196.900,   0.00,   0  !   !END!
5503!  X= 623.000,   5197.000,   0.00,   0  !   !END!
5504!  X= 623.000,   5197.100,   0.00,   0  !   !END!
5505!  X= 623.000,   5197.200,   5.63,   0  !   !END!
5506!  X= 623.000,   5197.300,   9.90,   0  !   !END!
5507!  X= 623.000,   5197.400,   15.06,   0  !   !END!
5508!  X= 623.000,   5197.500,   17.68,   0  !   !END!
5509!  X= 623.000,   5197.600,   25.31,   0  !   !END!
5510!  X= 623.000,   5197.700,   29.62,   0  !   !END!
5511!  X= 623.000,   5197.800,   34.07,   0  !   !END!
5512!  X= 623.000,   5197.900,   37.53,   0  !   !END!
5513!  X= 623.000,   5198.000,   40.89,   0  !   !END!
5514!  X= 623.000,   5198.100,   45.26,   0  !   !END!
5515!  X= 623.000,   5198.200,   49.83,   0  !   !END!
5516!  X= 623.000,   5198.300,   53.57,   0  !   !END!
5517!  X= 623.000,   5198.400,   56.53,   0  !   !END!
5518!  X= 623.000,   5198.500,   58.44,   0  !   !END!
5519!  X= 623.000,   5198.600,   58.89,   0  !   !END!
5520!  X= 623.000,   5198.700,   60.38,   0  !   !END!
5521!  X= 623.000,   5198.800,   61.00,   0  !   !END!
5522!  X= 623.000,   5198.900,   60.14,   0  !   !END!
5523!  X= 623.000,   5199.000,   57.33,   0  !   !END!
5524!  X= 623.000,   5199.500,   47.14,   0  !   !END!
5525!  X= 623.000,   5200.000,   25.70,   0  !   !END!
5526!  X= 623.050,   5194.900,   47.06,   0  !   !END!
5527!  X= 623.050,   5194.950,   45.00,   0  !   !END!
5528!  X= 623.050,   5195.000,   39.52,   0  !   !END!
5529!  X= 623.050,   5195.050,   25.00,   0  !   !END!
5530!  X= 623.050,   5195.100,   25.12,   0  !   !END!
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5531!  X= 623.050,   5195.150,   19.00,   0  !   !END!
5532!  X= 623.050,   5195.200,   13.59,   0  !   !END!
5533!  X= 623.050,   5195.250,   5.91,   0  !   !END!
5534!  X= 623.050,   5195.300,   0.19,   0  !   !END!
5535!  X= 623.050,   5195.350,   0.00,   0  !   !END!
5536!  X= 623.050,   5195.400,   0.00,   0  !   !END!
5537!  X= 623.050,   5195.450,   0.00,   0  !   !END!
5538!  X= 623.050,   5195.500,   0.00,   0  !   !END!
5539!  X= 623.050,   5195.550,   0.00,   0  !   !END!
5540!  X= 623.050,   5195.600,   0.00,   0  !   !END!
5541!  X= 623.050,   5195.650,   0.00,   0  !   !END!
5542!  X= 623.050,   5195.700,   0.00,   0  !   !END!
5543!  X= 623.050,   5195.750,   0.00,   0  !   !END!
5544!  X= 623.050,   5195.800,   0.00,   0  !   !END!
5545!  X= 623.100,   5192.600,   0.00,   0  !   !END!
5546!  X= 623.100,   5192.700,   4.90,   0  !   !END!
5547!  X= 623.100,   5192.800,   21.15,   0  !   !END!
5548!  X= 623.100,   5192.900,   39.91,   0  !   !END!
5549!  X= 623.100,   5193.000,   53.34,   0  !   !END!
5550!  X= 623.100,   5193.100,   66.76,   0  !   !END!
5551!  X= 623.100,   5193.200,   73.93,   0  !   !END!
5552!  X= 623.100,   5193.300,   75.28,   0  !   !END!
5553!  X= 623.100,   5193.400,   75.69,   0  !   !END!
5554!  X= 623.100,   5193.500,   71.78,   0  !   !END!
5555!  X= 623.100,   5193.600,   69.56,   0  !   !END!
5556!  X= 623.100,   5193.700,   69.10,   0  !   !END!
5557!  X= 623.100,   5193.800,   65.60,   0  !   !END!
5558!  X= 623.100,   5193.900,   57.43,   0  !   !END!
5559!  X= 623.100,   5194.000,   52.91,   0  !   !END!
5560!  X= 623.100,   5194.100,   51.47,   0  !   !END!
5561!  X= 623.100,   5194.200,   50.62,   0  !   !END!
5562!  X= 623.100,   5194.300,   52.60,   0  !   !END!
5563!  X= 623.100,   5194.400,   52.84,   0  !   !END!
5564!  X= 623.100,   5194.500,   53.18,   0  !   !END!
5565!  X= 623.100,   5194.600,   54.01,   0  !   !END!
5566!  X= 623.100,   5194.700,   53.02,   0  !   !END!
5567!  X= 623.100,   5194.800,   49.43,   0  !   !END!
5568!  X= 623.100,   5194.900,   43.87,   0  !   !END!
5569!  X= 623.100,   5194.950,   41.89,   0  !   !END!
5570!  X= 623.100,   5195.000,   26.90,   0  !   !END!
5571!  X= 623.100,   5195.050,   26.88,   0  !   !END!
5572!  X= 623.100,   5195.100,   11.15,   0  !   !END!
5573!  X= 623.100,   5195.150,   6.93,   0  !   !END!
5574!  X= 623.100,   5195.200,   6.64,   0  !   !END!
5575!  X= 623.100,   5195.250,   0.00,   0  !   !END!
5576!  X= 623.100,   5195.300,   0.00,   0  !   !END!
5577!  X= 623.100,   5195.350,   0.00,   0  !   !END!
5578!  X= 623.100,   5195.400,   0.00,   0  !   !END!
5579!  X= 623.100,   5195.450,   0.00,   0  !   !END!
5580!  X= 623.100,   5195.500,   0.00,   0  !   !END!
5581!  X= 623.100,   5195.550,   0.00,   0  !   !END!
5582!  X= 623.100,   5195.600,   0.00,   0  !   !END!
5583!  X= 623.100,   5195.650,   0.00,   0  !   !END!
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5584!  X= 623.100,   5195.700,   0.00,   0  !   !END!
5585!  X= 623.100,   5195.750,   0.00,   0  !   !END!
5586!  X= 623.100,   5195.800,   0.00,   0  !   !END!
5587!  X= 623.100,   5195.900,   0.00,   0  !   !END!
5588!  X= 623.100,   5196.000,   0.16,   0  !   !END!
5589!  X= 623.100,   5196.100,   0.00,   0  !   !END!
5590!  X= 623.100,   5196.200,   0.00,   0  !   !END!
5591!  X= 623.100,   5196.300,   0.00,   0  !   !END!
5592!  X= 623.100,   5196.400,   0.00,   0  !   !END!
5593!  X= 623.100,   5196.500,   0.00,   0  !   !END!
5594!  X= 623.100,   5196.600,   0.00,   0  !   !END!
5595!  X= 623.100,   5196.700,   0.00,   0  !   !END!
5596!  X= 623.100,   5196.800,   0.00,   0  !   !END!
5597!  X= 623.100,   5196.900,   0.00,   0  !   !END!
5598!  X= 623.100,   5197.000,   8.09,   0  !   !END!
5599!  X= 623.100,   5197.100,   15.36,   0  !   !END!
5600!  X= 623.100,   5197.200,   18.13,   0  !   !END!
5601!  X= 623.100,   5197.300,   21.14,   0  !   !END!
5602!  X= 623.100,   5197.400,   24.51,   0  !   !END!
5603!  X= 623.100,   5197.500,   26.52,   0  !   !END!
5604!  X= 623.100,   5197.600,   30.00,   0  !   !END!
5605!  X= 623.100,   5197.700,   34.52,   0  !   !END!
5606!  X= 623.100,   5197.800,   39.24,   0  !   !END!
5607!  X= 623.100,   5197.900,   45.12,   0  !   !END!
5608!  X= 623.100,   5198.000,   49.75,   0  !   !END!
5609!  X= 623.100,   5198.100,   53.51,   0  !   !END!
5610!  X= 623.100,   5198.200,   56.70,   0  !   !END!
5611!  X= 623.100,   5198.300,   59.77,   0  !   !END!
5612!  X= 623.100,   5198.400,   60.56,   0  !   !END!
5613!  X= 623.100,   5198.500,   60.94,   0  !   !END!
5614!  X= 623.100,   5198.600,   61.07,   0  !   !END!
5615!  X= 623.100,   5198.700,   61.67,   0  !   !END!
5616!  X= 623.100,   5198.800,   62.00,   0  !   !END!
5617!  X= 623.100,   5198.900,   60.83,   0  !   !END!
5618!  X= 623.100,   5199.000,   58.41,   0  !   !END!
5619!  X= 623.150,   5194.900,   43.00,   0  !   !END!
5620!  X= 623.150,   5194.950,   34.31,   0  !   !END!
5621!  X= 623.150,   5195.000,   24.85,   0  !   !END!
5622!  X= 623.150,   5195.050,   10.97,   0  !   !END!
5623!  X= 623.150,   5195.100,   8.15,   0  !   !END!
5624!  X= 623.150,   5195.150,   7.05,   0  !   !END!
5625!  X= 623.150,   5195.200,   0.09,   0  !   !END!
5626!  X= 623.150,   5195.250,   0.00,   0  !   !END!
5627!  X= 623.150,   5195.300,   0.00,   0  !   !END!
5628!  X= 623.150,   5195.350,   0.00,   0  !   !END!
5629!  X= 623.150,   5195.400,   0.00,   0  !   !END!
5630!  X= 623.150,   5195.450,   0.00,   0  !   !END!
5631!  X= 623.150,   5195.500,   0.00,   0  !   !END!
5632!  X= 623.150,   5195.550,   0.00,   0  !   !END!
5633!  X= 623.150,   5195.600,   0.00,   0  !   !END!
5634!  X= 623.150,   5195.650,   0.00,   0  !   !END!
5635!  X= 623.150,   5195.700,   0.00,   0  !   !END!
5636!  X= 623.150,   5195.750,   0.00,   0  !   !END!
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5637!  X= 623.150,   5195.800,   0.00,   0  !   !END!
5638!  X= 623.200,   5192.600,   10.42,   0  !   !END!
5639!  X= 623.200,   5192.700,   42.50,   0  !   !END!
5640!  X= 623.200,   5192.800,   33.21,   0  !   !END!
5641!  X= 623.200,   5192.900,   41.23,   0  !   !END!
5642!  X= 623.200,   5193.000,   55.37,   0  !   !END!
5643!  X= 623.200,   5193.100,   62.96,   0  !   !END!
5644!  X= 623.200,   5193.200,   74.35,   0  !   !END!
5645!  X= 623.200,   5193.300,   77.23,   0  !   !END!
5646!  X= 623.200,   5193.400,   75.45,   0  !   !END!
5647!  X= 623.200,   5193.500,   72.02,   0  !   !END!
5648!  X= 623.200,   5193.600,   63.99,   0  !   !END!
5649!  X= 623.200,   5193.700,   55.52,   0  !   !END!
5650!  X= 623.200,   5193.800,   52.28,   0  !   !END!
5651!  X= 623.200,   5193.900,   51.87,   0  !   !END!
5652!  X= 623.200,   5194.000,   51.96,   0  !   !END!
5653!  X= 623.200,   5194.100,   55.06,   0  !   !END!
5654!  X= 623.200,   5194.200,   60.36,   0  !   !END!
5655!  X= 623.200,   5194.300,   70.39,   0  !   !END!
5656!  X= 623.200,   5194.400,   72.28,   0  !   !END!
5657!  X= 623.200,   5194.500,   67.76,   0  !   !END!
5658!  X= 623.200,   5194.600,   58.49,   0  !   !END!
5659!  X= 623.200,   5194.700,   57.44,   0  !   !END!
5660!  X= 623.200,   5194.800,   47.60,   0  !   !END!
5661!  X= 623.200,   5194.900,   38.97,   0  !   !END!
5662!  X= 623.200,   5194.950,   33.17,   0  !   !END!
5663!  X= 623.200,   5195.000,   14.00,   0  !   !END!
5664!  X= 623.200,   5195.050,   15.25,   0  !   !END!
5665!  X= 623.200,   5195.100,   2.36,   0  !   !END!
5666!  X= 623.200,   5195.150,   1.67,   0  !   !END!
5667!  X= 623.200,   5195.200,   5.00,   0  !   !END!
5668!  X= 623.200,   5195.250,   0.00,   0  !   !END!
5669!  X= 623.200,   5195.300,   0.00,   0  !   !END!
5670!  X= 623.200,   5195.350,   0.00,   0  !   !END!
5671!  X= 623.200,   5195.400,   0.00,   0  !   !END!
5672!  X= 623.200,   5195.450,   0.00,   0  !   !END!
5673!  X= 623.200,   5195.500,   0.00,   0  !   !END!
5674!  X= 623.200,   5195.550,   0.00,   0  !   !END!
5675!  X= 623.200,   5195.600,   0.00,   0  !   !END!
5676!  X= 623.200,   5195.650,   0.00,   0  !   !END!
5677!  X= 623.200,   5195.700,   0.00,   0  !   !END!
5678!  X= 623.200,   5195.750,   0.00,   0  !   !END!
5679!  X= 623.200,   5195.800,   0.00,   0  !   !END!
5680!  X= 623.200,   5195.900,   0.00,   0  !   !END!
5681!  X= 623.200,   5196.000,   0.00,   0  !   !END!
5682!  X= 623.200,   5196.100,   0.00,   0  !   !END!
5683!  X= 623.200,   5196.200,   0.00,   0  !   !END!
5684!  X= 623.200,   5196.300,   0.00,   0  !   !END!
5685!  X= 623.200,   5196.400,   0.00,   0  !   !END!
5686!  X= 623.200,   5196.500,   0.00,   0  !   !END!
5687!  X= 623.200,   5196.600,   0.00,   0  !   !END!
5688!  X= 623.200,   5196.700,   0.00,   0  !   !END!
5689!  X= 623.200,   5196.800,   4.36,   0  !   !END!
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5690!  X= 623.200,   5196.900,   19.27,   0  !   !END!
5691!  X= 623.200,   5197.000,   27.76,   0  !   !END!
5692!  X= 623.200,   5197.100,   34.02,   0  !   !END!
5693!  X= 623.200,   5197.200,   33.57,   0  !   !END!
5694!  X= 623.200,   5197.300,   31.62,   0  !   !END!
5695!  X= 623.200,   5197.400,   31.68,   0  !   !END!
5696!  X= 623.200,   5197.500,   32.42,   0  !   !END!
5697!  X= 623.200,   5197.600,   34.43,   0  !   !END!
5698!  X= 623.200,   5197.700,   42.51,   0  !   !END!
5699!  X= 623.200,   5197.800,   47.07,   0  !   !END!
5700!  X= 623.200,   5197.900,   51.62,   0  !   !END!
5701!  X= 623.200,   5198.000,   55.88,   0  !   !END!
5702!  X= 623.200,   5198.100,   60.17,   0  !   !END!
5703!  X= 623.200,   5198.200,   63.52,   0  !   !END!
5704!  X= 623.200,   5198.300,   66.74,   0  !   !END!
5705!  X= 623.200,   5198.400,   66.82,   0  !   !END!
5706!  X= 623.200,   5198.500,   64.49,   0  !   !END!
5707!  X= 623.200,   5198.600,   63.90,   0  !   !END!
5708!  X= 623.200,   5198.700,   64.60,   0  !   !END!
5709!  X= 623.200,   5198.800,   64.91,   0  !   !END!
5710!  X= 623.200,   5198.900,   62.90,   0  !   !END!
5711!  X= 623.200,   5199.000,   60.16,   0  !   !END!
5712!  X= 623.250,   5194.900,   34.58,   0  !   !END!
5713!  X= 623.250,   5194.950,   29.00,   0  !   !END!
5714!  X= 623.250,   5195.000,   13.97,   0  !   !END!
5715!  X= 623.250,   5195.050,   5.67,   0  !   !END!
5716!  X= 623.250,   5195.100,   5.00,   0  !   !END!
5717!  X= 623.250,   5195.150,   4.29,   0  !   !END!
5718!  X= 623.250,   5195.200,   0.00,   0  !   !END!
5719!  X= 623.250,   5195.250,   0.00,   0  !   !END!
5720!  X= 623.250,   5195.300,   0.00,   0  !   !END!
5721!  X= 623.250,   5195.350,   0.00,   0  !   !END!
5722!  X= 623.250,   5195.400,   0.00,   0  !   !END!
5723!  X= 623.250,   5195.450,   0.00,   0  !   !END!
5724!  X= 623.250,   5195.500,   0.00,   0  !   !END!
5725!  X= 623.250,   5195.550,   0.00,   0  !   !END!
5726!  X= 623.250,   5195.600,   0.00,   0  !   !END!
5727!  X= 623.250,   5195.650,   0.00,   0  !   !END!
5728!  X= 623.250,   5195.700,   0.00,   0  !   !END!
5729!  X= 623.250,   5195.750,   0.00,   0  !   !END!
5730!  X= 623.250,   5195.800,   0.00,   0  !   !END!
5731!  X= 623.300,   5192.600,   0.00,   0  !   !END!
5732!  X= 623.300,   5192.700,   24.34,   0  !   !END!
5733!  X= 623.300,   5192.800,   17.88,   0  !   !END!
5734!  X= 623.300,   5192.900,   50.23,   0  !   !END!
5735!  X= 623.300,   5193.000,   63.65,   0  !   !END!
5736!  X= 623.300,   5193.100,   60.93,   0  !   !END!
5737!  X= 623.300,   5193.200,   64.93,   0  !   !END!
5738!  X= 623.300,   5193.300,   69.07,   0  !   !END!
5739!  X= 623.300,   5193.400,   63.87,   0  !   !END!
5740!  X= 623.300,   5193.500,   61.94,   0  !   !END!
5741!  X= 623.300,   5193.600,   52.40,   0  !   !END!
5742!  X= 623.300,   5193.700,   51.86,   0  !   !END!
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5743!  X= 623.300,   5193.800,   54.24,   0  !   !END!
5744!  X= 623.300,   5193.900,   57.00,   0  !   !END!
5745!  X= 623.300,   5194.000,   57.77,   0  !   !END!
5746!  X= 623.300,   5194.100,   66.30,   0  !   !END!
5747!  X= 623.300,   5194.200,   82.61,   0  !   !END!
5748!  X= 623.300,   5194.300,   105.82,   0  !   !END!
5749!  X= 623.300,   5194.400,   108.43,   0  !   !END!
5750!  X= 623.300,   5194.500,   87.06,   0  !   !END!
5751!  X= 623.300,   5194.600,   74.10,   0  !   !END!
5752!  X= 623.300,   5194.700,   63.11,   0  !   !END!
5753!  X= 623.300,   5194.800,   46.80,   0  !   !END!
5754!  X= 623.300,   5194.900,   33.51,   0  !   !END!
5755!  X= 623.300,   5194.950,   18.00,   0  !   !END!
5756!  X= 623.300,   5195.000,   4.12,   0  !   !END!
5757!  X= 623.300,   5195.050,   0.00,   0  !   !END!
5758!  X= 623.300,   5195.100,   0.00,   0  !   !END!
5759!  X= 623.300,   5195.150,   0.93,   0  !   !END!
5760!  X= 623.300,   5195.200,   0.00,   0  !   !END!
5761!  X= 623.300,   5195.250,   0.00,   0  !   !END!
5762!  X= 623.300,   5195.300,   0.00,   0  !   !END!
5763!  X= 623.300,   5195.350,   0.00,   0  !   !END!
5764!  X= 623.300,   5195.400,   0.00,   0  !   !END!
5765!  X= 623.300,   5195.450,   0.00,   0  !   !END!
5766!  X= 623.300,   5195.500,   0.00,   0  !   !END!
5767!  X= 623.300,   5195.550,   0.00,   0  !   !END!
5768!  X= 623.300,   5195.600,   0.00,   0  !   !END!
5769!  X= 623.300,   5195.650,   0.00,   0  !   !END!
5770!  X= 623.300,   5195.700,   0.00,   0  !   !END!
5771!  X= 623.300,   5195.750,   0.00,   0  !   !END!
5772!  X= 623.300,   5195.800,   0.00,   0  !   !END!
5773!  X= 623.300,   5195.900,   0.00,   0  !   !END!
5774!  X= 623.300,   5196.000,   0.00,   0  !   !END!
5775!  X= 623.300,   5196.100,   0.00,   0  !   !END!
5776!  X= 623.300,   5196.200,   0.00,   0  !   !END!
5777!  X= 623.300,   5196.300,   0.00,   0  !   !END!
5778!  X= 623.300,   5196.400,   0.00,   0  !   !END!
5779!  X= 623.300,   5196.500,   0.00,   0  !   !END!
5780!  X= 623.300,   5196.600,   0.00,   0  !   !END!
5781!  X= 623.300,   5196.700,   12.11,   0  !   !END!
5782!  X= 623.300,   5196.800,   24.65,   0  !   !END!
5783!  X= 623.300,   5196.900,   36.01,   0  !   !END!
5784!  X= 623.300,   5197.000,   42.04,   0  !   !END!
5785!  X= 623.300,   5197.100,   43.39,   0  !   !END!
5786!  X= 623.300,   5197.200,   41.85,   0  !   !END!
5787!  X= 623.300,   5197.300,   40.58,   0  !   !END!
5788!  X= 623.300,   5197.400,   41.04,   0  !   !END!
5789!  X= 623.300,   5197.500,   42.15,   0  !   !END!
5790!  X= 623.300,   5197.600,   43.08,   0  !   !END!
5791!  X= 623.300,   5197.700,   49.05,   0  !   !END!
5792!  X= 623.300,   5197.800,   54.37,   0  !   !END!
5793!  X= 623.300,   5197.900,   59.34,   0  !   !END!
5794!  X= 623.300,   5198.000,   63.06,   0  !   !END!
5795!  X= 623.300,   5198.100,   66.29,   0  !   !END!
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5796!  X= 623.300,   5198.200,   67.89,   0  !   !END!
5797!  X= 623.300,   5198.300,   68.43,   0  !   !END!
5798!  X= 623.300,   5198.400,   68.49,   0  !   !END!
5799!  X= 623.300,   5198.500,   68.06,   0  !   !END!
5800!  X= 623.300,   5198.600,   67.61,   0  !   !END!
5801!  X= 623.300,   5198.700,   65.90,   0  !   !END!
5802!  X= 623.300,   5198.800,   64.37,   0  !   !END!
5803!  X= 623.300,   5198.900,   61.83,   0  !   !END!
5804!  X= 623.300,   5199.000,   57.69,   0  !   !END!
5805!  X= 623.350,   5194.900,   25.07,   0  !   !END!
5806!  X= 623.350,   5194.950,   1.00,   0  !   !END!
5807!  X= 623.350,   5195.000,   0.20,   0  !   !END!
5808!  X= 623.350,   5195.050,   0.00,   0  !   !END!
5809!  X= 623.350,   5195.100,   0.00,   0  !   !END!
5810!  X= 623.350,   5195.150,   0.00,   0  !   !END!
5811!  X= 623.350,   5195.200,   0.00,   0  !   !END!
5812!  X= 623.350,   5195.250,   0.00,   0  !   !END!
5813!  X= 623.350,   5195.300,   0.00,   0  !   !END!
5814!  X= 623.350,   5195.350,   0.00,   0  !   !END!
5815!  X= 623.350,   5195.400,   0.00,   0  !   !END!
5816!  X= 623.350,   5195.450,   0.00,   0  !   !END!
5817!  X= 623.350,   5195.500,   0.00,   0  !   !END!
5818!  X= 623.350,   5195.550,   0.00,   0  !   !END!
5819!  X= 623.350,   5195.600,   0.00,   0  !   !END!
5820!  X= 623.350,   5195.650,   0.00,   0  !   !END!
5821!  X= 623.350,   5195.700,   0.00,   0  !   !END!
5822!  X= 623.350,   5195.750,   0.00,   0  !   !END!
5823!  X= 623.350,   5195.800,   0.00,   0  !   !END!
5824!  X= 623.400,   5192.600,   0.00,   0  !   !END!
5825!  X= 623.400,   5192.700,   0.00,   0  !   !END!
5826!  X= 623.400,   5192.800,   0.00,   0  !   !END!
5827!  X= 623.400,   5192.900,   62.10,   0  !   !END!
5828!  X= 623.400,   5193.000,   80.50,   0  !   !END!
5829!  X= 623.400,   5193.100,   76.79,   0  !   !END!
5830!  X= 623.400,   5193.200,   60.23,   0  !   !END!
5831!  X= 623.400,   5193.300,   55.53,   0  !   !END!
5832!  X= 623.400,   5193.400,   48.48,   0  !   !END!
5833!  X= 623.400,   5193.500,   35.33,   0  !   !END!
5834!  X= 623.400,   5193.600,   52.02,   0  !   !END!
5835!  X= 623.400,   5193.700,   81.76,   0  !   !END!
5836!  X= 623.400,   5193.800,   75.42,   0  !   !END!
5837!  X= 623.400,   5193.900,   64.00,   0  !   !END!
5838!  X= 623.400,   5194.000,   61.48,   0  !   !END!
5839!  X= 623.400,   5194.100,   90.07,   0  !   !END!
5840!  X= 623.400,   5194.200,   125.79,   0  !   !END!
5841!  X= 623.400,   5194.300,   136.60,   0  !   !END!
5842!  X= 623.400,   5194.400,   129.48,   0  !   !END!
5843!  X= 623.400,   5194.500,   105.61,   0  !   !END!
5844!  X= 623.400,   5194.600,   87.52,   0  !   !END!
5845!  X= 623.400,   5194.700,   65.85,   0  !   !END!
5846!  X= 623.400,   5194.800,   41.75,   0  !   !END!
5847!  X= 623.400,   5194.900,   1.78,   0  !   !END!
5848!  X= 623.400,   5194.950,   0.00,   0  !   !END!
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5849!  X= 623.400,   5195.000,   0.00,   0  !   !END!
5850!  X= 623.400,   5195.050,   0.00,   0  !   !END!
5851!  X= 623.400,   5195.100,   0.00,   0  !   !END!
5852!  X= 623.400,   5195.150,   0.00,   0  !   !END!
5853!  X= 623.400,   5195.200,   0.00,   0  !   !END!
5854!  X= 623.400,   5195.250,   0.00,   0  !   !END!
5855!  X= 623.400,   5195.300,   0.00,   0  !   !END!
5856!  X= 623.400,   5195.350,   0.00,   0  !   !END!
5857!  X= 623.400,   5195.400,   0.00,   0  !   !END!
5858!  X= 623.400,   5195.450,   0.00,   0  !   !END!
5859!  X= 623.400,   5195.500,   0.00,   0  !   !END!
5860!  X= 623.400,   5195.550,   0.00,   0  !   !END!
5861!  X= 623.400,   5195.600,   0.00,   0  !   !END!
5862!  X= 623.400,   5195.650,   0.00,   0  !   !END!
5863!  X= 623.400,   5195.700,   0.00,   0  !   !END!
5864!  X= 623.400,   5195.750,   0.00,   0  !   !END!
5865!  X= 623.400,   5195.800,   0.00,   0  !   !END!
5866!  X= 623.400,   5195.900,   0.00,   0  !   !END!
5867!  X= 623.400,   5196.000,   0.00,   0  !   !END!
5868!  X= 623.400,   5196.100,   0.00,   0  !   !END!
5869!  X= 623.400,   5196.200,   0.00,   0  !   !END!
5870!  X= 623.400,   5196.300,   0.00,   0  !   !END!
5871!  X= 623.400,   5196.400,   0.00,   0  !   !END!
5872!  X= 623.400,   5196.500,   0.00,   0  !   !END!
5873!  X= 623.400,   5196.600,   3.55,   0  !   !END!
5874!  X= 623.400,   5196.700,   22.43,   0  !   !END!
5875!  X= 623.400,   5196.800,   34.31,   0  !   !END!
5876!  X= 623.400,   5196.900,   41.19,   0  !   !END!
5877!  X= 623.400,   5197.000,   45.45,   0  !   !END!
5878!  X= 623.400,   5197.100,   46.09,   0  !   !END!
5879!  X= 623.400,   5197.200,   46.20,   0  !   !END!
5880!  X= 623.400,   5197.300,   46.54,   0  !   !END!
5881!  X= 623.400,   5197.400,   47.37,   0  !   !END!
5882!  X= 623.400,   5197.500,   49.19,   0  !   !END!
5883!  X= 623.400,   5197.600,   50.10,   0  !   !END!
5884!  X= 623.400,   5197.700,   53.54,   0  !   !END!
5885!  X= 623.400,   5197.800,   57.27,   0  !   !END!
5886!  X= 623.400,   5197.900,   61.11,   0  !   !END!
5887!  X= 623.400,   5198.000,   63.54,   0  !   !END!
5888!  X= 623.400,   5198.100,   65.40,   0  !   !END!
5889!  X= 623.400,   5198.200,   66.40,   0  !   !END!
5890!  X= 623.400,   5198.300,   67.91,   0  !   !END!
5891!  X= 623.400,   5198.400,   67.59,   0  !   !END!
5892!  X= 623.400,   5198.500,   64.30,   0  !   !END!
5893!  X= 623.400,   5198.600,   63.98,   0  !   !END!
5894!  X= 623.400,   5198.700,   64.46,   0  !   !END!
5895!  X= 623.400,   5198.800,   63.12,   0  !   !END!
5896!  X= 623.400,   5198.900,   58.83,   0  !   !END!
5897!  X= 623.400,   5199.000,   47.99,   0  !   !END!
5898!  X= 623.500,   5192.000,   0.00,   0  !   !END!
5899!  X= 623.500,   5192.500,   0.00,   0  !   !END!
5900!  X= 623.500,   5192.600,   0.00,   0  !   !END!
5901!  X= 623.500,   5192.700,   0.00,   0  !   !END!
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5902!  X= 623.500,   5192.800,   0.00,   0  !   !END!
5903!  X= 623.500,   5192.900,   54.97,   0  !   !END!
5904!  X= 623.500,   5193.000,   88.79,   0  !   !END!
5905!  X= 623.500,   5193.100,   81.22,   0  !   !END!
5906!  X= 623.500,   5193.200,   64.62,   0  !   !END!
5907!  X= 623.500,   5193.300,   38.05,   0  !   !END!
5908!  X= 623.500,   5193.400,   0.00,   0  !   !END!
5909!  X= 623.500,   5193.500,   0.00,   0  !   !END!
5910!  X= 623.500,   5193.600,   24.98,   0  !   !END!
5911!  X= 623.500,   5193.700,   74.94,   0  !   !END!
5912!  X= 623.500,   5193.800,   75.80,   0  !   !END!
5913!  X= 623.500,   5193.900,   48.82,   0  !   !END!
5914!  X= 623.500,   5194.000,   55.45,   0  !   !END!
5915!  X= 623.500,   5194.100,   107.78,   0  !   !END!
5916!  X= 623.500,   5194.200,   177.28,   0  !   !END!
5917!  X= 623.500,   5194.300,   169.14,   0  !   !END!
5918!  X= 623.500,   5194.400,   146.37,   0  !   !END!
5919!  X= 623.500,   5194.500,   130.77,   0  !   !END!
5920!  X= 623.500,   5194.600,   104.35,   0  !   !END!
5921!  X= 623.500,   5194.700,   60.67,   0  !   !END!
5922!  X= 623.500,   5194.800,   20.70,   0  !   !END!
5923!  X= 623.500,   5194.900,   0.00,   0  !   !END!
5924!  X= 623.500,   5195.000,   0.00,   0  !   !END!
5925!  X= 623.500,   5195.100,   0.00,   0  !   !END!
5926!  X= 623.500,   5195.200,   0.00,   0  !   !END!
5927!  X= 623.500,   5195.300,   0.00,   0  !   !END!
5928!  X= 623.500,   5195.400,   0.00,   0  !   !END!
5929!  X= 623.500,   5195.500,   0.00,   0  !   !END!
5930!  X= 623.500,   5195.600,   0.00,   0  !   !END!
5931!  X= 623.500,   5195.700,   0.00,   0  !   !END!
5932!  X= 623.500,   5195.800,   0.00,   0  !   !END!
5933!  X= 623.500,   5195.900,   0.00,   0  !   !END!
5934!  X= 623.500,   5196.000,   0.00,   0  !   !END!
5935!  X= 623.500,   5196.100,   0.00,   0  !   !END!
5936!  X= 623.500,   5196.200,   0.00,   0  !   !END!
5937!  X= 623.500,   5196.300,   0.00,   0  !   !END!
5938!  X= 623.500,   5196.400,   0.00,   0  !   !END!
5939!  X= 623.500,   5196.500,   0.00,   0  !   !END!
5940!  X= 623.500,   5196.600,   7.72,   0  !   !END!
5941!  X= 623.500,   5196.700,   22.84,   0  !   !END!
5942!  X= 623.500,   5196.800,   34.85,   0  !   !END!
5943!  X= 623.500,   5196.900,   42.59,   0  !   !END!
5944!  X= 623.500,   5197.000,   45.23,   0  !   !END!
5945!  X= 623.500,   5197.100,   45.83,   0  !   !END!
5946!  X= 623.500,   5197.200,   45.98,   0  !   !END!
5947!  X= 623.500,   5197.300,   46.86,   0  !   !END!
5948!  X= 623.500,   5197.400,   47.88,   0  !   !END!
5949!  X= 623.500,   5197.500,   49.25,   0  !   !END!
5950!  X= 623.500,   5197.600,   50.79,   0  !   !END!
5951!  X= 623.500,   5197.700,   53.42,   0  !   !END!
5952!  X= 623.500,   5197.800,   55.91,   0  !   !END!
5953!  X= 623.500,   5197.900,   58.52,   0  !   !END!
5954!  X= 623.500,   5198.000,   60.85,   0  !   !END!
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5955!  X= 623.500,   5198.100,   61.97,   0  !   !END!
5956!  X= 623.500,   5198.200,   62.46,   0  !   !END!
5957!  X= 623.500,   5198.300,   62.57,   0  !   !END!
5958!  X= 623.500,   5198.400,   62.51,   0  !   !END!
5959!  X= 623.500,   5198.500,   62.55,   0  !   !END!
5960!  X= 623.500,   5198.600,   63.10,   0  !   !END!
5961!  X= 623.500,   5198.700,   63.70,   0  !   !END!
5962!  X= 623.500,   5198.800,   61.62,   0  !   !END!
5963!  X= 623.500,   5198.900,   50.37,   0  !   !END!
5964!  X= 623.500,   5199.000,   38.68,   0  !   !END!
5965!  X= 623.500,   5199.500,   10.91,   0  !   !END!
5966!  X= 623.500,   5200.000,   22.23,   0  !   !END!
5967!  X= 623.600,   5192.600,   0.00,   0  !   !END!
5968!  X= 623.600,   5192.700,   0.00,   0  !   !END!
5969!  X= 623.600,   5192.800,   26.48,   0  !   !END!
5970!  X= 623.600,   5192.900,   65.79,   0  !   !END!
5971!  X= 623.600,   5193.000,   76.36,   0  !   !END!
5972!  X= 623.600,   5193.100,   77.75,   0  !   !END!
5973!  X= 623.600,   5193.200,   91.80,   0  !   !END!
5974!  X= 623.600,   5193.300,   41.74,   0  !   !END!
5975!  X= 623.600,   5193.400,   0.00,   0  !   !END!
5976!  X= 623.600,   5193.500,   0.00,   0  !   !END!
5977!  X= 623.600,   5193.600,   0.00,   0  !   !END!
5978!  X= 623.600,   5193.700,   0.00,   0  !   !END!
5979!  X= 623.600,   5193.800,   0.00,   0  !   !END!
5980!  X= 623.600,   5193.900,   0.00,   0  !   !END!
5981!  X= 623.600,   5194.000,   50.70,   0  !   !END!
5982!  X= 623.600,   5194.100,   115.50,   0  !   !END!
5983!  X= 623.600,   5194.200,   180.94,   0  !   !END!
5984!  X= 623.600,   5194.300,   178.33,   0  !   !END!
5985!  X= 623.600,   5194.400,   167.50,   0  !   !END!
5986!  X= 623.600,   5194.500,   145.95,   0  !   !END!
5987!  X= 623.600,   5194.600,   115.71,   0  !   !END!
5988!  X= 623.600,   5194.700,   55.75,   0  !   !END!
5989!  X= 623.600,   5194.800,   0.00,   0  !   !END!
5990!  X= 623.600,   5194.900,   0.00,   0  !   !END!
5991!  X= 623.600,   5195.000,   0.00,   0  !   !END!
5992!  X= 623.600,   5195.100,   0.00,   0  !   !END!
5993!  X= 623.600,   5195.200,   0.00,   0  !   !END!
5994!  X= 623.600,   5195.300,   0.00,   0  !   !END!
5995!  X= 623.600,   5195.400,   0.00,   0  !   !END!
5996!  X= 623.600,   5195.500,   0.00,   0  !   !END!
5997!  X= 623.600,   5195.600,   0.00,   0  !   !END!
5998!  X= 623.600,   5195.700,   0.00,   0  !   !END!
5999!  X= 623.600,   5195.800,   0.00,   0  !   !END!
6000!  X= 623.600,   5195.900,   0.00,   0  !   !END!
6001!  X= 623.600,   5196.000,   0.00,   0  !   !END!
6002!  X= 623.600,   5196.100,   0.00,   0  !   !END!
6003!  X= 623.600,   5196.200,   0.00,   0  !   !END!
6004!  X= 623.600,   5196.300,   0.00,   0  !   !END!
6005!  X= 623.600,   5196.400,   0.00,   0  !   !END!
6006!  X= 623.600,   5196.500,   0.55,   0  !   !END!
6007!  X= 623.600,   5196.600,   11.23,   0  !   !END!
```

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6008!  X= 623.600,   5196.700,   23.24,   0  !   !END!
6009!  X= 623.600,   5196.800,   33.35,   0  !   !END!
6010!  X= 623.600,   5196.900,   37.23,   0  !   !END!
6011!  X= 623.600,   5197.000,   42.54,   0  !   !END!
6012!  X= 623.600,   5197.100,   44.00,   0  !   !END!
6013!  X= 623.600,   5197.200,   44.67,   0  !   !END!
6014!  X= 623.600,   5197.300,   45.55,   0  !   !END!
6015!  X= 623.600,   5197.400,   47.10,   0  !   !END!
6016!  X= 623.600,   5197.500,   48.42,   0  !   !END!
6017!  X= 623.600,   5197.600,   49.27,   0  !   !END!
6018!  X= 623.600,   5197.700,   51.65,   0  !   !END!
6019!  X= 623.600,   5197.800,   53.23,   0  !   !END!
6020!  X= 623.600,   5197.900,   55.94,   0  !   !END!
6021!  X= 623.600,   5198.000,   57.59,   0  !   !END!
6022!  X= 623.600,   5198.100,   58.99,   0  !   !END!
6023!  X= 623.600,   5198.200,   59.90,   0  !   !END!
6024!  X= 623.600,   5198.300,   60.54,   0  !   !END!
6025!  X= 623.600,   5198.400,   61.32,   0  !   !END!
6026!  X= 623.600,   5198.500,   62.13,   0  !   !END!
6027!  X= 623.600,   5198.600,   62.88,   0  !   !END!
6028!  X= 623.600,   5198.700,   63.38,   0  !   !END!
6029!  X= 623.600,   5198.800,   52.90,   0  !   !END!
6030!  X= 623.600,   5198.900,   38.13,   0  !   !END!
6031!  X= 623.600,   5199.000,   23.03,   0  !   !END!
6032!  X= 623.700,   5192.600,   0.00,   0  !   !END!
6033!  X= 623.700,   5192.700,   0.00,   0  !   !END!
6034!  X= 623.700,   5192.800,   0.00,   0  !   !END!
6035!  X= 623.700,   5192.900,   52.43,   0  !   !END!
6036!  X= 623.700,   5193.000,   38.38,   0  !   !END!
6037!  X= 623.700,   5193.100,   38.60,   0  !   !END!
6038!  X= 623.700,   5193.200,   61.16,   0  !   !END!
6039!  X= 623.700,   5193.300,   9.58,   0  !   !END!
6040!  X= 623.700,   5193.400,   0.00,   0  !   !END!
6041!  X= 623.700,   5193.500,   0.00,   0  !   !END!
6042!  X= 623.700,   5193.600,   0.00,   0  !   !END!
6043!  X= 623.700,   5193.700,   0.00,   0  !   !END!
6044!  X= 623.700,   5193.800,   0.00,   0  !   !END!
6045!  X= 623.700,   5193.900,   0.00,   0  !   !END!
6046!  X= 623.700,   5194.000,   51.07,   0  !   !END!
6047!  X= 623.700,   5194.100,   126.73,   0  !   !END!
6048!  X= 623.700,   5194.200,   173.56,   0  !   !END!
6049!  X= 623.700,   5194.300,   207.59,   0  !   !END!
6050!  X= 623.700,   5194.400,   179.56,   0  !   !END!
6051!  X= 623.700,   5194.500,   150.79,   0  !   !END!
6052!  X= 623.700,   5194.600,   129.50,   0  !   !END!
6053!  X= 623.700,   5194.700,   42.44,   0  !   !END!
6054!  X= 623.700,   5194.800,   0.00,   0  !   !END!
6055!  X= 623.700,   5194.900,   0.00,   0  !   !END!
6056!  X= 623.700,   5195.000,   0.00,   0  !   !END!
6057!  X= 623.700,   5195.100,   0.00,   0  !   !END!
6058!  X= 623.700,   5195.200,   0.00,   0  !   !END!
6059!  X= 623.700,   5195.300,   0.00,   0  !   !END!
6060!  X= 623.700,   5195.400,   0.00,   0  !   !END!
```

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6061!  X= 623.700,   5195.500,   0.00,   0  !   !END!
6062!  X= 623.700,   5195.600,   0.00,   0  !   !END!
6063!  X= 623.700,   5195.700,   0.00,   0  !   !END!
6064!  X= 623.700,   5195.800,   0.00,   0  !   !END!
6065!  X= 623.700,   5195.900,   0.00,   0  !   !END!
6066!  X= 623.700,   5196.000,   0.00,   0  !   !END!
6067!  X= 623.700,   5196.100,   7.56,   0  !   !END!
6068!  X= 623.700,   5196.200,   13.88,   0  !   !END!
6069!  X= 623.700,   5196.300,   19.56,   0  !   !END!
6070!  X= 623.700,   5196.400,   2.25,   0  !   !END!
6071!  X= 623.700,   5196.500,   22.93,   0  !   !END!
6072!  X= 623.700,   5196.600,   19.88,   0  !   !END!
6073!  X= 623.700,   5196.700,   21.21,   0  !   !END!
6074!  X= 623.700,   5196.800,   27.28,   0  !   !END!
6075!  X= 623.700,   5196.900,   31.30,   0  !   !END!
6076!  X= 623.700,   5197.000,   38.15,   0  !   !END!
6077!  X= 623.700,   5197.100,   40.15,   0  !   !END!
6078!  X= 623.700,   5197.200,   42.61,   0  !   !END!
6079!  X= 623.700,   5197.300,   43.76,   0  !   !END!
6080!  X= 623.700,   5197.400,   44.79,   0  !   !END!
6081!  X= 623.700,   5197.500,   45.49,   0  !   !END!
6082!  X= 623.700,   5197.600,   46.91,   0  !   !END!
6083!  X= 623.700,   5197.700,   48.94,   0  !   !END!
6084!  X= 623.700,   5197.800,   51.88,   0  !   !END!
6085!  X= 623.700,   5197.900,   53.47,   0  !   !END!
6086!  X= 623.700,   5198.000,   54.48,   0  !   !END!
6087!  X= 623.700,   5198.100,   55.27,   0  !   !END!
6088!  X= 623.700,   5198.200,   55.63,   0  !   !END!
6089!  X= 623.700,   5198.300,   55.95,   0  !   !END!
6090!  X= 623.700,   5198.400,   57.73,   0  !   !END!
6091!  X= 623.700,   5198.500,   61.32,   0  !   !END!
6092!  X= 623.700,   5198.600,   60.39,   0  !   !END!
6093!  X= 623.700,   5198.700,   53.72,   0  !   !END!
6094!  X= 623.700,   5198.800,   36.00,   0  !   !END!
6095!  X= 623.700,   5198.900,   12.36,   0  !   !END!
6096!  X= 623.700,   5199.000,   1.31,   0  !   !END!
6097!  X= 624.000,   5192.000,   0.00,   0  !   !END!
6098!  X= 624.000,   5192.500,   0.00,   0  !   !END!
6099!  X= 624.000,   5193.000,   0.00,   0  !   !END!
6100!  X= 624.000,   5193.500,   0.00,   0  !   !END!
6101!  X= 624.000,   5194.000,   33.24,   0  !   !END!
6102!  X= 624.000,   5194.500,   80.21,   0  !   !END!
6103!  X= 624.000,   5195.000,   0.00,   0  !   !END!
6104!  X= 624.000,   5195.500,   0.00,   0  !   !END!
6105!  X= 624.000,   5196.000,   48.80,   0  !   !END!
6106!  X= 624.000,   5196.500,   61.81,   0  !   !END!
6107!  X= 624.000,   5197.000,   40.57,   0  !   !END!
6108!  X= 624.000,   5197.500,   35.83,   0  !   !END!
6109!  X= 624.000,   5198.000,   40.39,   0  !   !END!
6110!  X= 624.000,   5198.500,   2.75,   0  !   !END!
6111!  X= 624.000,   5199.000,   23.98,   0  !   !END!
6112!  X= 624.000,   5199.500,   59.16,   0  !   !END!
6113!  X= 624.000,   5200.000,   72.79,   0  !   !END!
```

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6114!  X= 624.500,   5192.000,   0.00,   0  !   !END!
6115!  X= 624.500,   5192.500,   0.00,   0  !   !END!
6116!  X= 624.500,   5193.000,   0.00,   0  !   !END!
6117!  X= 624.500,   5193.500,   0.00,   0  !   !END!
6118!  X= 624.500,   5194.000,   0.00,   0  !   !END!
6119!  X= 624.500,   5194.500,   0.00,   0  !   !END!
6120!  X= 624.500,   5195.000,   0.00,   0  !   !END!
6121!  X= 624.500,   5195.500,   0.00,   0  !   !END!
6122!  X= 624.500,   5196.000,   49.31,   0  !   !END!
6123!  X= 624.500,   5196.500,   72.38,   0  !   !END!
6124!  X= 624.500,   5197.000,   54.48,   0  !   !END!
6125!  X= 624.500,   5197.500,   7.58,   0  !   !END!
6126!  X= 624.500,   5198.000,   0.00,   0  !   !END!
6127!  X= 624.500,   5198.500,   0.00,   0  !   !END!
6128!  X= 624.500,   5199.000,   53.61,   0  !   !END!
6129!  X= 624.500,   5199.500,   99.39,   0  !   !END!
6130!  X= 624.500,   5200.000,   102.88,   0  !   !END!
6131!  X= 625.000,   5192.000,   0.00,   0  !   !END!
6132!  X= 625.000,   5192.500,   0.00,   0  !   !END!
6133!  X= 625.000,   5193.000,   0.00,   0  !   !END!
6134!  X= 625.000,   5193.500,   0.00,   0  !   !END!
6135!  X= 625.000,   5194.000,   0.00,   0  !   !END!
6136!  X= 625.000,   5194.500,   0.00,   0  !   !END!
6137!  X= 625.000,   5195.000,   0.00,   0  !   !END!
6138!  X= 625.000,   5195.500,   24.65,   0  !   !END!
6139!  X= 625.000,   5196.000,   25.93,   0  !   !END!
6140!  X= 625.000,   5196.500,   70.64,   0  !   !END!
6141!  X= 625.000,   5197.000,   39.96,   0  !   !END!
6142!  X= 625.000,   5197.500,   0.00,   0  !   !END!
6143!  X= 625.000,   5198.000,   0.00,   0  !   !END!
6144!  X= 625.000,   5198.500,   5.47,   0  !   !END!
6145!  X= 625.000,   5199.000,   55.94,   0  !   !END!
6146!  X= 625.000,   5199.500,   123.57,   0  !   !END!
6147!  X= 625.000,   5200.000,   131.46,   0  !   !END!

-------------
    a
     Data for each receptor are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     Receptor height above ground is optional.  If no value is entered,
     the receptor is placed on the ground.
    c
     Receptors can be assigned using group names provided in 20b.  If no
     group names are used (NRGRP=0) then the default assignment name X
     must be used.
```

# Appendix 6.2-3: Technical Memorandum: Dust Mitigation Measures for South Ridge Project

# MEMORANDUM

To:
Gillian Kearney [Canada Fluorspar Inc.]

Cc:

From:
Barrie Lawrence [IEC]

Date:
5 March 2026

Project No.:
SX25-0033

Independent Environmental Consultants (IEC)
582 St Clair Avenue West, Suite 221, Toronto, ON, M6C 1A6
TollFree: (844) 736-7369
Cell: 416-557-0617
Email: blawrence@independentenvironmental.ca

Subject:
**Dust Mitigation Measures For South Ridge Project**

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## Introduction

Independent Environmental Consultants (IEC) was retained by Canada Fluorspar Inc. (CFI) to perform air dispersion modelling of the South Ridge Project (the Project) using the CALMET/CALPUFF modelling package. The modelling incorporated inputs derived from production estimates provided by CFI for the Project, effective January 15, 2026, with model outcomes generated for three meteorological years, 2022 to 2024 inclusive. The model assumed all equipment operated simultaneously at 100% capacity, 100% of the time irrespective of the logistical improbabilities, and no dust mitigation measures were incorporated into the model. The resulting concentrations, which necessarily incorporated a high degree of conservatism, indicated that on rare occasions, 24-hour concentration of $PM_{10}$ and TPM may exceed the associated Newfoundland and Labrador Air Quality Standard (AQS) at nearby sensitive receptors.

This memo provides an indication of the modelled concentrations at the sensitive receptors if dust mitigation was incorporated. It does not speak to other layers of conservatism that are built into the model which would further lower the modelled concentrations.

## Dust Mitigation Measures

The WRAP Fugitive Dust Handbook[1], September 7, 2006, addresses the estimation of uncontrolled fugitive dust emissions and emission reductions achieved by demonstrated control techniques for twelve major and several minor fugitive dust source categories. Reproduced from the Handbook for ease of reference, below are five tables (Table 3-7, Table 4-2, Table 6-6, Table 8-7 and Table 9-4) indicating emission control measures and effective control efficiencies for activities present at the South Ridge Project. As can be readily seen, the regular application of water and/or dust suppressant will reduce dust

[1] https://www.env.nm.gov/wp-content/uploads/sites/2/2017/02/WRAP_FDHandbook_Rev_06.pdf

emissions by at least 55% and by as much as 84%, while restricting the vehicle speed on unpaved roads and surfaces could further reduce dust emissions by 44%.

**Table 3-7. Control Efficiencies for Control Measures for Construction/Demolition[20, 21]**

| Control measure | Source component | PM10 control efficiency | References/Comments |
|---|---|---|---|
| Apply water every 4 hrs within 100 feet of a structure being demolished | Active demolition and debris removal | 36% | MRI, April 2001, test series 701. 4-hour watering interval (Scenario: lot remains vacant 6 mo after demolition) |
| Gravel apron, 25' long by road width | Trackout | 46% | MRI, April 2001 |
| Apply dust suppressants (e.g., polymer emulsion) | Post-demolition stabilization | 84% | CARB April 2002; for actively disturbed areas |
| Apply water to disturbed soils after demolition is completed or at the end of each day of cleanup | Demolition Activities | 10% | MRI, April 2001, test series 701. 14-hour watering interval. |
| Prohibit demolition activities when wind speeds exceed 25 mph | Demolition Activities | 98% | Estimated for high wind days in absence of soil disturbance activities |
| Apply water at various intervals to disturbed areas within construction site | Construction Activities | 61% | MRI, April 2001, test series 701. 3.2-hour watering interval |
| | | 74% | MRI, April 2001, test series 701. 2.1-hour watering interval |
| Require minimum soil moisture of 12% for earthmoving | Scraper loading and unloading | 69% | AP-42 emission factor equation for materials handling due to increasing soil moisture from 1.4% to 12% |
| Limit on-site vehicle speeds to 15 mph (Scenario: radar enforcement) | Construction traffic | 57% | Assume linear relationship between PM10 emissions and uncontrolled vehicle speed of 35 mph |

**Table 4-2. Control Efficiencies for Control Measures for Materials Handling**

| Control measure | PM10 control efficiency | References/comments |
|---|---|---|
| Continuous water spray at conveyor transfer point | 62% | The control efficiency achieved by increasing the moisture content of the material from 1% to 2% is calculated utilizing the AP-42 emission factor equation for materials handling which contains a correction term for moisture content. |
| Require construction of 3-sided enclosures with 50% porosity for storage pile | 75% | Sierra Research, 2003.[15] Determined through modeling of open area windblown emissions with 50% reduction in wind speed and assuming no emission reduction when winds approach open side. |
| Water the storage pile by hand or apply cover when wind events are declared | 90% | Fitz et al., April 2000.[16] |

**Table 6-6. Control Efficiencies for Control Measures for Unpaved Roads[36, 37]**

| Control measure | PM10 control efficiency | References/Comments |
|---|---|---|
| Limit maximum speed on unpaved roads to 25 miles per hour | 44% | Assumes linear relationship between PM10 emissions and vehicle speed and an uncontrolled speed of 45 mph. |
| Pave unpaved roads and unpaved parking areas | 99% | Based on comparison of paved road and unpaved road PM10 emission factors. |
| Implement watering twice a day for industrial unpaved road | 55% | MRI, April 2001 |
| Apply dust suppressant annually to unpaved parking areas | 84% | CARB April 2002 |

**Table 8-7. Control Efficiencies for Control Measures for Open Area Wind Erosion**

| Control measure | Source Component | PM10 Control Efficiency | References/comments |
|---|---|---|---|
| Apply dust suppressants to stabilize disturbed area after cessation of disturbance | Disturbed areas | 84% | CARB, April 2002.[43] |
| Apply gravel to stabilize disturbed open areas | Disturbed areas | 84% | CARB, April 2002.[43] Estimated to be as effective as chemical dust suppressants. |

**Table 9-4. Control Efficiencies for Control Measures for Storage Pile Wind Erosion**

| Control measure | PM10 control efficiency | References/comments |
|---|---|---|
| Require construction of 3-sided enclosures with 50% porosity | 75% | Sierra Research, 2003.[13] Determined through modeling of open area windblown emissions with 50% reduction in wind speed and assuming no emission reduction when winds approach open side |
| Water the storage pile by hand or apply cover when wind events are declared | 90% | Fitz et al., April 2000.[14] |

**Revised Model Results**

As part of the modelling assessment presented in the ***Canada Fluorspar South Ridge Project Final CALPUFF Air Dispersion Modelling*** report (February 2026), Tables 4.1, 4.2 and 4.3 – showing modelled concentrations at the sensitive receptors for 2022, 2023 and 2024 respectively - have been reproduced below using a conservative assumption of a 50% reduction in dust (i.e., TPM and $PM_{10}$) emissions to reflect the implementation of mitigative measures. As can be seen in the revised Tables, the application of dust mitigation measures alone, aside from other conservative measures included in the model, indicate that compliance can be achieved at the sensitive receptors.

**Table 4.1: Revised Summary of Maximum Predicted Concentrations at Sensitive Receptors, 2022**

| Pollutant | Averaging Period | Units | AQS | R1 | | R2 | | R3 | | R4 | | Mon | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS |
| $NO_2$ | 1-hour | µg/m³ | 400 [1] | 168.6 | 42.1% | 230.6 | 57.6% | 115.0 | 28.7% | 123.1 | 30.8% | 97.2 | 24.3% |
| | 24-hour | µg/m³ | 200 [1] | 40.5 | 20.2% | 55.6 | 27.8% | 17.5 | 8.7% | 16.4 | 8.2% | 23.2 | 11.6% |
| | Annual | µg/m³ | 100 [1] | 1.4 | 1.4% | 1.9 | 1.9% | 1.2 | 1.2% | 1.3 | 1.3% | 0.8 | 0.8% |
| $SO_2$ | 1-hour | µg/m³ | 900 [1] | 0.3 | 0.04% | 0.4 | 0.05% | 0.2 | 0.03% | 0.3 | 0.03% | 0.2 | 0.02% |
| | 3-hour | µg/m³ | 600 [1] | 0.2 | 0.03% | 0.3 | 0.05% | 0.2 | 0.03% | 0.1 | 0.02% | 0.1 | 0.02% |
| | 24-hour | µg/m³ | 300 [1] | 0.09 | 0.03% | 0.11 | 0.04% | 0.04 | 0.01% | 0.03 | 0.01% | 0.05 | 0.02% |
| | Annual | µg/m³ | 60 [1] | 0.003 | 0.005% | 0.004 | 0.007% | 0.002 | 0.003% | 0.002 | 0.004% | 0.002 | 0.003% |
| CO | 1-hour | µg/m³ | 35,000 | 167.4 | 0.5% | 211.5 | 0.6% | 114.6 | 0.3% | 119.7 | 0.3% | 92.2 | 0.3% |
| | 8-hour | µg/m³ | 15,000 | 66.9 | 0.4% | 80.0 | 0.5% | 42.1 | 0.3% | 39.6 | 0.3% | 54.0 | 0.4% |
| TPM | 1-hour | µg/m³ | N/A | 237.8 | N/A | 354.5 | N/A | 244.5 | N/A | 195.2 | N/A | 190.4 | N/A |
| | 24-hour | µg/m³ | 120 | 49.0 | 40.8% | 68.2 | 56.8% | 45.2 | 37.7% | 25.1 | 20.9% | 31.2 | 26.0% |
| | Annual | µg/m³ | 60 | 3.1 | 5.2% | 4.9 | 8.1% | 2.7 | 4.4% | 2.1 | 3.5% | 2.1 | 3.4% |
| $PM_{10}$ | 1-hour | µg/m³ | N/A | 152.3 | N/A | 231.9 | N/A | 119.4 | N/A | 97.9 | N/A | 112.2 | N/A |
| | 24-hour | µg/m³ | 50 | 35.2 | 70.3% | 47.9 | 95.8% | 22.4 | 44.9% | 11.7 | 23.50% | 23.9 | 47.8% |
| | Annual | µg/m³ | N/A | 1.6 | N/A | 2.3 | N/A | 1.3 | N/A | 1.0 | N/A | 1.1 | N/A |
| $PM_{2.5}$ | 1-hour | µg/m³ | N/A | 25.4 | N/A | 34.9 | N/A | 17.6 | N/A | 10.5 | N/A | 19.7 | N/A |
| | 24-hour | µg/m³ | 25 | 5.4 | 21.5% | 7.3 | 29.0% | 3.5 | 14.1% | 2.4 | 9.6% | 3.9 | 15.8% |
| | Annual | µg/m³ | 8.8 | 0.4 | 5.3% | 0.7 | 8.3% | 0.3 | 4.0% | 0.2 | 2.6% | 0.3 | 3.3% |

**Notes:**
N/A – not applicable
Compliance with AQS based on the 9th hourly, 6th 3-hour, 3rd 8-hour and 2nd daily maximums.
[1] – Regulatory standard is in ppb. Represents the conversion from ppb to µg/m³
R1: Closest Home within Town of St. Lawrence. Located on Corporation Place. 622545 E, 5196268 N, NAD 83 UTM zone 21
R2: Closest residential structure northwest of the Project on road south of Pollux Crescent. 622404 E, 5195958 N, NAD 83 UTM zone 21
R3: Closest Home North of the Project. Located on Salt Cover Brook. 620776 E, 5196324 N, NAD 83 UTM zone 21
R4: Closest residential structure to the Project found within the RV Park located north of Iron Spring Road. 620543 E, 5193752 N, NAD 83 UTM zone 21
Mon: Ambient Monitoring Station. 621776 E, 5196763 N, NAD 83 UTM zone 21

**Table 4.2: Revised Summary of Maximum Predicted Concentrations at Sensitive Receptors, 2023**

| Pollutant | Averaging Period | Units | AQS | R1 | | R2 | | R3 | | R4 | | Mon | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS |
| $NO_2$ | 1-hour | µg/m³ | 400 [1] | 157.5 | 39.4% | 201.0 | 50.2% | 183.7 | 45.9% | 112.5 | 28.1% | 143.5 | 35.9% |
| | 24-hour | µg/m³ | 200 [1] | 25.0 | 12.5% | 31.5 | 15.7% | 23.3 | 11.7% | 23.7 | 11.9% | 23.6 | 11.8% |
| | Annual | µg/m³ | 100 [1] | 1.4 | 1.4% | 2.0 | 2.0% | 0.8 | 0.8% | 1.1 | 1.1% | 1.1 | 1.1% |
| $SO_2$ | 1-hour | µg/m³ | 900 [1] | 0.3 | 0.04% | 0.4 | 0.04% | 0.4 | 0.04% | 0.2 | 0.03% | 0.3 | 0.03% |
| | 3-hour | µg/m³ | 600 [1] | 0.2 | 0.03% | 0.2 | 0.04% | 0.2 | 0.03% | 0.1 | 0.02% | 0.2 | 0.04% |
| | 24-hour | µg/m³ | 300 [1] | 0.06 | 0.02% | 0.07 | 0.02% | 0.05 | 0.02% | 0.05 | 0.02% | 0.05 | 0.02% |
| | Annual | µg/m³ | 60 [1] | 0.003 | 0.005% | 0.004 | 0.006% | 0.003 | 0.005% | 0.003 | 0.005% | 0.002 | 0.004% |
| CO | 1-hour | µg/m³ | 35,000 | 153.4 | 0.4% | 192.5 | 0.5% | 184.2 | 0.5% | 116.9 | 0.3% | 142.5 | 0.4% |
| | 8-hour | µg/m³ | 15,000 | 70.2 | 0.5% | 87.9 | 0.6% | 51.2 | 0.3% | 38.0 | 0.3% | 57.1 | 0.4% |
| TPM | 1-hour | µg/m³ | N/A | 244.2 | N/A | 332.5 | N/A | 296.6 | N/A | 170.0 | N/A | 233.8 | N/A |
| | 24-hour | µg/m³ | 120 | 37.0 | 30.8% | 53.2 | 44.3% | 45.1 | 37.6% | 27.1 | 22.6% | 43.6 | 36.4% |
| | Annual | µg/m³ | 60 | 2.8 | 4.7% | 4.3 | 7.2% | 3.2 | 5.3% | 2.5 | 4.2% | 2.4 | 4.0% |
| $PM_{10}$ | 1-hour | µg/m³ | N/A | 143.0 | N/A | 185.7 | N/A | 182.9 | N/A | 80.0 | N/A | 150.9 | N/A |
| | 24-hour | µg/m³ | 50 | 21.7 | 43.5% | 28.9 | 57.8% | 27.5 | 55.0% | 15.7 | 31.5% | 25.7 | 51.4% |
| | Annual | µg/m³ | N/A | 1.5 | N/A | 2.1 | N/A | 1.7 | N/A | 1.2 | N/A | 1.3 | N/A |
| $PM_{2.5}$ | 1-hour | µg/m³ | N/A | 21.1 | N/A | 27.8 | N/A | 30.9 | N/A | 10.4 | N/A | 24.0 | N/A |
| | 24-hour | µg/m³ | 25 | 3.4 | 13.6% | 4.7 | 18.6% | 4.5 | 17.9% | 3.0 | 12.2% | 3.9 | 15.8% |
| | Annual | µg/m³ | 8.8 | 0.4 | 4.5% | 0.6 | 7.0% | 0.4 | 4.6% | 0.3 | 3.3% | 0.3 | 3.6% |

**Notes:**
N/A – not applicable
Compliance with AQS based on the 9th hourly, 6th 3-hour, 3rd 8-hour and 2nd daily maximums.
[1] – Regulatory standard is in ppb. Represents the conversion from ppb to µg/m³
R1: Closest Home within Town of St. Lawrence. Located on Corporation Place. 622545 E, 5196268 N, NAD 83 UTM zone 21
R2: Closest residential structure northwest of the Project on road south of Pollux Crescent. 622404 E, 5195958 N, NAD 83 UTM zone 21
R3: Closest Home North of the Project. Located on Salt Cover Brook. 620776 E, 5196324 N, NAD 83 UTM zone 21
R4: Closest residential structure to the Project found within the RV Park located north of Iron Spring Road. 620543 E, 5193752 N, NAD 83 UTM zone 21
Mon: Ambient Monitoring Station. 621776 E, 5196763 N, NAD 83 UTM zone 21

**Table 4.3: Revised Summary of Maximum Predicted Concentrations at Sensitive Receptors, 2024**

| Pollutant | Averaging Period | Units | AQS | R1 | | R2 | | R3 | | R4 | | Mon | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS | Conc. | % Of AQS |
| $NO_2$ | 1-hour | µg/m³ | 400 [1] | 114.5 | 28.6% | 156.3 | 39.1% | 124.4 | 31.1% | 146.7 | 36.7% | 95.8 | 24.0% |
| | 24-hour | µg/m³ | 200 [1] | 17.7 | 8.9% | 23.8 | 11.9% | 23.5 | 11.7% | 26.5 | 13.2% | 12.8 | 6.4% |
| | Annual | µg/m³ | 100 [1] | 1.2 | 1.2% | 1.8 | 1.8% | 0.8 | 0.8% | 1.7 | 1.7% | 0.7 | 0.7% |
| $SO_2$ | 1-hour | µg/m³ | 900 [1] | 0.2 | 0.03% | 0.3 | 0.03% | 0.3 | 0.03% | 0.3 | 0.03% | 0.2 | 0.02% |
| | 3-hour | µg/m³ | 600 [1] | 0.1 | 0.02% | 0.2 | 0.03% | 0.2 | 0.03% | 0.2 | 0.03% | 0.1 | 0.02% |
| | 24-hour | µg/m³ | 300 [1] | 0.04 | 0.01% | 0.05 | 0.02% | 0.05 | 0.02% | 0.05 | 0.02% | 0.03 | 0.01% |
| | Annual | µg/m³ | 60 [1] | 0.002 | 0.004% | 0.003 | 0.006% | 0.002 | 0.003% | 0.004 | 0.006% | 0.001 | 0.002% |
| CO | 1-hour | µg/m³ | 35,000 | 112.1 | 0.3% | 148.0 | 0.4% | 132.4 | 0.4% | 144.4 | 0.4% | 92.7 | 0.3% |
| | 8-hour | µg/m³ | 15,000 | 41.0 | 0.3% | 59.5 | 0.4% | 46.2 | 0.3% | 51.7 | 0.3% | 33.2 | 0.2% |
| TPM | 1-hour | µg/m³ | N/A | 177.0 | N/A | 259.6 | N/A | 234.2 | N/A | 218.0 | N/A | 168.0 | N/A |
| | 24-hour | µg/m³ | 120 | 29.5 | 24.6% | 45.7 | 38.1% | 61.6 | 51.4% | 39.4 | 32.8% | 25.1 | 20.9% |
| | Annual | µg/m³ | 60 | 2.9 | 4.8% | 4.6 | 7.6% | 2.4 | 3.9% | 2.9 | 4.9% | 1.7 | 2.9% |
| $PM_{10}$ | 1-hour | µg/m³ | N/A | 103.8 | N/A | 135.1 | N/A | 150.7 | N/A | 107.9 | N/A | 103.6 | N/A |
| | 24-hour | µg/m³ | 50 | 17.0 | 34.0% | 25.0 | 49.9% | 29.2 | 58.4% | 19.9 | 39.7% | 14.5 | 29.1% |
| | Annual | µg/m³ | N/A | 1.4 | N/A | 2.1 | N/A | 1.2 | N/A | 1.4 | N/A | 0.9 | N/A |
| $PM_{2.5}$ | 1-hour | µg/m³ | N/A | 15.3 | N/A | 20.1 | N/A | 22.4 | N/A | 11.1 | N/A | 17.0 | N/A |
| | 24-hour | µg/m³ | 25 | 2.9 | 11.6% | 4.2 | 16.8% | 4.2 | 16.8% | 2.8 | 11.0% | 2.5 | 9.8% |
| | Annual | µg/m³ | 8.8 | 0.4 | 4.9% | 0.6 | 8.0% | 0.3 | 3.5% | 0.3 | 4.0% | 0.2 | 2.9% |

Notes:
N/A – not applicable
Compliance with AQS based on the 9th hourly, 6th 3-hour, 3rd 8-hour and 2nd daily maximums.
[1] – Regulatory standard is in ppb. Represents the conversion from ppb to µg/m³
R1: Closest Home within Town of St. Lawrence. Located on Corporation Place. 622545 E, 5196268 N, NAD 83 UTM zone 21
R2: Closest residential structure northwest of the Project on road south of Pollux Crescent. 622404 E, 5195958 N, NAD 83 UTM zone 21
R3: Closest Home North of the Project. Located on Salt Cover Brook. 620776 E, 5196324 N, NAD 83 UTM zone 21
R4: Closest residential structure to the Project found within the RV Park located north of Iron Spring Road. 620543 E, 5193752 N, NAD 83 UTM zone 21
Mon: Ambient Monitoring Station. 621776 E, 5196763 N, NAD 83 UTM zone 21

# Appendix 6.3-1: Curriculum Vitae

# DANIEL KREMER, M.SC., P.ENG.

**Managing Consultant, Acoustics**

Daniel Kremer, M.Sc., P.Eng., has over a decade of experience in noise, acoustics and vibration. Senior noise and vibration engineer completing environmental noise studies for regulatory compliance in throughout Canada and the United States. Primary work has focused on renewable energy, residential land-use planning (Ontario municipal), large scale mining, pipeline development, and oil and gas noise compliance.

Daniel has completed numerous environmental studies guiding clients through source measurements, long term monitoring, modeling, and navigating regulatory frameworks. He has participated as an expert witness and peer reviewer for noise and vibration, providing impartial technical review both oral and written. He has represented companies and clients to engage with various project stakeholders, maintaining excellent relationships by providing valued key insights and guidance.

## CAREER

2021-2025 – Senior Acoustic Engineer, RWDI

2017-2021 – Intermediate Acoustic Engineer, RWDI

2013-2017 - Acoustic Scientist, RWDI

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ENVIRONMENT & HEALTH

# HOOMAN ZOKA, M.SC., P.ENG.

**Lead Consultant, Acoustics and Vibrations**

Hooman is a Professional Engineer (P.Eng.) and the Lead Acoustical Consultant at Ramboll, bringing over 10 years of comprehensive experience across academia and industry. He specializes in acoustic modeling, data analysis, and mitigation. His critical advantage lies in his extensive background in mechanical component design and manufacturing, which synergizes with his skills in acoustics and vibrations. This allows him to pinpoint the physical root causes of noise issues and engineer practical, robust, source-level solutions. Hooman holds a Master's degree in Mechanical Engineering from Concordia University and has made significant contributions to the field, evidenced by four journal papers, four conference papers, and one patent (Iranian Patent Organization).

## CAREER

| | |
|---|---|
| 2020-2022 | Lab Demonstrator, Invigilator, Marker, Concordia University |
| 2016-2018 | Mechanical Design Engineer, Mashhad Municipality – Fire Department |
| 2015-2017 | Lab Instructor, Khayyam University |
| 2015 | R&D Engineer – Industrial Internship, Hydraulic Engineering Services Co. (H.E.S.) |
| 2012 | Quality and Control (Q&C) Engineer – Industrial Internship, Khavar Parts Product Co. (K.P.P.) |

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# Appendix 6.3-2: Modelled Sound Power Levels

## MODELLED SOUND POWER LEVELS

| Sources | Table | Description | Octave Band (Hz) Sound Power Levels (dB) | | | | | | | | | Overall Sound Power | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB | dBA |
| BS 5228-1:2009+A1:2014 | (Table C.6 14) | CAT 777 (Haul Truck) | 117 | 117 | 122 | 117 | 113 | 111 | 109 | 104 | 99 | 125 | 117 |
| BS 5228-1:2009+A1:2014 | (Table C.6 31) | CAT 16 Grader | 116 | 116 | 115 | 111 | 107 | 112 | 106 | 102 | 93 | 122 | 114 |
| BS 5228-1:2009+A1:2014 | (Table C.6 28) | CAT D9 - Dozer | 108 | 108 | 112 | 104 | 105 | 107 | 109 | 97 | 87 | 117 | 113 |
| BS 5228-1:2009+A1:2014 | (Table C.9 7) | CAT 992 - Loader | 116 | 116 | 116 | 115 | 113 | 114 | 111 | 105 | 98 | 123 | 118 |
| BS 5228-1:2009+A1:2014 | (Table C.6 5) | CAT 395 - Tracked Excavator | 119 | 119 | 120 | 111 | 112 | 108 | 106 | 105 | 98 | 125 | 114 |
| BS 5228-1:2009+A1:2014 | (Table C.9 7) | CAT 988 - Loader | 116 | 116 | 116 | 115 | 113 | 114 | 111 | 105 | 98 | 123 | 118 |
| BS 5228-1:2009+A1:2014 | (Table C.6 37) | CAT 725 (Water Truck) | 108 | 108 | 109 | 103 | 107 | 101 | 102 | 98 | 93 | 115 | 109 |
| BS 5228-1:2009+A1:2014 | (Table C.11 11) | Kenworth C500 + Tipper Truck | 124 | 124 | 107 | 103 | 107 | 110 | 108 | 100 | 95 | 127 | 114 |
| BS 5228-1:2009+A1:2014 | (Table C.5 16) | Articulated Dump Truck (ADT) | 116 | 116 | 118 | 108 | 107 | 104 | 99 | 93 | 89 | 122 | 109 |
| BS 5228-1:2009+A1:2014 | (Table C.9 2) | CAT MD6200 (Blast Drill) | 122 | 122 | 123 | 118 | 119 | 115 | 113 | 108 | 101 | 129 | 121 |
| BS 5228-1:2009+A1:2014 | (Table C.4 41) | Mobile Crane | 101 | 101 | 99 | 96 | 98 | 94 | 91 | 82 | 77 | 107 | 99 |

*Note: All sound powers are based on equivalent equipment obtained from the British Standards Institute (BSI), 2014. BSI Standards Publication BS 5228-1:2009+A1:2014*

*Sound powers in this table do not include any tonal penalties.*

*Linear movement mobile equipment (Haul trucks, graders, water trucks, Kenworth C500) used appropriate Lmax pass by levels.*

# Appendix 6.3-3: Blasting – Vibration and Overpressure Calculations

# Calculation Sheet

## Ground Vibration and Air-Overpressure

| | | | |
|---|---|---|---|
| **Project Name:** | **CFI - South Ridge** | **Date:** | December, 2025 |
| **Project Number:** | **324001177** | | |
| **Receptor ID:** | **R1** | | |

## Data Input

| | | |
|---|---|---|
| | **Unit System** | Metric |
| **Ground Vibration** | **Industry** | Quarries |
| | **Confidence Level** | Best Fit |
| **Air-Overpressure** | **Blasting Type** | Quarry Face |
| | **Statistical Type** | Best Fit |

| | | | | |
|---|---|---|---|---|
| **Distance from Blasting** | **R** | **1980** | | m |
| | **Blast Type** | **Waste** | **Ore** | |
| **Maximum Charge-Weight per delay** | **W** | **232** | **118** | kg |

## Calculation Results

**Ground Vibration** $PPV = A \times (SD_2)^{-B}$

| | | | | |
|---|---|---|---|---|
| **Square Root Scaled Distance** | $SD_2$ | **130.1** | **182.6** | $m/kg^{½}$ |
| | **A** | **1090** | **1090** | |
| | **B** | **-1.82** | **-1.82** | |

**Air-Overpressure** $P = A \times (SD_3)^{-B}$

| | | | | |
|---|---|---|---|---|
| **Cube Root Scaled Distance** | $SD_3$ | **322.4** | **404.1** | $m/kg^{⅓}$ |
| | **A** | **37** | **37** | |
| | **B** | **-0.97** | **-0.97** | |

**Peak Particle Velocity**

| | | | |
|---|---|---|---|
| **PPV** | **0.16** | **0.09** | mm/s |

**Air-Overpressure**

| | | | |
|---|---|---|---|
| **P** | **0.14** | **0.11** | mb |
| $SPL_{peak}$ | **116.9** | **114.8** | dB |

## References

Blaster's Handbook of International Society of Explosive Engineers (ISEE) - 18th Edition

# Calculation Sheet

## Ground Vibration and Air-Overpressure

| | | | |
|---|---|---|---|
| **Project Name:** | **CFI - South Ridge** | **Date:** | December, 2025 |
| **Project Number:** | **324001177** | | |
| **Receptor ID:** | **R2** | | |

## Data Input

| | | |
|---|---|---|
| | **Unit System** | Metric |
| **Ground Vibration** | **Industry** | Coal Mines |
| | **Confidence Level** | Best Fit |
| **Air-Overpressure** | **Blasting Type** | Quarry Face |
| | **Statistical Type** | Best Fit |

| | | | | |
|---|---|---|---|---|
| **Distance from Blasting** | **R** | **1650** | | m |
| | **Blast Type** | **Waste** | **Ore** | |
| **Maximum Charge-Weight per delay** | **W** | **232** | **118** | kg |

## Calculation Results

**Ground Vibration** $PPV = A \times (SD_2)^{-B}$

**Square Root Scaled Distance**

| | | | |
|---|---|---|---|
| $SD_2$ | **108.4** | **152.2** | m/kg $^{½}$ |
| **A** | **905** | **905** | |
| **B** | **-1.52** | **-1.52** | |

**Air-Overpressure** $P = A \times (SD_3)^{-B}$

**Cube Root Scaled Distance**

| | | | |
|---|---|---|---|
| $SD_3$ | **268.7** | **336.8** | m/kg $^{⅓}$ |
| **A** | **37** | **37** | |
| **B** | **-0.97** | **-0.97** | |

**Peak Particle Velocity**

| | | | |
|---|---|---|---|
| **PPV** | **0.73** | **0.44** | mm/s |

**Air-Overpressure**

| | | | |
|---|---|---|---|
| **P** | **0.17** | **0.14** | mb |
| $SPL_{peak}$ | **118.6** | **116.9** | dB |

## References

Blaster's Handbook of International Society of Explosive Engineers (ISEE) - 18th Edition

# Calculation Sheet

## Ground Vibration and Air-Overpressure

| | | | |
|---|---|---|---|
| **Project Name:** | **CFI - South Ridge** | **Date:** | December, 2025 |
| **Project Number:** | **324001177** | | |
| **Receptor ID:** | **R3** | | |

## Data Input

| | | |
|---|---|---|
| | **Unit System** | Metric |
| **Ground Vibration** | **Industry** | Coal Mines |
| | **Confidence Level** | Best Fit |
| **Air-Overpressure** | **Blasting Type** | Quarry Face |
| | **Statistical Type** | Best Fit |

| | | | | |
|---|---|---|---|---|
| **Distance from Blasting** | **R** | **1705** | | m |
| | **Blast Type** | **Waste** | **Ore** | |
| **Maximum Charge-Weight per delay** | **W** | **232** | **118** | kg |

## Calculation Results

**Ground Vibration** $PPV = A \times (SD_2)^{-B}$

**Square Root Scaled Distance**

| | | | |
|---|---|---|---|
| $SD_2$ | **112.0** | **157.2** | m/kg $^{½}$ |
| **A** | **905** | **905** | |
| **B** | **-1.52** | **-1.52** | |

**Air-Overpressure** $P = A \times (SD_3)^{-B}$

**Cube Root Scaled Distance**

| | | | |
|---|---|---|---|
| $SD_3$ | **277.6** | **348.0** | m/kg $^{⅓}$ |
| **A** | **37** | **37** | |
| **B** | **-0.97** | **-0.97** | |

**Peak Particle Velocity**

| | | | |
|---|---|---|---|
| **PPV** | **0.7** | **0.42** | mm/s |

**Air-Overpressure**

| | | | |
|---|---|---|---|
| **P** | **0.16** | **0.13** | mb |
| $SPL_{peak}$ | **118.1** | **116.3** | dB |

## References

Blaster's Handbook of International Society of Explosive Engineers (ISEE) - 18th Edition

# Calculation Sheet

## Ground Vibration and Air-Overpressure

| | | | |
|---|---|---|---|
| **Project Name:** | **CFI - South Ridge** | **Date:** | December, 2025 |
| **Project Number:** | **324001177** | | |
| **Receptor ID:** | **R4** | | |

## Data Input

| | | |
|---|---|---|
| | **Unit System** | Metric |
| **Ground Vibration** | **Industry** | Coal Mines |
| | **Confidence Level** | Best Fit |
| **Air-Overpressure** | **Blasting Type** | Quarry Face |
| | **Statistical Type** | Best Fit |

| | | | | |
|---|---|---|---|---|
| **Distance from Blasting** | **R** | 1200 | | m |
| | **Blast Type** | **Waste** | **Ore** | |
| **Maximum Charge-Weight per delay (TNT Equivalent)** | **W** | 232 | 118 | kg |

## Calculation Results

**Ground Vibration** $PPV = A \times (SD_1)^{-B}$

| | | | | |
|---|---|---|---|---|
| **Square Root Scaled Distance** | $SD_2$ | 78.9 | 110.7 | $m/kg^{½}$ |
| | **A** | 905 | 905 | |
| | **B** | -1.52 | -1.52 | |

**Air-Overpressure** $P = A \times (SD_3)^{-B}$

| | | | | |
|---|---|---|---|---|
| **Cube Root Scaled Distance** | $SD_3$ | 195.4 | 244.9 | $m/kg^{⅓}$ |
| | **A** | 37 | 37 | |
| | **B** | -0.97 | -0.97 | |

**Peak Particle Velocity**

| | | | |
|---|---|---|---|
| **PPV** | 1.19 | 0.71 | mm/s |

**Air-Overpressure**

| | | | |
|---|---|---|---|
| **P** | 0.23 | 0.18 | mb |
| $SPL_{peak}$ | 121.2 | 119.1 | dB |

## References

# Appendix 6.4-1: Technical Note – Hydrogeological Conceptualization and Numerical Groundwater Modelling

# TECHNICAL NOTE

# HYDROGEOLOGICAL CONCEPTUALISATION AND NUMERICAL GROUNDWATER MODELLING

Technical Input to Support the South Ridge Environmental Assessment


Job No. 44063_M
Doc No. CA0195_v3
Date: April 2026
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# 1 INTRODUCTION

This Technical Note has been prepared by Mining One to provide hydrogeological and numerical groundwater modelling inputs in support of the South Ridge Environmental Assessment (EA). The purpose of the document is to present the current understanding of groundwater quantity conditions at the South Ridge Project, based on available data, hydrogeological conceptualisation, and numerical groundwater flow modelling.

The scope of this Technical Note includes:

- A summary of available hydrogeological data and key data limitations.
- A description of existing groundwater conditions, including groundwater occurrence, hydraulic heads, and regional flow characteristics.
- Development of a hydrogeological conceptualisation relevant to groundwater quantity assessment.
- Numerical groundwater flow modelling undertaken to characterise baseline conditions and assess potential groundwater drawdown associated with pit dewatering; and
- Discussion of potential implications for environmental receptors, together with associated uncertainty.

This Technical Note focuses on groundwater quantity and flow behaviour. Assessment of groundwater quality and regulatory interpretation of environmental effects are addressed separately.

This Technical Note has been prepared for the exclusive use of the South Ridge Project and for the purpose of supporting the Environmental Assessment. The interpretations and conclusions presented herein are based on information available at the time of preparation, including limited site-specific groundwater data and the use of reasonable assumptions consistent with the current level of investigation.

The numerical groundwater model described in this document is intended to provide order-of-magnitude and screening-level insights into groundwater behaviour and potential dewatering effects. Model results should be interpreted in the context of data availability, conceptual uncertainty, and the objectives of the assessment. The findings presented herein may be refined as additional hydrogeological data become available through future investigations and monitoring programs.

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# 2 AVAILABLE DATA AND INFORMATION

## 2.1 Data Sources and Information Reviewed

Mining One received a range of datasets from Canada Fluorspar Inc. (CFI) to support the present hydrogeological assessment. These datasets include groundwater level measurements collected during drilling activities, results of hydraulic testing programs, geological and topographic wireframe models, and supporting technical reports. A summary of the key datasets reviewed is provided in Table 2-1.

In addition to project-specific datasets, selected historical hydrogeological and water management studies were reviewed to provide regional context and background understanding of groundwater conditions and operational practices within the broader St. Lawrence fluorspar mining area. The principal reference documents reviewed include:

1) Scott Wilson (2009). St Lawrence Fluorspar Project Pre-Feasibility Study: Hydrological Aspects. Technical Report, October 2009.
2) Golder Associates (2015). Proposed AGS Mine Project – Phase 1 Hydrogeology Study. Report prepared for Canada Fluorspar Inc., January 2015.
3) Golder Associates (2015). Fluorspar Mine Site – Phase 2 Hydrogeology Work. Factual Report prepared for Canada Fluorspar Inc., 2015.
4) Golder Associates (2015). Canada Fluorspar Inc. AGS Project Preliminary Water Quality Baseline Report., 2015.
5) Golder Associates (2016). Fluorspar Mine Site – Numerical Groundwater Flow Modelling of Groundwater Inflow and Drawdown. Report prepared for Canada Fluorspar Inc., 2016.
6) Knight Piesold Ltd. (2017). St. Lawrence Fluorspar Project – Site-Wide Water Management Plan (Updated). February 2017.
7) Piran Mining UK Ltd. (2024). Hydrogeological Observations and Results from Phase I and Phase II Geotechnical Drilling Program in the AGS Pit Area and South Ridge (Director Surface) Resource Area. May 2024.

**Table 2-1: List of Hydrogeology and Related Data Reviewed**

| Data Type | Filename | Remarks |
|---|---|---|
| Topography | 2mtopo_before miningtr.dm | Topography wireframe prior to surface mining operations |
| Mine Designs | Pit Surface.dxf | Wireframe of proposed open pit geometry used to define excavation extents and seepage face boundary conditions in the numerical groundwater model. |
| | TS Stockpiles Solid.dxf | Design wireframes of topsoil, waste dump, and stockpiles used to define surface topography changes and assess potential |
| | Waste Dump Solids.dxf | |

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| Data Type | Filename | Remarks |
|---|---|---|
| | NEW OB DUMP_Solid.dxf | interaction with groundwater flow and recharge |
| Geological Model | DS_INTERP_V6_TR.dm | Block model that has lithological information used to define hydrogeological domain in the numerical groundwater model |
| Structural Model | Sr_g1_0724tr.dm; Sr_g2_0724tr.dm; Sr_g3_0724tr.dm; Sr_g4_0724tr.dm | Structural model wireframes in South Ridge area, used to define structure flow control in the numerical groundwater model |
| Groundwater Level Survey | GeotechHydro2024_Groundwater _Packer.xlsx | Snapshot groundwater level measurements collected during geotechnical drilling, used to provide indicative groundwater elevations and spatial variability across the South Ridge area. |
| Hydrogeological Test | GeotechHydro2024_Groundwater _Packer.xlsx | Summary of single-packer hydraulic conductivity test results conducted during the geotechnical drilling program, used to inform indicative hydraulic parameter ranges for fractured bedrock |
| Referral Documents | Scott Wilson (2009). St Lawrence Fluorspar Project Pre-Feasibility Study: Hydrological Aspects. Technical Report, October 2009 | Provides early project-scale hydrological and hydrogeological baseline information and preliminary water management considerations |
| | Golder Associates (2015). Proposed AGS Mine Project – Phase 1 Hydrogeology Study. Report prepared for Canada Fluorspar Inc., January 2015 | Documents baseline hydrogeological conditions based on drilling investigations and monitoring well construction (14-series wells), including groundwater level observations and hydrostratigraphic interpretation, and provides regional context for subsequent hydrogeological assessments |
| | Golder Associates (2015). Fluorspar Mine Site – Phase 2 Hydrogeology Work. Factual Report prepared for Canada Fluorspar Inc., 2015 | Documents hydrogeological field investigations at the AGS Mine, including groundwater levels, packer testing, and conceptual understanding of groundwater flow |
| | Golder Associates (2015). Canada Fluorspar Inc. AGS Project Preliminary Water Quality Baseline Report., 2015 | Provides baseline groundwater and surface water quality data for the AGS Mine area, used as regional context for groundwater quality considerations. |
| | Golder Associates (2016). Fluorspar Mine Site – Numerical Groundwater Flow Modelling of Groundwater Inflow and Drawdown. Report prepared for Canada Fluorspar Inc., 2016 | Presents historical numerical groundwater modelling undertaken for the AGS Mine, including inflow estimates, drawdown extents, and calibration parameters for fractured bedrock aquifers |

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| Data Type | Filename | Remarks |
|---|---|---|
| | Knight Piesold Ltd. (2017). St. Lawrence Fluorspar Project – Site-Wide Water Management Plan (Updated). February 2017 | Outlines site-wide water management infrastructure, drainage controls, and water balance concepts relevant to groundwater–surface water interaction |
| | Piran Mining UK Ltd. (2024). Hydrogeological Observations and Results from Phase I and Phase II Geotechnical Drilling Program in the AGS Pit Area and South Ridge (Director Surface) Area. | Summarises recent hydrogeological observations, groundwater level measurements, and packer test results from geotechnical drilling in the AGS Pit and South Ridge areas |

## 2.2 Summary of Hydrogeological Investigations (2024 - 2026)

### 2.2.1 Program Overview

Hydrogeological investigations at the South Ridge Mine area have been undertaken in two main phases:

1) Phase 1 (October 2023 – March 2024): integrated within the geotechnical drilling program, incorporating snapshot groundwater level measurements and interval-scale hydraulic conductivity testing (packer tests).
2) Phase 2 (January – February 2026): dedicated hydrogeological works including drilling and construction of pumping and observation wells, execution of a pumping test program (step-drawdown, constant-rate pumping, and recovery monitoring), and establishment of additional groundwater monitoring points.

Phase 1 (October 2023 – March 2024) was conducted as part of a geotechnical drilling campaign. Although the drilling program was primarily designed for geotechnical characterisation, hydrogeological observations and testing were incorporated to support the PFS-level hydrogeological assessment. The hydrogeological scope included snapshot groundwater level measurements in drillholes and interval-scale hydraulic conductivity testing using packer tests over selected intervals. These components were undertaken by the Canada Fluorspar Inc. (CFI) exploration geology team under the supervision of Piran Mining UK Ltd., using a single-packer test system supplied by the drilling contractor (Warrior Drilling).

Phase 2 (January – February 2026) comprised dedicated hydrogeological works to strengthen the dataset supporting groundwater conceptualisation and numerical groundwater modelling. The Phase 2 program included:

- Hydrogeological drilling and monitoring installation, including construction and completion of one pumping well (PW1) and two observation/monitoring wells (OBS_01 and OBS_02), and conversion of selected completed geotechnical boreholes into practical monitoring points using an open-hole standpipe configuration.
- Pumping test execution, comprising step-drawdown testing, a constant-rate pumping test, and recovery monitoring, supported by continuous logger records and targeted manual checks.
- Groundwater survey, including pre-test (baseline) groundwater level measurements and repeat gauging as required to support interpretation and provide reference groundwater level conditions for subsequent assessment and model refinement.

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Together, these two investigation phases provide both interval-scale and aquifer-scale hydraulic information to support conceptual model development and numerical groundwater modelling.

### 2.2.2 Hydrogeological Drilling and Monitoring Installation (2026)

A dedicated hydrogeological field program was completed in January–February 2026 to establish groundwater monitoring well and to support aquifer testing at the South Ridge Mine area. The program included construction of one pumping well (PW1) and two observation/monitoring wells (OBS_01 and OBS_02), which were retained as monitoring assets for future groundwater level monitoring beyond the pumping test program.

The locations and key details of the newly constructed wells and the additional monitoring points are summarised in Table 2-2 and shown in Figure 2-1. The pumping well (PW1) was installed centrally within the test area, with the two observation wells located approximately 100 m from PW1 on opposite sides of the pumping well to provide monitoring coverage during aquifer testing and to support ongoing groundwater level monitoring.

In addition to the new pumping test wells, four (4) completed geotechnical boreholes (DS-2024-180, DS-2024-184, DS-2024-187, and DS-2024-188) were converted into practical groundwater monitoring points. An open-hole standpipe configuration was adopted, with surface casing installed near collar to protect the installation and maintain access for repeat gauging and potential future instrumentation (e.g., pressure transducers), as required.

Detailed construction logs and completion design for PW1, OBS_01 and OBS_02 (including casing/screen configuration and key completion details) are provided in Appendix. [X].

**Table 2-2: Summary of Pumping Test Wells and Groundwater Monitoring Points**

| Site_ID | Collar Coordinate (UTM 21T) | | | Total Depth (m) | Survey Hole Direction | | Remarks |
|---|---|---|---|---|---|---|---|
| | Easting | Northing | Elevation (masl)* | | Azimuth | Inclination | |
| PW-1 | 621516 | 5194629 | 52.02 | 80 | 0 | -90 | Pumping Well |
| OBS-01 | 621452 | 5194705 | 50.28 | 80 | 0 | -90 | Observation Pump test and GW Monitoring Well (Standpipe Piezometers) |
| OBS-02 | 621595 | 5194566 | 52.87 | 80 | 0 | -90 | |
| DS-2024-180 | 621282 | 5194772 | 31.90 | 62.5 | 38.2 | -54.7 | Standpipe Open Hole |
| DS-2024-184 | 621425 | 5194634 | 41.34 | 77.0 | 51.9 | -52.9 | |
| DS-2024-187 | 621618 | 5194355 | 42.75 | 88.4 | 183.3 | -60.2 | |
| DS-2024-188 | 621377 | 5194549 | 30.54 | 69.9 | 233.6 | -56.7 | |

*masl: meter above sea water level

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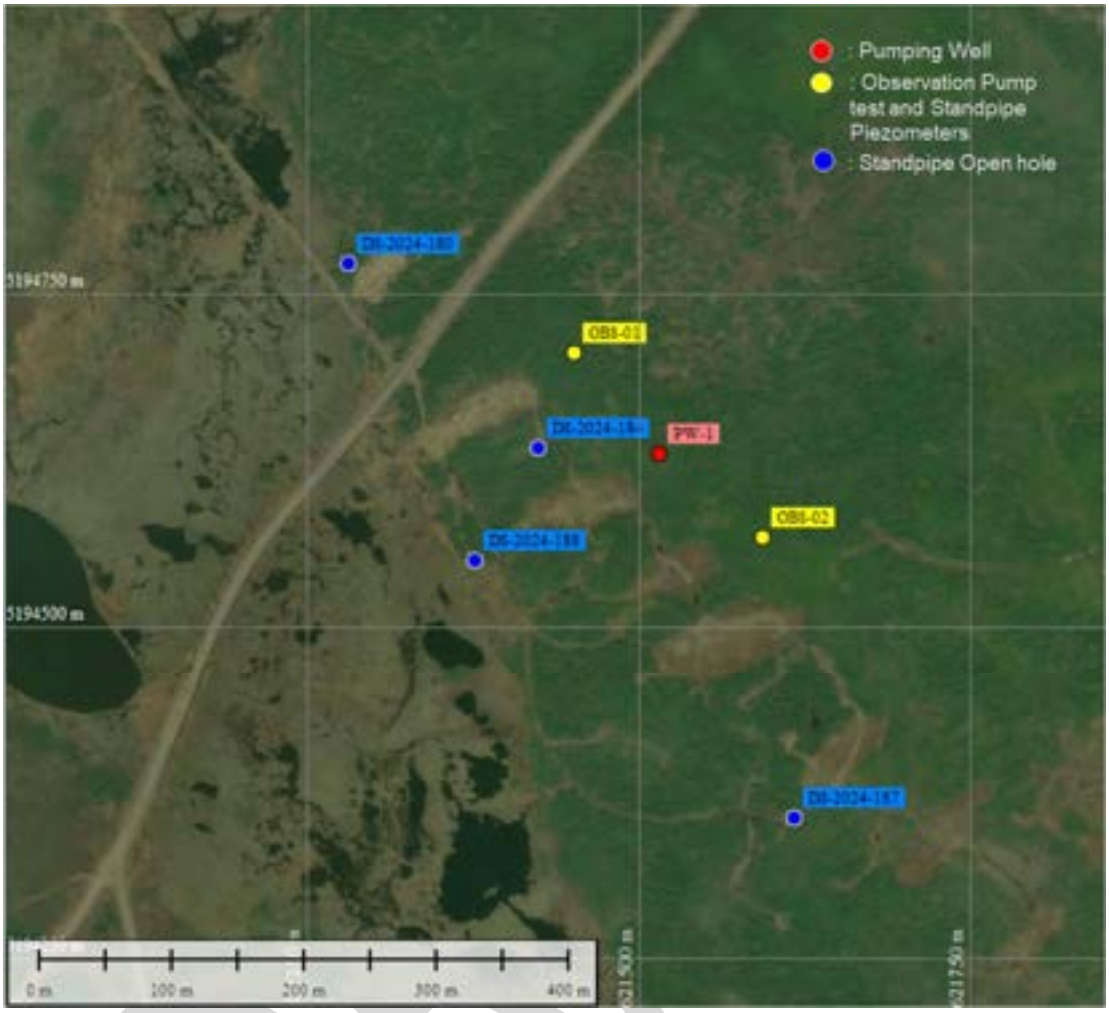


**Figure 2-1: Location of Pumping Test Wells and Groundwater Monitoring Points**

### 2.2.3 Summary of Packer Test Results (2024)

Packer testing was undertaken during the 2023–2024 drilling program across selected intervals to characterize interval-scale hydraulic conductivity. The tests targeted fractured bedrock intervals within the St. Lawrence Granite and were conducted over discrete depth intervals below ground surface.

A total of ten single packer tests were completed across nine drillholes (DS-2024-179 to DS-2024-188). Test length typically ranged between approximately 5 and 15 m in length, with test depths generally in the bottom depth of boreholes. The orientation of tested drillholes varied, with dip angles ranging from approximately -48° to -61°.

Hydraulic conductivity derived from the packer tests span several orders of magnitude, reflecting variability in fracture frequency and rock mass conditions. Measured hydraulic conductivity ranges from approximately 8E-9 m/s to 4.6E-6 m/s. The tested intervals are summarized in Table 2-3, including hole identification, collar and survey, test depth lengths, and calculated hydraulic conductivity values.

**Table 2-3: Summary of Packer Test Results in South Ridge Area**

| Hole Id | Easting | Northing | Elevation | Dip | Azi. | Test Length (m) | Mid Interval Depth (m) | K (m/s) |
|---|---|---|---|---|---|---|---|---|
| DS-2024-179 | 621272.7 | 5194757.6 | 31.9 | 323.3 | -58.9 | 8.9 | 56.6 | 4.7E-07 |
| DS-2024-179 | 621272.7 | 5194757.6 | 31.9 | 323.3 | -58.9 | 5.7 | 59.8 | 1.6E-06 |
| DS-2024-180 | 621282.1 | 5194772.2 | 31.9 | 38.2 | -54.7 | 7.3 | 55.2 | 1.2E-07 |
| DS-2024-181 | 621267.5 | 5194717.2 | 30.9 | 235.4 | -61.0 | 5.7 | 59.3 | 1.2E-06 |
| DS-2024-182 | 621313.2 | 5194651.3 | 29.9 | 232.1 | -59.7 | 5.8 | 65.2 | 3.0E-08 |
| DS-2024-184 | 621425.2 | 5194634.0 | 41.3 | 51.9 | -52.9 | 9.3 | 67.7 | 8.0E-09 |
| DS-2024-185 | 621516.9 | 5194464.6 | 41.2 | 253.8 | -57.7 | 8.7 | 74.3 | 1.5E-07 |
| DS-2024-186 | 621585.6 | 5194419.7 | 45.4 | 42.8 | -48.6 | 14.7 | 91.5 | 3.2E-07 |
| DS-2024-187 | 621617.6 | 5194354.8 | 42.8 | 183.3 | -60.2 | 6.8 | 81.6 | 3.0E-08 |
| DS-2024-188 | 621376.9 | 5194549.1 | 30.5 | 233.6 | -56.7 | 8.6 | 61.3 | 4.6E-06 |

### 2.2.4 Summary of Pumping Test (2026)

Aquifer-scale hydraulic parameters were derived from a pumping test program completed in early February 2026 using one pumping well (PW1) and two observation wells (OBS_01 and OBS_02). The test program comprised step-drawdown testing, a constant-rate pumping test, and recovery monitoring.

#### 2.2.4.1 Step-Drawdown Test

A step-drawdown test was completed using three time-controlled steps of 30 minutes at approximately 4, 8, and 12 GPM. Drawdown in PW1 increased progressively with discharge, reaching approximately 5.35 m, 11.43 m, and 19.58 m at the end of each step, respectively. Key step-test calculations are summarized in Table 2-4, and the resulting efficiency trend is presented in Figure 2-2.

The step-test results indicate decreasing well efficiency with increasing discharge, consistent with increasing well losses at higher pumping rates. Based on the step-test behaviors, an intermediate discharge rate (approximately 7–8 GPM) was adopted for the constant-rate test to maintain stable pumping performance while applying a measurable aquifer stress.

**Table 2-4: Summary data of Step Drawdown Test**

| Stage | ΔSw (n) | Sw (n) | Qn | Sw(n)/Q(n) |
|---|---|---|---|---|
| | m | m | $m^3/d$ | $d/m^2$ |
| Stage 1 | 5.349 | 5.349 | 21.804 | 0.245 |
| Stage 2 | 6.081 | 11.430 | 43.608 | 0.262 |
| Stage 3 | 8.153 | 19.583 | 59.961 | 0.327 |

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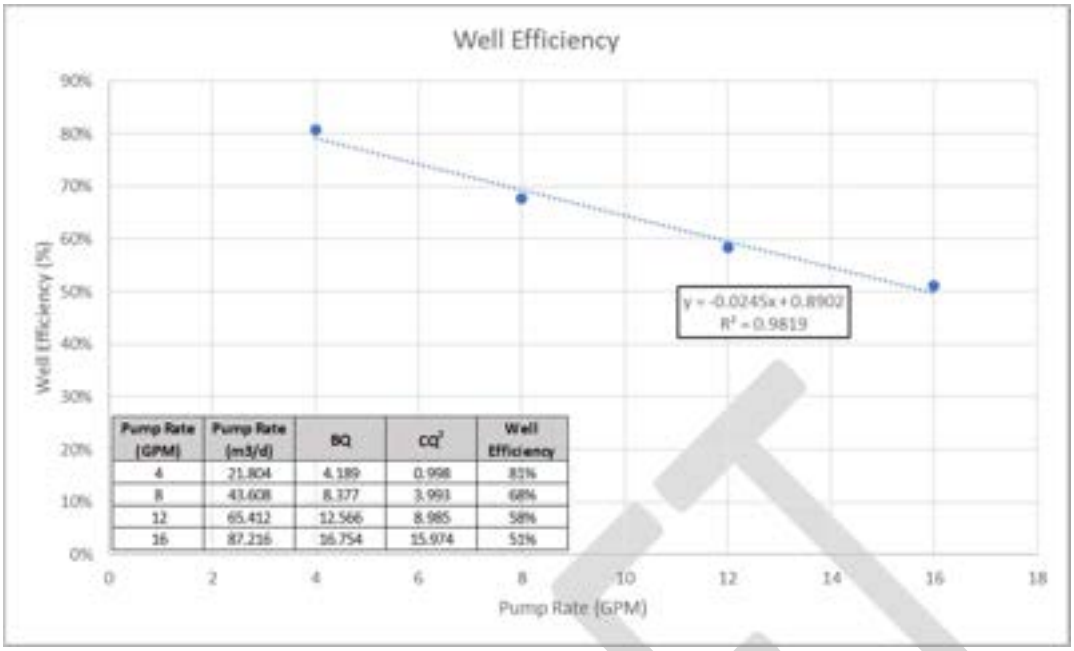


**Figure 2-2: Well Efficiency from Step Draw Down Test**

#### 2.2.4.2 Constant-Rate and Recovery Test

A 72-hour constant-rate pumping test was completed at an average discharge of approximately 7–8 GPM, reported as stable over the test period. Recovery monitoring commenced immediately following pumping shutdown and continued for approximately 16 hours, supported by continuous logger records and targeted manual checks.

Analytical interpretation of the February 2026 dataset provides estimation of transmissivity and storage parameters. A summary of the reported interpretation outputs is provided in Table 2-5.

**Table 2-5: Summary of Hydraulic Properties from Pumping Test Interpretation**

| Test component | Method | Transmissivity (T) - $m^2/s$ | Storage (S) |
|---|---|---|---|
| Constant-rate test | Theis | $1.417 \times 10^{-5}$ | 0.02026 |
| Recovery test | Hantush–Jacob | $3.638 \times 10^{-6}$ | 0.04323 |
| Combined analysis | Theis (confined) | $8.385 \times 10^{-6}$ | 0.08925 |

### 2.2.5 Groundwater Level Observations

Groundwater level information for South Ridge has been collected through (i) snapshot measurements recorded during the 2023–2024 drilling and testing program, and (ii) baseline and test-period observations collected during the January–February 2026 hydrogeological program (including continuous logger records during the pumping test). Together, these data provide reference groundwater level conditions to support conceptual model development and numerical groundwater model calibration.

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#### 2.2.5.1 Snapshot Groundwater Levels (2023–2024)

During the October 2023 to March 2024 drilling campaign, groundwater levels were measured as snapshot observations in drillholes. These measurements provide point-in-time groundwater level information associated with drilling and testing activities and are suitable for establishing indicative groundwater conditions at the time of drilling.

Measured depths to groundwater (below collar) ranged from approximately 0.7 m to 13 m across the monitored drillholes (Table 2-6). Calculated groundwater elevations (derived from collar elevation and measured depth-to-water and referenced to UTM coordinates) indicate spatial variability in groundwater levels across the South Ridge area. The deepest measured groundwater levels were recorded in drillholes DS-2024-184 and DS-2024-185, while shallower groundwater levels were observed in other drillholes.

Snapshot groundwater level data, including coordinates, drillhole orientation, measured depths to water, and calculated groundwater elevations, are summarized in Table 2-6. No continuous groundwater level monitoring was undertaken as part of the 2024 investigation program, and no dedicated monitoring wells were installed.

#### 2.2.5.2 Snapshot Groundwater Levels (2026)

Baseline (pre-test) groundwater levels were measured prior to commencement of the February 2026 pumping test program. These measurements represent point-in-time (snapshot) groundwater level conditions and were used as reference levels for subsequent aquifer test interpretation.

Reported static water levels prior to pumping were approximately 22.43 mbgl (PW1), 10.7 mbgl (OBS_01), and 16.87 mbgl (OBS_02). The snapshot groundwater level dataset, including measurement depths, coordinates, and calculated groundwater elevations, is summarized inTable 2-6.

**Table 2-6: Summary of Groundwater Level Measurements in South Ridge Area**

| Hole Ref | Azi. | Incl. | Hole Depth (m) | Depth Water Level (m) | Water Table Coords in Hole (UTM) | | | Measurement Period |
|---|---|---|---|---|---|---|---|---|
| | | | | | m East | m North | Elev (m) | |
| DS-2024-179 | 323.3 | -58.9 | 65.5 | 2.05 | 621272.1 | 5194758 | 30.1 | Feb-24 |
| DS-2024-180 | 38.2 | -54.7 | 62.5 | 0.8 | 621282.4 | 5194773 | 31.2 | Feb-24 |
| DS-2024-181 | 235.4 | -61 | 65 | 2.21 | 621266.6 | 5194717 | 29.0 | Feb-24 |
| DS-2024-182 | 232.1 | -59.7 | 71 | 0.73 | 621312.9 | 5194651 | 29.3 | Feb-24 |
| DS-2024-183 | 48.7 | -56.9 | 83 | 8.41 | 621348.4 | 5194715 | 29.1 | Feb-24 |
| DS-2024-184 | 51.9 | -52.9 | 77 | 14.75 | 621432.2 | 5194639 | 29.6 | Feb-24 |
| DS-2024-185 | 253.8 | -57.7 | 83 | 15.24 | 621509.1 | 5194462 | 28.3 | Feb-24 |
| DS-2024-186 | 42.8 | -48.6 | 106.2 | 6.72 | 621588.6 | 5194423 | 40.3 | Feb-24 |
| DS-2024-187 | 183.3 | -60.2 | 88.4 | 14.58 | 621617.2 | 5194348 | 30.1 | Feb-24 |
| DS-2024-188 | 233.6 | -56.7 | 69.9 | 2.44 | 621375.8 | 5194548 | 28.5 | Feb-24 |
| DS-2024-180 | 38.2 | -54.7 | 62.5 | 0.75 | 621282.4 | 5194773 | 31.3 | Feb-26 |
| DS-2024-184 | 51.9 | -52.9 | 77 | 11.53 | 621432.2 | 5194640 | 32.1 | Feb-26 |
| DS-2024-187 | 183.3 | -60.2 | 88.4 | 11.6 | 621617.2 | 5194348 | 32.7 | Feb-26 |
| DS-2024-188 | 233.6 | -56.7 | 69.9 | 1.75 | 621375.8 | 5194548 | 29.1 | Feb-26 |

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| Hole Ref | Azi. | Incl. | Hole Depth (m) | Depth Water Level (m) | Water Table Coords in Hole (UTM) | | | Measurement Period |
|---|---|---|---|---|---|---|---|---|
| | | | | | m East | m North | Elev (m) | |
| PW-1 | 0 | -90 | 80 | 22.43 | 621516.2 | 5194629 | 29.6 | Feb-26 |
| OBS-1 | 0 | -90 | 80 | 10.85 | 621451.9 | 5194705 | 39.4 | Feb-26 |
| OBS-2 | 0 | -90 | 80 | 16.75 | 621594.5 | 5194566 | 36.1 | Feb-26 |

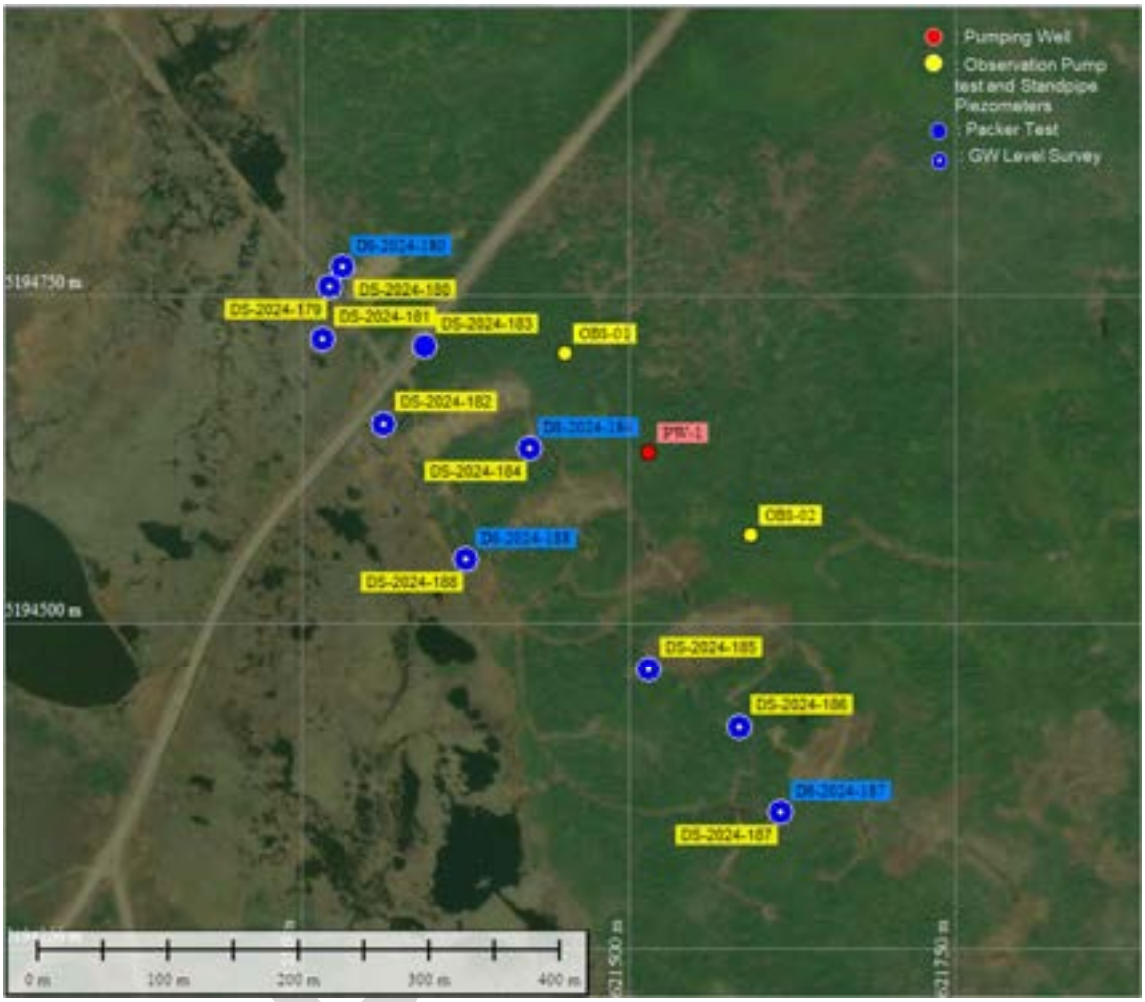


**Figure 2-3: Distribution of Hydrogeological Investigation Location in South Ridge Area (2024 and 2026 Investigation)**

## 2.3 Hydrogeological Information from the AGS Mine Area

Hydrogeological information from the AGS Mine Area provides important regional and operational context for the South Ridge hydrogeological assessment. The AGS Pit is located approximately 5 km west of South Ridge and represents the most extensively investigated and instrumented area within the broader St. Lawrence fluorspar mining district.

Multiple hydrogeological investigations have been undertaken at AGS as part of historical and recent mining activities, including groundwater level monitoring, pumping tests, packer testing,

and groundwater sampling. These datasets form the primary basis for understanding groundwater behaviour in fractured bedrock settings similar to those anticipated at South Ridge.

### 2.3.1 Groundwater Level Observations

Groundwater levels have been recorded in fourteen (14) drillholes across the AGS Pit area during drilling campaigns conducted between 2023 and 2024. Observed depths to groundwater range from approximately 0.45 m to 26.12 m below ground surface. The spatial distribution of groundwater measurement locations within the AGS Mine Area is shown in Figure 2-4, and the measured groundwater elevations are summarised in Table 2-7.

It is noted that all groundwater level measurements at AGS were collected as snapshot observations during drilling and do not represent long-term stabilised groundwater conditions. Furthermore, the AGS Pit is an active mining area where groundwater levels may be influenced by ongoing dewatering, blasting, and excavation activities. As such, observed water levels may reflect locally induced drawdown rather than natural piezometric conditions.

Despite these limitations, the AGS groundwater level dataset provides useful insight into the range of groundwater elevations and variability within the fractured bedrock aquifer system under operational conditions.

### 2.3.2 Summary of Packer Test Results

Packer testing has been conducted extensively within the AGS Mine Area during both the Golder (2015) and Piran Mining UK (2024) investigation programs. A total of eighteen (18) packer tests were completed in AGS drillholes, targeting fractured rhyolite, metasediment, and granite lithologies.

Measured hydraulic conductivity values generally fall within the range of approximately $10^{-9}$ to $10^{-7}$ m/s, consistent with low matrix permeability hard rock. However, several intervals returned higher hydraulic conductivity values, up to the order of $10^{-6}$ m/s, indicating the presence of locally open and hydraulically connected fracture zones.

These results confirm that groundwater flow within the AGS area is dominated by structurally controlled secondary permeability rather than lithology-driven primary porosity.

### 2.3.3 Summary of Pumping Test Result

As part of Golder's 2015 hydrogeological investigation program, a series of pumping tests were conducted in the AGS Pit area using three large-diameter vertical wells (PW-15-01, MW-15-01, and MW-15-02). The wells were drilled to depths of up to approximately 200 m and screened within hard rock intervals.

The pumping test program comprised a short-term (3-hour) constant-rate test, followed by a long-term (72-hour) constant-rate pumping test and a subsequent recovery phase. Pumping rates averaged approximately 200 L/min during the short-term test and 192 L/min during the long-term test, reflecting the maximum capacity of the available pumping equipment.

Groundwater responses were monitored using automated level loggers installed in the pumping and monitoring wells, supplemented by manual water level measurements in surrounding exploration boreholes. Test data were analysed using standard analytical methods, including Theis, Cooper–Jacob, and Theis's recovery approaches.

Derived transmissivity values from the pumping tests generally ranged between approximately 15 and 30 m²/day, with storativity estimates typically on the order of $10^{-4}$ to $10^{-5}$. These results

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indicate a moderately productive fractured bedrock aquifer system at AGS, with groundwater flow controlled primarily by secondary permeability associated with fractures and fault zones.

### 2.3.4 Applicability of AGS Data to South Ridge

While AGS and South Ridge are underlain by broadly similar lithologies, several factors constrain the direct transferability of AGS hydrogeological data to South Ridge. These include differences in surface conditions, disturbance history, operational drawdown effects, and uncertain hydraulic connectivity between the two areas.

AGS hydrogeological data are therefore used in this assessment to provide regional context and indicative parameter ranges, rather than as direct inputs for local-scale groundwater modelling at South Ridge. The limitations and uncertainties associated with extrapolating AGS-derived data are considered further in subsequent sections of this report.

**Table 2-7: Groundwater Depth Measurement Data in AGS Mine Area (2024 Survey)**

| Hole ID | Easting | Northing | Ground Surface Elevation (masl) | GW Elevation (masl) | Groundwater Depth (m) |
|---|---|---|---|---|---|
| GS-2023-310 | 616598 | 5196166 | 119.28 | 95.33 | -23.94 |
| GS-2023-311 | 616189 | 5196300 | 97.45 | 90.54 | -6.91 |
| GS-2023-312 | 616054 | 5196339 | 95.16 | 90.94 | -4.21 |
| GS-2023-314 | 616773 | 5195929 | 100.48 | 99.23 | -1.25 |
| GS-2023-315 | 616944 | 5195808 | 99.20 | 98.33 | -0.87 |
| GS-2023-316 | 616322 | 5196480 | 120.73 | 102.51 | -18.22 |
| GS-2024-317 | 616406 | 5196445 | 120.06 | 115.98 | -4.08 |
| GS-2024-318 | 616230 | 5196569 | 117.77 | 98.64 | -19.13 |
| GS-2024-319 | 616027 | 5196563 | 100.00 | 93.18 | -6.82 |
| GS-2024-320 | 616318 | 5196584 | 117.44 | 116.99 | -0.45 |
| GS-2024-321 | 616912 | 5196037 | 97.78 | 81.14 | -16.64 |
| GS-2024-322 | 617020 | 5195930 | 81.80 | 77.10 | -4.71 |
| GS-2024-323 | 617101 | 5195674 | 100.54 | 78.28 | -22.26 |
| GS-2024-324 | 616577 | 5196131 | 119.12 | 93.00 | -26.12 |

**Table 2-8: Summary of Hydraulic Conductivity from Packer Tests in AGS Mine Area**

| Hole ID | Test Interval | | K (m/s) | Conducted By | Year | Location |
|---|---|---|---|---|---|---|
| | From (m) | To (m) | | | | |
| GS-15-184 | 199 | 427 | 2.00E-07 | Golder | 2015 | AGS Pit |
| GS-15-184 | 30 | 427 | 4.00E-08 | Golder | 2015 | AGS Pit |
| GS-14-94 | 201 | 400 | 7.00E-08 | Golder | 2015 | AGS Pit |
| GS-14-94 | 31 | 400 | 6.00E-08 | Golder | 2015 | AGS Pit |
| GS-15-177 | 201 | 423 | 6.00E-07 | Golder | 2015 | AGS Pit |
| GS-15-177 | 249 | 423 | 2.00E-07 | Golder | 2015 | AGS Pit |
| GS-15-177 | 30 | 423 | 6.00E-07 | Golder | 2015 | AGS Pit |
| GS-23-316 | 168.784 | 182.5 | 8.40E-08 | CFI - Piran Mining | 2023 | AGS Pit |
| GS-24-317 | 36.784 | 50.5 | 4.45E-08 | CFI - Piran Mining | 2024 | AGS Pit |

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| Hole ID | Test Interval | | K (m/s) | Conducted By | Year | Location |
|---|---|---|---|---|---|---|
| | From (m) | To (m) | | | | |
| GS-24-317 | 90.688 | 110.5 | 1.53E-08 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-318 | 55.084 | 68.8 | 9.77E-09 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-318 | 93.988 | 113.8 | 8.80E-09 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-319 | 51.688 | 71.5 | 6.30E-08 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-320 | 65.688 | 85.5 | 4.21E-08 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-321 | 66.688 | 86.5 | 2.43E-08 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-322 | 30.688 | 50.5 | 4.84E-08 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-323 | 33.688 | 53.5 | 2.62E-08 | CFI - Piran Mining | 2024 | AGS Pit |
| GS-24-324 | 35.588 | 55.4 | 1.24E-07 | CFI - Piran Mining | 2024 | AGS Pit |

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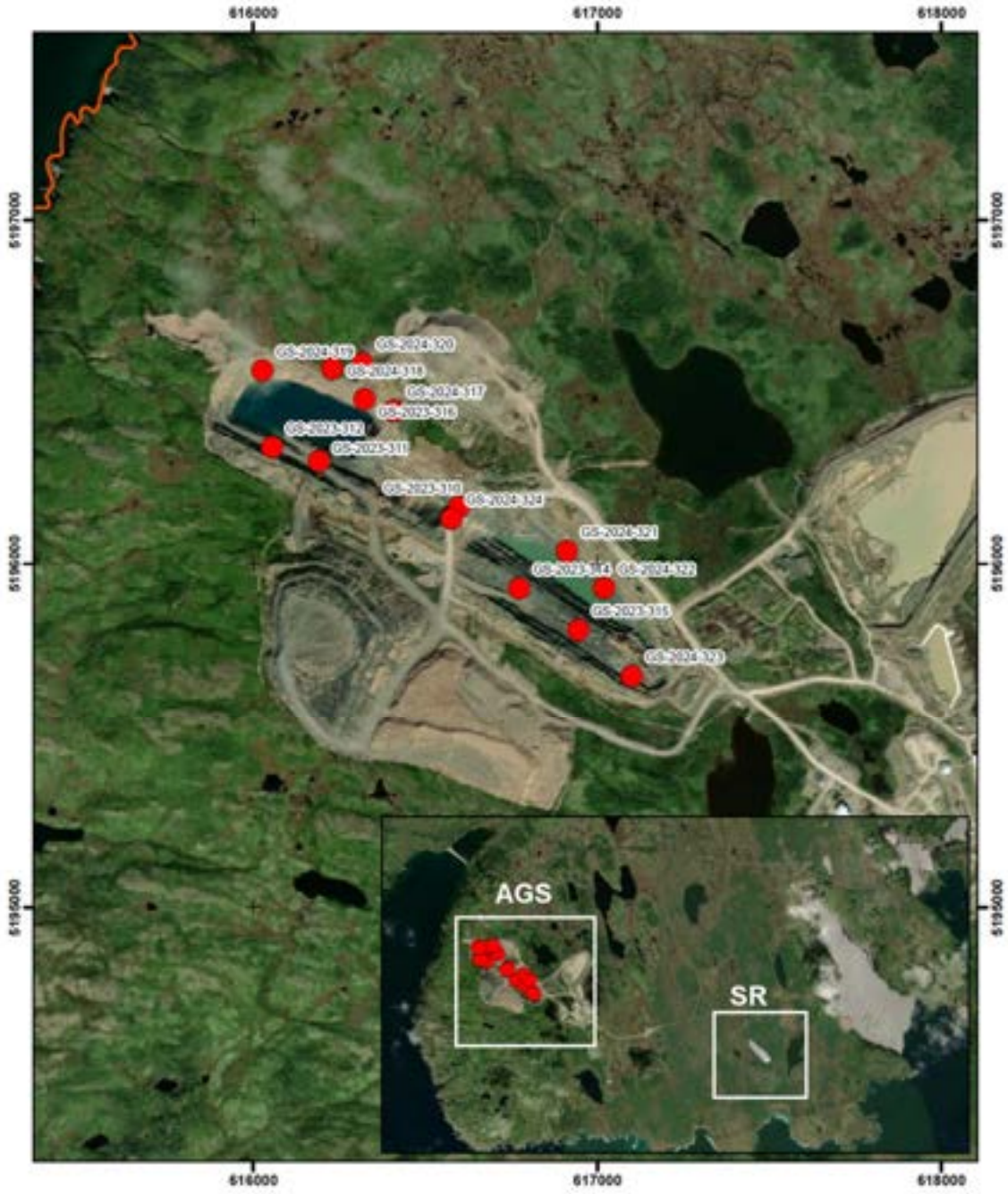


**Figure 2-4: Distribution of Hydrogeological Test Location in AGS Mine Area**

## 2.4 Data Gaps and Key Information Limitations

The primary data gaps and limitations relevant to the groundwater quantity assessment include:

- Continuous monitoring remains limited to the monitoring period associated with the Feb 2026 program; longer-term monitoring across seasonal conditions is still not available.

- Limited regional hydrogeological dataset and spatial coverage to characterise variability across the broader South Ridge area.
- Limited quantitative data on groundwater–surface water interactions.

These limitations necessitate the use of conservative assumptions and simplified representations within the hydrogeological conceptualisation and numerical groundwater modelling. The implications of these data gaps are explicitly considered in the interpretation of model results and in the assessment of uncertainty presented later in this Technical Note.

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# 3 EXISTING CONDITIONS

## 3.1 General Site Settings

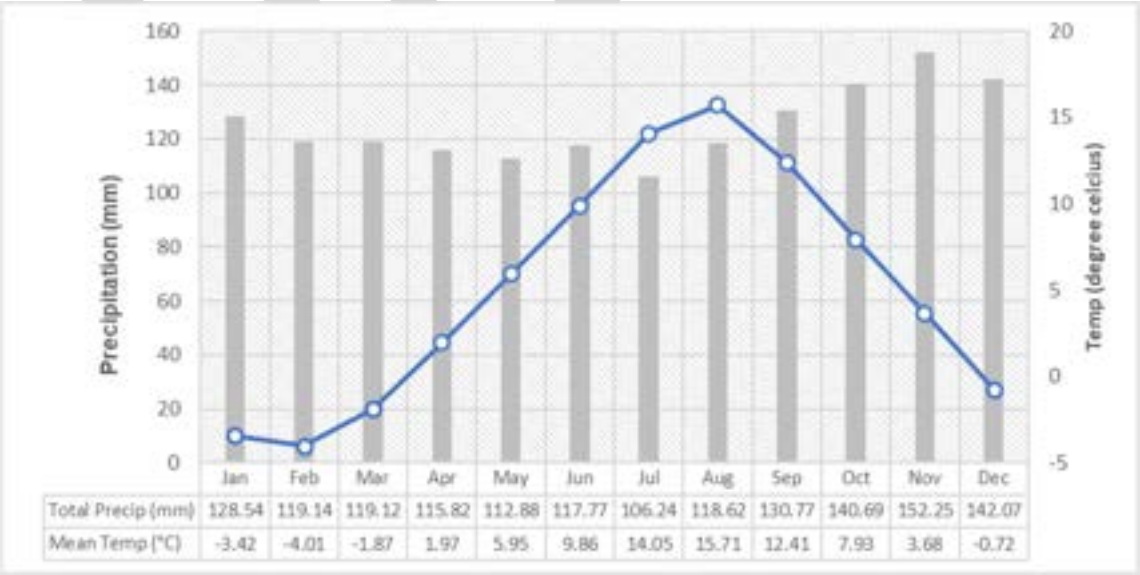
### 3.1.1 Climate

The climate of the project area is characterised by foggy, cool summers and short, relatively moderate winters. Climate data for the St. Lawrence project area were obtained from the Environment and Climate Change Canada (ECCC) – St. Lawrence climate station (Station ID: 8403619). The station is located approximately 4 km northeast of the mine site, which makes it the most representative long-term monitoring point for local climatic conditions.

Mean monthly temperatures indicate cold winters with average values below freezing from December to March (coldest in February at −4.0 °C) and mild summers with peak values reaching 15.7 °C in August (Figure 3-1). Monthly precipitation is relatively evenly distributed throughout the year, with totals ranging from 106 mm in July to 152 mm in November (Figure 3-1). The long-term average annual precipitation is about 1,500–1,600 mm (Figure 3-2 and Figure 3-3).

For the period 1966–1996, detailed rainfall and snowfall records are available (Figure 3-2). During this interval, annual precipitation averaged 1,550 mm, of which rainfall typically contributed between 1,100 and 1,300 mm (80-85% from Total Precipitation), while snowfall accounted for 200–400 mm (15-20% from Total Precipitation). Several wet years, such as 1982 and 1994, exceeded 1,900–2,200 mm, while drier years, such as 1977 and 1992, were closer to 1,100–1,300 mm.

From 1999 onwards, only total precipitation records are available (Figure 3-3). Annual totals in this period are consistent with the earlier record, averaging around 1,500 mm. The driest year was 2004 with 921 mm, while the wettest years include 2010 and 2022, when totals exceeded 1,800 mm. Snow and rain partitioning is not available after 1996; therefore, only total precipitation is reported for the recent period.




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precip (mm) | 128.54 | 119.14 | 119.12 | 115.82 | 112.88 | 117.77 | 106.24 | 118.62 | 130.77 | 140.69 | 152.25 | 142.07 |
| Mean Temp (°C) | -3.42 | -4.01 | -1.87 | 1.97 | 5.95 | 9.86 | 14.05 | 15.71 | 12.41 | 7.93 | 3.68 | -0.72 |

**Figure 3-1: Mean Monthly Temperature and Precipitation (1966–2024)**

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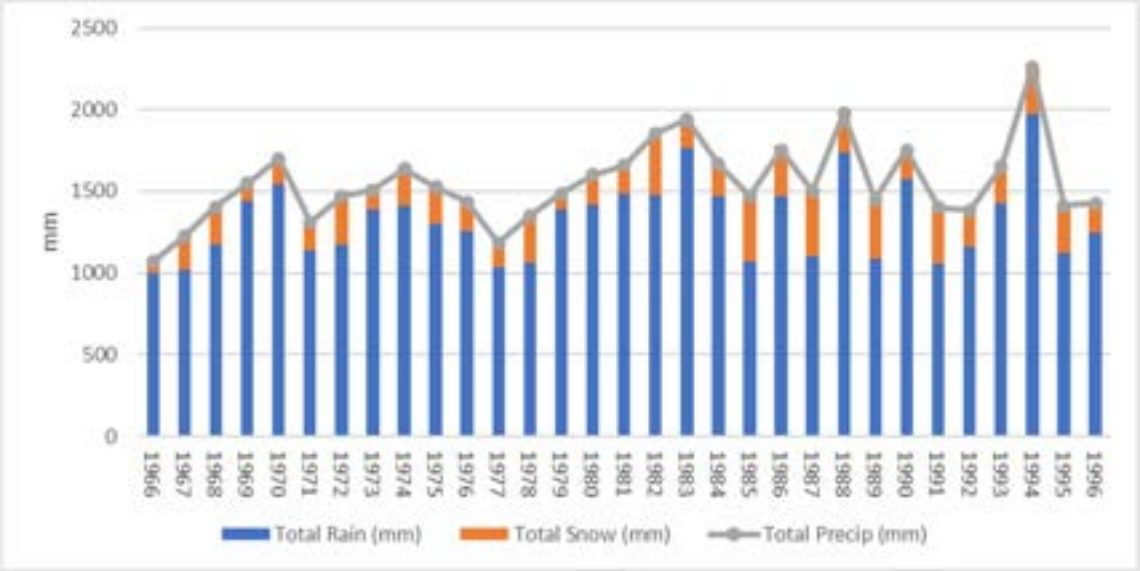


**Figure 3-2: Annual Rainfall, Snowfall, and Total Precipitation (1966–1996)**

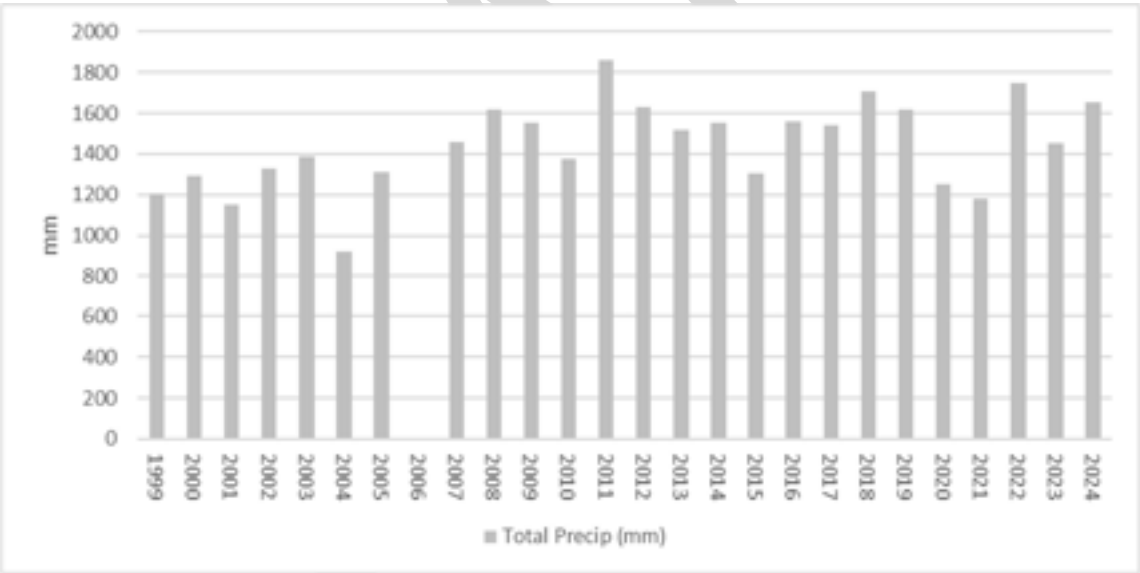


**Figure 3-3: Annual Total Precipitation (1999–2024)**

### 3.1.2 Topography and Catchments

The St. Lawrence area has been strongly influenced by past glaciation, resulting in a series of broad but elongated upland valley troughs that generally slope southward toward the coast. These valleys are separated by low, rounded ridges that define the principal watershed boundaries and broadly follow the orientation of the underlying geological structure. Ground elevations decrease from approximately 300–500 m above sea level in the northern uplands to approximately 50–100 m near the southern coastal margin.

Topographic gradients across much of the project area are relatively low, promoting the development of numerous shallow ponds and poorly drained depressions. These features are commonly associated with saturated upland bogs and peatlands, which locally attenuate surface runoff and provide temporary surface water storage.

The South Ridge Mine area is situated near the interface of two catchments (Figure 3-4), with surface drainage divided primarily between the Salt Cove Watershed and the Shoal Cove Watershed. Surface water within these catchments generally drains southward toward the coastline through a network of short streams, ponds, and wetlands.

The Shoal Cove Watershed encompasses Shoal Cove Pond (approximately 15.7 ha) and drains toward the coastal area east of the Project site. The Salt Cove Watershed, which extends northward and westward of the mine area, includes Clarkes Pond (approximately 10.0 ha) and a series of interconnected upland ponds and wetlands that ultimately discharge toward Salt Cove and the adjacent coastal environment.

The proximity of the South Ridge Mine to watershed boundaries, combined with the presence of multiple ponds and wetlands, indicates a hydrological setting characterised by diffuse surface drainage, locally attenuated runoff, and potential interaction between surface water bodies and the shallow groundwater system. These characteristics are considered important controls on groundwater recharge and surface water–groundwater interaction within the Project area.

**Figure 3-4:` Regional Watershed and Surface Drainage**

### 3.1.3 Geological Background and Structure Condition

Regionally, the Project area is located within the Avalonian terrane of southern Newfoundland and is underlain by a complex assemblage of Neoproterozoic volcanic–sedimentary sequences and younger intrusive bodies. As shown in Figure 3-5, the regional geology is characterised by the extensive development of the St. Lawrence Granite and associated intrusive units, which intrude older rocks of the Burin Group and related formations. This regional geological framework provides the structural and lithological context for the development of fault-controlled fluorite mineralisation within the St. Lawrence area.

At the Project scale, the South Ridge Mine area is underlain predominantly by the St. Lawrence Granite (SLG), a Late Devonian peralkaline to subalkaline granitic intrusion that forms the principal bedrock unit across the site. The SLG intrudes older Neoproterozoic volcanic and sedimentary rocks of the Burin Group and occurs as a regionally extensive intrusive body. The granite is typically massive and crystalline, with very low primary porosity, and its physical behaviour is dominated by brittle deformation.

As a result, fractures, faults, and associated structural features exert a primary control on the physical properties of the rock mass. These structures define the dominant pathways for fluid movement within the bedrock and represent key geological elements relevant to the hydrogeological setting of the Project area.

The geological and structural interpretation presented in this section is based primarily on the Canada Fluorspar Inc. Mineral Resource Estimate (MRE), November 2023, which integrates historical underground mapping, surface geological observations, and multiple drilling programs conducted between 2013 and 2020.

The Director Vein is the dominant structural feature within the Project area and forms the principal mineralised structure at South Ridge. The Director Vein is a fault-controlled zone developed within the SLG, characterised by a steep dip (typically 70–75°, locally vertical) and a northwest–southeast strike. The structure extends for approximately 2.2 km along strike and persists from surface to depths of approximately 450 m, indicating a laterally and vertically continuous fault system.

Vein thickness varies along strike and with depth, ranging from less than 1 m to locally greater than 10 m. Toward its northern extent, the Director Vein locally bifurcates into subsidiary splays and terminates shortly after entering adjacent metasedimentary units, suggesting a lithological and structural boundary that may limit continuity beyond the granite contact. Localised zones of hydrothermal alteration, including soft, clay-rich material interpreted as fault gouge, indicate repeated brittle reactivation along the structure.

Historical underground mine workings developed along portions of the Director Vein locally modify the rock mass and represent legacy anthropogenic features that may influence subsurface conditions in the vicinity of the structure.

The geological sequence in the overburden typically consists of a thin layer (~10) of surficial organic soils, underlain by glacial till comprised of silty sand and gravel with varying percentages of cobbles and boulders. Based on the results of the subsurface investigation, superficial material is observed to be up to 14m in thickness.

In summary, the Project area is characterised by a crystalline granitic host rock in which steeply dipping, laterally extensive fault structures form the dominant geological framework. These

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features define the physical structure of the site and provide the geological context for subsequent hydrogeological interpretation.

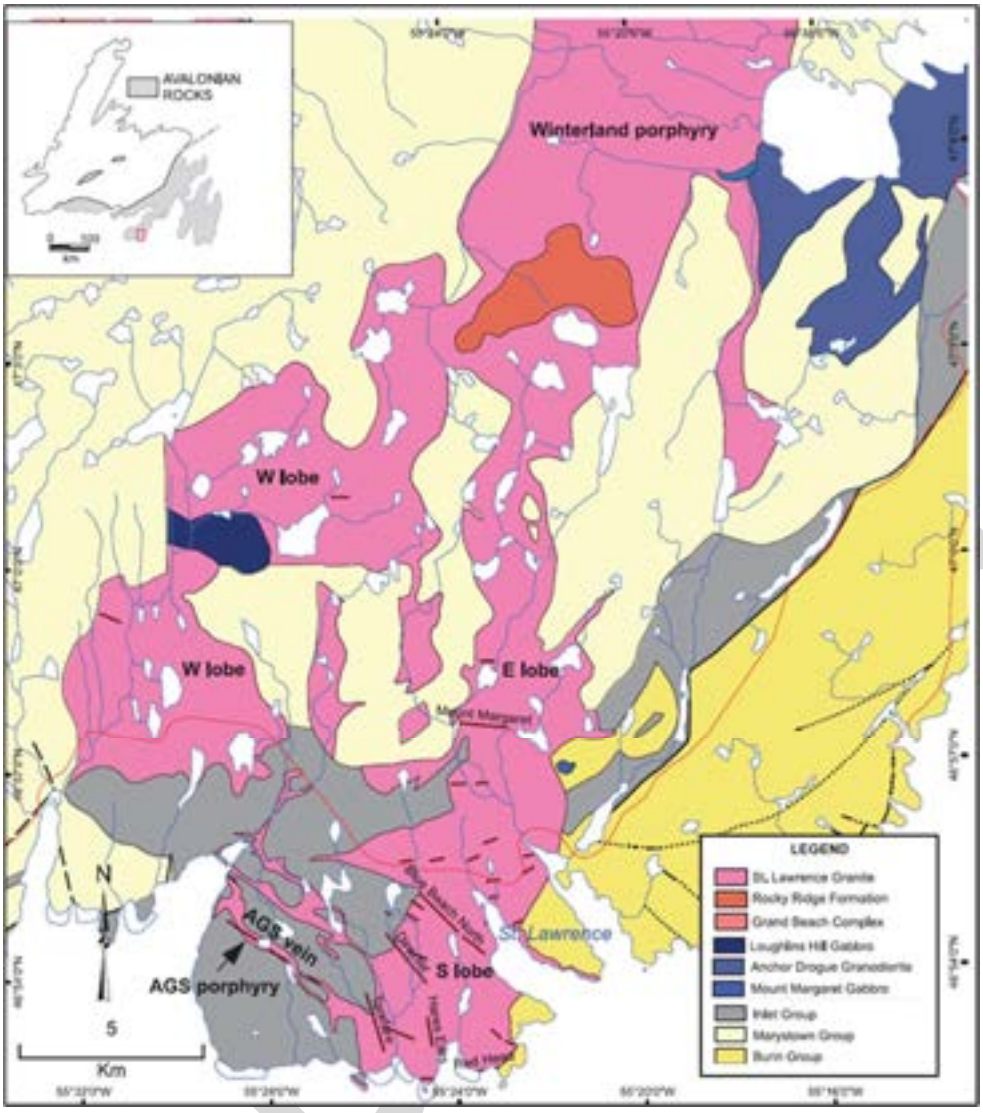


**Figure 3-5: Regional Geological Map (after O'Brien et al., 1976; Strong et al., 1978)**

### 3.1.4 Regional Hydrogeological Framework

The South Ridge–St. Lawrence area is characterised by a fractured bedrock aquifer system developed within crystalline and volcanic–sedimentary rocks. Primary porosity within these lithologies is negligible, and groundwater occurrence, storage, and movement are controlled predominantly by secondary permeability associated with fractures, joints, and fault zones.

At the regional scale, groundwater occurs within a heterogeneous assemblage of plutonic, volcanic, and sedimentary units, with aquifer productivity varying spatially in response to fracture intensity, connectivity, and structural setting rather than lithology alone. Felsic plutonic rocks,

including the St. Lawrence Granite, typically exhibit low to moderate groundwater yields, with locally enhanced productivity where fracture zones and structural lineaments are well developed.

The regional hydrogeological framework of the St. Lawrence area, including the distribution of major hydrostratigraphic units and their typical groundwater yield characteristics, is illustrated in Figure 3-6. This framework provides a broad-scale context for groundwater occurrence within the fractured bedrock system surrounding the South Ridge Project area.

Groundwater recharge across the region is derived primarily from direct infiltration of precipitation into fractured and weathered bedrock. Regional groundwater flow is broadly governed by topographic gradients, with discharge inferred toward low-lying valleys and coastal zones consistent with the regional physiographic setting.

Available groundwater well data from the St. Lawrence area indicate that yields are generally moderate but highly variable, reflecting the heterogeneous nature of the fractured bedrock aquifer system. Productive water-bearing zones are commonly encountered at shallow to intermediate depths where fracture density and connectivity are greatest.

In summary, the regional hydrogeological setting comprises a fracture-controlled bedrock aquifer system with spatially variable groundwater availability. Structural features exert a primary influence on groundwater occurrence and flow and define the broader hydrogeological framework of the Project area.

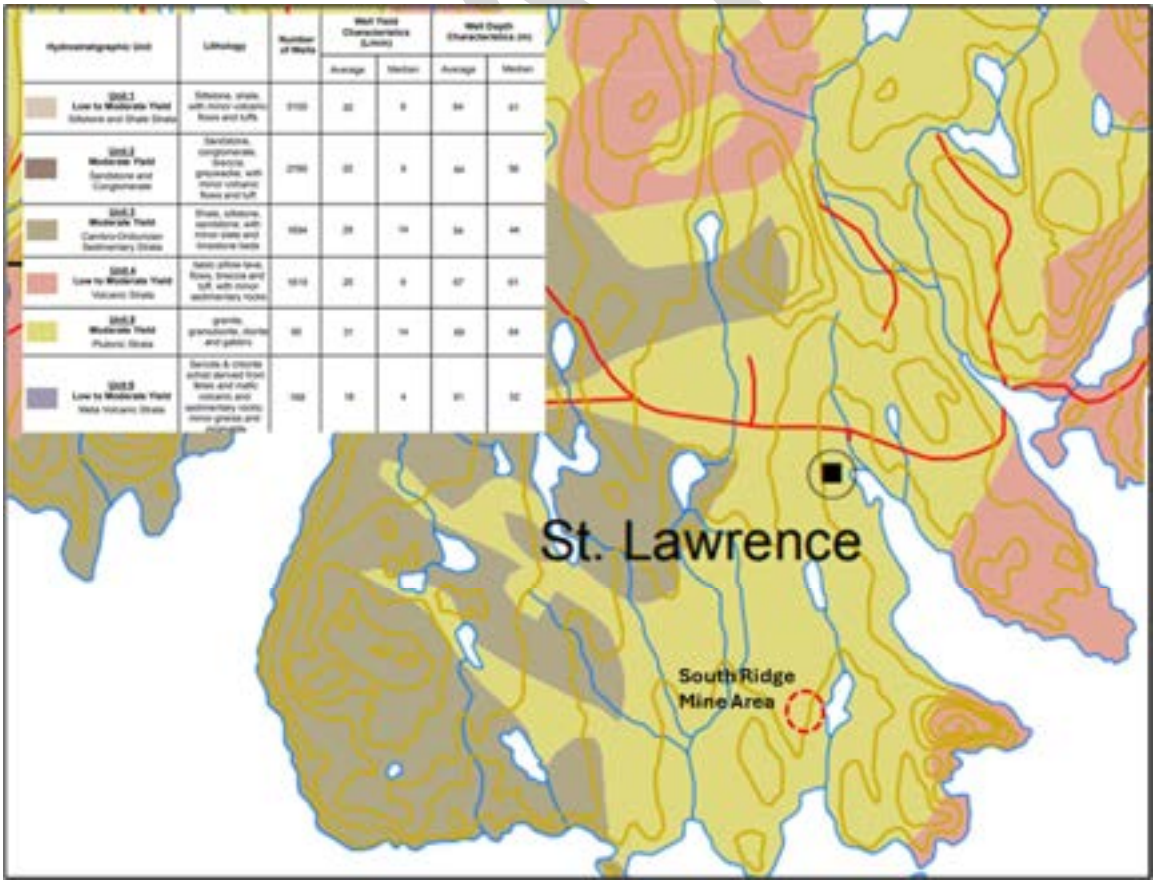


**Figure 3-6: Regional Hydrostratigraphic Framework of the St. Lawrence Area**

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## 3.2 Groundwater Quantity

### 3.2.1 Groundwater Levels

Groundwater level information for the South Ridge area is derived from snapshot measurements collected during the 2023–2024 drilling campaigns (October 2023 to March 2024), supplemented by baseline (pre-test) groundwater level measurements collected in February 2026 at PW1, OBS-01 and OBS-02. These measurements represent point-in-time groundwater conditions at the time of measurement rather than long-term stabilised groundwater levels.

Groundwater level measurements were recorded at fourteen (14) locations within the South Ridge (Director Surface) area (Table 3-1), comprising snapshot measurements from February 2024 and baseline (pre-test) measurements from February 2026. Measured depths to groundwater range from approximately 0.73 m to 22.43 m below ground surface, and calculated groundwater elevations range from approximately 28.3 masl to 40.3 masl. Groundwater elevations indicate spatial variability across the South Ridge area.

Continuous groundwater monitoring is planned to be conducted on a monthly basis to track temporal variations in groundwater levels and support ongoing assessment of site hydrogeological conditions.

**Table 3-1: Summary of Groundwater Level Measurements. South Ridge Area**

| Hole ID | Easting | Northing | Ground Surface Elevation (masl) | Depth to Groundwater (m) | Groundwater Elevation (masl) | Measurement Period |
|---|---|---|---|---|---|---|
| DS-2024-179 | 621272.7 | 5194758 | 31.89 | 2.05 | 30.1 | Feb-24 |
| DS-2024-180 | 621282.1 | 5194772 | 31.9 | 0.8 | 31.2 | Feb-24 |
| DS-2024-181 | 621267.5 | 5194717 | 30.93 | 2.21 | 29.0 | Feb-24 |
| DS-2024-182 | 621313.2 | 5194651 | 29.92 | 0.73 | 29.3 | Feb-24 |
| DS-2024-183 | 621344.9 | 5194712 | 36.18 | 8.41 | 29.1 | Feb-24 |
| DS-2024-184 | 621425.2 | 5194634 | 41.34 | 14.75 | 29.6 | Feb-24 |
| DS-2024-185 | 621516.9 | 5194465 | 41.17 | 15.24 | 28.3 | Feb-24 |
| DS-2024-186 | 621585.6 | 5194420 | 45.39 | 6.72 | 40.3 | Feb-24 |
| DS-2024-187 | 621617.6 | 5194355 | 42.75 | 14.58 | 30.1 | Feb-24 |
| DS-2024-188 | 621376.9 | 5194549 | 30.54 | 2.44 | 28.5 | Feb-24 |
| DS-2024-180 | 621282.1 | 5194772 | 31.9 | 0.75 | 31.3 | Feb-26 |
| DS-2024-184 | 621425.2 | 5194634 | 41.34 | 11.53 | 32.1 | Feb-26 |
| DS-2024-187 | 621617.6 | 5194355 | 42.75 | 11.6 | 32.7 | Feb-26 |
| DS-2024-188 | 621376.9 | 5194549 | 30.54 | 1.75 | 29.1 | Feb-26 |
| PW-1 | 621516.2 | 5194629 | 52.02 | 22.43 | 29.6 | Feb-26 |
| OBS-1 | 621451.9 | 5194705 | 50.28 | 10.85 | 39.4 | Feb-26 |
| OBS-2 | 621594.5 | 5194566 | 52.87 | 16.75 | 36.1 | Feb-26 |

### 3.2.2 Hydraulic Properties

Hydraulic properties of the groundwater system at South Ridge are inferred from packer testing completed during the 2024 drilling program, the February 2026 pumping test program, and

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historical pumping and packer test data from the AGS Mine area, located approximately 5 km west of South Ridge These include results from pumping tests, packer tests, slug tests, and estimated from Hazen test which collectively inform estimates of hydraulic conductivity and storativity across the overburden, and fractured bedrock aquifer system.

South Ridge Area

Hydraulic properties for the South Ridge area are based on single-packer testing completed during the 2024 diamond drilling program and the February 2026 pumping test program.

The packer tests targeted fractured bedrock intervals within the St. Lawrence Granite and were conducted over discrete test sections below ground surface. A total of ten packer tests were completed across nine drillholes (DS-2024-179 to DS-2024-188). Test length typically ranged between approximately 5 and 15 m in length, with test depths generally in the bottom depth of boreholes. The orientation of tested drillholes varied, with dip angles ranging from approximately -48° to -61°. Interpreted hydraulic conductivity values from the packer tests span several orders of magnitude, reflecting variability in fracture frequency and rock mass conditions, and range from approximately 8E-09 m/s to 4.6E-06 m/s.

The February 2026 pumping test was undertaken at PW1 with monitoring at OBS-01 and OBS-02. Pumping test interpretation indicates low transmissivity, with estimated transmissivity values ranging from $3.644 \times 10^{-6}$ to $1.422 \times 10^{-5}$ m²/s. These pumping test parameters were adopted to support the updated conceptualization and groundwater model.

AGS Mine Area (Regional Context)

More extensive hydraulic testing has been conducted historically at the AGS Mine, including long-term pumping tests and multiple packer test programs. Pumping test analyses indicate transmissivity values typically ranging from 15 to 30 m²/day, with storativity values on the order of $10^{-4}$ to $10^{-5}$, consistent with a fractured bedrock aquifer system dominated by secondary permeability.

Packer test results from AGS generally fall within the range of $10^{-9}$ to $10^{-7}$ m/s, with occasional higher values up to $10^{-6}$ m/s, confirming the presence of hydraulically conductive fracture zones.

For overburden materials, hydraulic conductivity values were estimated using the Hazen method, based on available grain size distribution data. The results show that hydraulic conductivity values range between 2E-07 m/s and 6E-03 m/s, with a median value of approximately 6E-6 m/s.

Table 3-2 summarises the range of hydraulic conductivity values derived from hydrogeological testing in both the South Ridge and AGS areas.

**Table 3-2: Summary of Hydraulic Properties Data from South Ridge and AGS Site**

| Location | Dominant lithology | Dataset / Method | No. of tests | Parameter | Unit | Min | Avg | Max |
|---|---|---|---|---|---|---|---|---|
| South Ridge | St. Lawrence Granite | Packer tests (2024) | 10 | Hydraulic conductivity (K) | m/s | 8.00E-09 | 8.50E-07 | 4.60E-06 |
| | St. Lawrence Granite | Pumping test (Feb 2026) | 1 | Transmissivity (T) | m²/s | 3.64E-06 | 8.39E-06 | 1.42E-05 |

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| Location | Dominant lithology | Dataset / Method | No. of tests | Parameter | Unit | Min | Avg | Max |
|---|---|---|---|---|---|---|---|---|
| | St. Lawrence Granite | Pumping test (Feb 2026) | 1 | Storativity (S) | – | 0.02026 | 0.08925 | 0.08925 |
| AGS Mine | Rhyolite, metasediment | Packer tests (historical) | 18 | Hydraulic conductivity (K) | m/s | 8.80E-09 | 1.26E-07 | 6.00E-07 |
| | Rhyolite, metasediment | Pumping test (historical) | – | Storativity (S) | – | – | 8.50E-05 | – |
| | Overburden | Hazen estimates (historical) | 4 | Hydraulic conductivity (K) | m/s | 2.00E-07 | 6.00E-06 | 6.00E-03 |

### 3.2.3 Groundwater Flow Direction and Gradient

Indicative groundwater flow directions were interpreted based on snapshot groundwater level measurements collected during the 2023–2024 drilling program, supplemented by baseline groundwater levels measured in February 2026. A conceptual piezometric surface was constructed to support visualisation of potential groundwater gradients across the South Ridge area (Figure 3-7).

The interpreted groundwater flow pattern suggests a broadly curvilinear flow system influenced by local topography and structural controls, with groundwater generally migrating from higher elevation areas toward lower-lying terrain and surface drainage features. Localised deviations in inferred flow direction may reflect the influence of fracture networks, lithological variability, and the uneven spatial distribution of groundwater level measurements.

Interpreted piezometric profiles indicate relatively gentle regional hydraulic gradients across the South Ridge area, typically in the order of 0.004 to 0.01, with locally steeper gradients of up to approximately 0.02 observed over shorter distances. These gradients are consistent with groundwater flow within a fractured bedrock aquifer, where local topographic controls and structural features may produce spatial variability in hydraulic gradient.

It is emphasised that the interpreted groundwater flow directions and gradients are indicative only and represent groundwater conditions at the time of measurement. The absence of continuous groundwater level monitoring and reliance on snapshot measurements introduce uncertainty in defining stable hydraulic gradients and seasonal variability. Consequently, the groundwater flow interpretation presented herein should be regarded as conceptual and subject to refinement as additional monitoring data become available.

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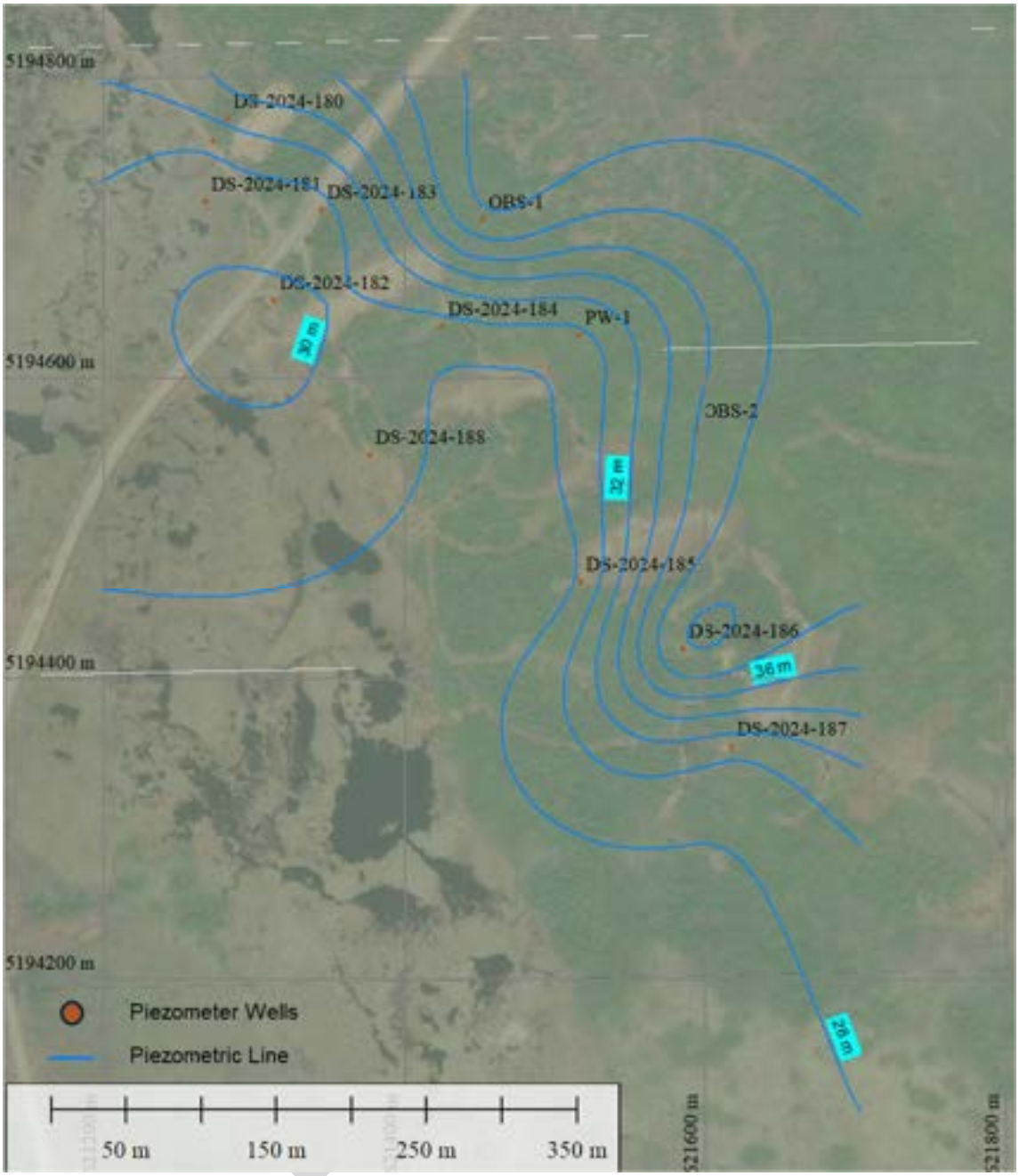


**Figure 3-7: Indicative Piezometric Surface and Interpreted Groundwater Flow Directions Based on Snapshot Groundwater Level Measurements (Average GW Level from 2024 – 2026 Measurements)**

### 3.2.4 Existing Groundwater Monitoring

At present, a dedicated long-term groundwater monitoring network is not yet established in the South Ridge area. The February 2026 program included the construction of PW1, OBS-01 and OBS-02, which provides an initial foundation that can be used for ongoing monitoring. However, continuous groundwater level data currently available from these wells are limited to the pumping

test and immediate post-test period, and longer-term monitoring is still required to characterise temporal variability, seasonal response, and longer-term trends.

While PW1, OBS-01 and OBS-02 provide an initial basis for ongoing monitoring, the lack of a broader monitoring network and long-duration records remains a key limitation for groundwater quantity assessment at South Ridge. This limitation underscores the need to extend monitoring duration and expand spatial coverage (e.g., additional monitoring points and long-term logger deployment) to improve confidence in groundwater level trends, hydraulic connectivity, and system response to mining-related stresses.

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# 4 HYDROGEOLOGICAL CONCEPTUAL MODEL

## 4.1 Conceptual Model Overview

The hydrogeological conceptual model for the South Ridge Project has been developed to synthesise the key physical controls governing groundwater occurrence, movement, and interaction with surface features within the Project area. The conceptual model integrates regional climate, topography, geological and structural setting, historical mining features, and site-specific hydrogeological observations to establish a coherent representation of the groundwater system that informs subsequent numerical groundwater flow modelling.

Groundwater at South Ridge occurs within a fractured crystalline bedrock aquifer system dominated by granitic lithologies, where primary porosity is negligible and groundwater storage and flow are controlled predominantly by secondary permeability associated with fractures, joints, and fault zones. Consequently, groundwater occurrence and hydraulic properties are spatially heterogeneous and governed primarily by the distribution, orientation, and connectivity of structural features rather than lithological variations alone.

Groundwater recharge is conceptualised to occur mainly through direct infiltration of precipitation into exposed or thinly overburdened bedrock and weathered zones. The widespread presence of shallow ponds, wetlands, and bogs across the Project area indicates a shallow groundwater system that is locally well connected to surface water features and supports near-surface groundwater storage and recharge processes.

The overburden forms a relatively thin but laterally continuous unit that primarily acts as a near-surface recharge and storage zone. Due to its limited thickness, it is not expected to represent a significant regional aquifer; however, it plays an important role in regulating the infiltration and transmission of recharge to the underlying fractured bedrock. The hydraulic behaviour of the overburden is therefore expected to influence the timing and distribution of recharge to the bedrock system, but its overall contribution to sustained groundwater inflow is considered secondary relative to the fractured bedrock domain.

At a regional scale, groundwater flow is generally driven by topographic gradients, with groundwater migrating from higher elevation upland areas toward lower-lying valleys and the coastal margin. At the site scale, groundwater flow paths are locally modified by the structural fabric of the bedrock, with major fault zones and fracture corridors acting as preferential pathways that influence both lateral and vertical groundwater movement.

Vertical groundwater flow within intact bedrock is expected to be limited; however, locally enhanced vertical connectivity is anticipated along steeply dipping fractures and fault zones that provide hydraulic linkage between shallow and deeper portions of the aquifer system. This behaviour is consistent with a fracture-dominated groundwater regime typical of crystalline rock environments.

Historical underground mine workings developed along major structural features locally alter the natural groundwater system by introducing anthropogenic drainage pathways. These features are expected to influence groundwater flow patterns and hydraulic gradients in their immediate vicinity, particularly where hydraulic connectivity with the surrounding fracture network is well developed.

Overall, the South Ridge groundwater system is conceptualised as a structurally controlled, fractured bedrock aquifer characterised by spatially variable groundwater availability.

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Groundwater recharge is driven by precipitation, groundwater flow is governed by topographic and structural controls, and groundwater movement is concentrated along fault and fracture networks. This conceptual understanding provides the framework for the numerical groundwater flow model described in subsequent sections of this Technical Note

## 4.2 Hydrogeological Domain

For the purposes of hydrogeological assessment, the South Ridge Project area is conceptualised as comprising a simplified number of hydrostratigraphic units defined by their hydraulic behaviour rather than strictly by lithostratigraphic classification. Groundwater occurrence and movement are primarily controlled by the degree of weathering, fracturing, and structural disruption within the bedrock.

### 4.2.1 Overburden and Weathered Zone

The overburden and weathered zone at the proposed mine site comprise a thin veneer of surficial materials derived from glacial and fluvial processes, including organic soils, glacial till, sand, gravel, and locally developed bog and wetland deposits. These materials typically overlie the St. Lawrence Granite and occur as a discontinuous cover reflecting glacially scoured terrain and variable sediment accumulation.

Geological reports indicate that the overburden generally consists of a thin layer (approximately 1 m) of surficial organic soils underlain by glacial till composed of silty sand and gravel with varying proportions of cobbles and boulders. Results from the 2024 investigations indicate that overburden thickness varies across the site, ranging from approximately 3 m to 14 m, with an average thickness of approximately 7.5 m. The February 2026 investigations indicate overburden thicknesses of approximately 13–17 m, broadly consistent with the 2024 dataset. This variability is interpreted to be representative of site-wide conditions rather than isolated anomalies (Figure 4-1).

The overburden and shallow weathered materials are treated as a single hydrogeological domain due to their similar hydraulic behaviour. Groundwater within this domain is expected to be shallow, predominantly unconfined, and responsive to precipitation, with hydraulic behaviour controlled by the heterogeneous distribution of coarse-grained materials.

Hydraulic conductivity values for these superficial materials were estimated using the Hazen method, based on available grain size distribution data. The results show that hydraulic conductivity values range between 2.00E-07 m/s and 6.00E-03 m/s, with a median value of approximately 6.00E-06 m/s.

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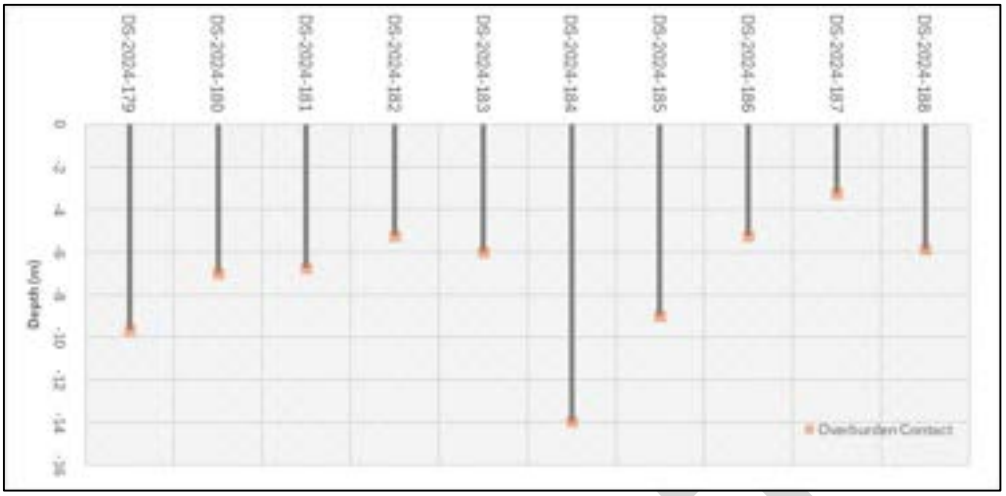


**Figure 4-1: Overburden – Host Rock Lithological Contact**

### 4.2.2 Fractured Bedrock Domain

The fractured bedrock domain represents the principal groundwater-bearing domain at South Ridge and governs groundwater flow at both the site and mine scale. This domain is developed predominantly within the St. Lawrence Granite, where primary porosity is negligible and groundwater storage and flow are controlled by secondary permeability associated with fractures, joints, and structurally disturbed zones.

Fracture density and connectivity are spatially variable, resulting in a hydraulically heterogeneous aquifer system. Groundwater flow within this domain is therefore not uniformly distributed but preferentially concentrated along transmissive fracture networks. Flow behaviour is anisotropic at the site scale and reflects the combined influence of topographic gradients and the orientation and connectivity of fracture sets and structural features within the bedrock.

Hydraulic conductivity estimates derived from packer testing indicate significant variability with depth and between boreholes (Figure 4-2). Measured hydraulic conductivity values within the fractured bedrock domain generally range from approximately $8.0 \times 10^{-9}$ to $4.6 \times 10^{-6}$ m/s (average ~$8.5 \times 10^{-7}$ m/s). No consistent monotonic trend of increasing or decreasing hydraulic conductivity with depth is observed, indicating that permeability is not governed by stratiform layering or systematic depth-related decay.

Localised intervals exhibiting comparatively higher hydraulic conductivity values, on the order of $10^{-6}$ m/s, are interpreted to reflect zones of enhanced structural connectivity. Limited geotechnical logging provides direct evidence of structurally disturbed intervals within the St. Lawrence Granite, including descriptions of possible fault zones, veining, and alteration in selected drillholes. Although detailed structural logging is not available across the full drillhole dataset, these observations support a conceptual interpretation in which elevated permeability zones are structurally controlled, potentially associated with fault damage zones or fracture corridors.

Accordingly, the fractured bedrock at South Ridge is conceptualised as a fracture-dominated aquifer system characterised by pronounced vertical and lateral heterogeneity. Groundwater flow within this domain is controlled primarily by discrete transmissive structures rather than by matrix permeability, and these structures are expected to exert a primary influence on groundwater movement and potential inflow pathways to future mine workings.

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### 4.2.3 Major Structure (Fault and Vein)

Major fault zones and structurally disrupted corridors constitute a distinct hydrogeological domain due to their potential to significantly modify groundwater flow patterns. These zones are characterised by elevated fracture intensity and, locally, the presence of fault-related damage zones, shear fabrics, and gouge or altered infill materials.

Depending on their internal structure, degree of fragmentation, and nature of infilling, fault and fracture zones may act either as preferential groundwater flow pathways or as partial hydraulic barriers. At South Ridge, these structures are interpreted to play an important role in controlling hydraulic connectivity between shallow and deeper portions of the fractured bedrock system and in focusing groundwater flow along dominant structural trends.

Within the local mine area, four principal structural feature groups (SR-G1 to SR-G4) were incorporated into the hydrogeological framework based on their mapped geometry and hydraulic characteristics (Figure 4-3):

- SR-G1 comprises a major fault zone and three associated splays striking southeast with moderate to sub-vertical dips toward the southwest. These features are characterised by fault gouge, shear zones, and highly jointed brittle to locally ductile rock with soft sheared infill. Individual structures have estimated thicknesses ranging from approximately 1 m to 15 m and extend up to approximately 220 m down-dip and 250–900 m along strike.
- SR-G2 includes a single northwest-striking structure with sub-vertical to vertical dips toward the northeast. This feature exhibits similar fault and shear characteristics, with thicknesses typically ranging from 1 m to 5 m (commonly around 2 m) and estimated extents of approximately 100 m down-dip and 250 m along strike.
- SR-G3 consists of two east-striking features dipping steeply to the south. These structures are composed of highly jointed brittle to ductile rock with shear fabrics and occasional gouge infill, with thicknesses of approximately 1 m to 5 m and modelled extents of up to 100 m down-dip and 250 m along strike.
- SR-G4 includes two shallow-dipping features striking northwest to northeast and dipping toward the northeast to southeast. These structures are characterised by highly jointed rock with soft sheared and locally vuggy infill, with thicknesses of approximately 1 m to 2 m and modelled extents of up to 120 m down-dip and 500 m along strike.

Mineralised vein domains, including the principal fluorite-bearing structures, are hydraulically associated with fault and fracture systems and are therefore considered part of the broader structurally controlled hydrogeological framework. These domains may locally exhibit enhanced permeability due to brecciation and fracture development; however, their hydraulic behaviour is expected to be highly variable and site-specific.

Groundwater movement within mineralised vein domains is therefore closely linked to the surrounding structural fabric rather than the mineralised material itself. Their hydrogeological significance is best considered in terms of their role within the overall fault and fracture network that governs groundwater flow at the site.

Direct site-specific hydraulic conductivity measurements for the major structural domains are limited. However, the dataset has been strengthened by packer testing completed during the 2024 drilling program and the February 2026 pumping test interpretation (Section 2.2.4; Table 2-5). Packer test results indicate hydraulic conductivity values in fractured bedrock ranging from approximately $8.0 \times 10^{-9}$ to $4.6 \times 10^{-6}$ m/s, while the 2026 pumping test indicates low

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transmissivity (T = 3.638 × $10^{-6}$ to 1.417 × $10^{-5}$ m²/s) and storativity (S = 0.02026 to 0.08925). These values provide a suitable basis for conceptualisation and numerical representation, subject to calibration during groundwater modelling.

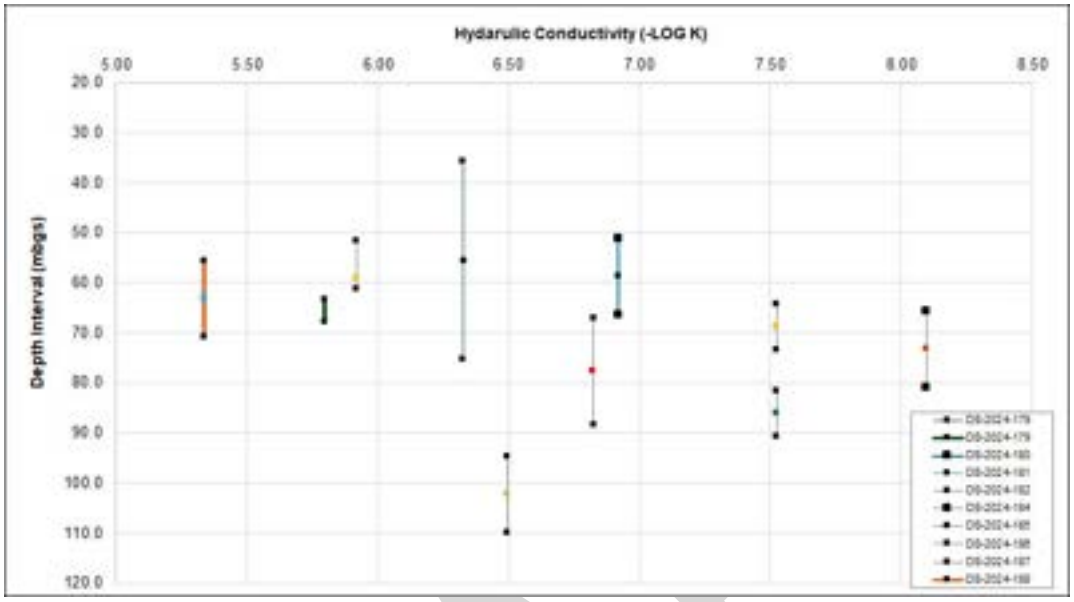


**Figure 4-2: Variation of Hydraulic Conductivity with Depth from Packer Test Intervals in Fractured Bedrock**

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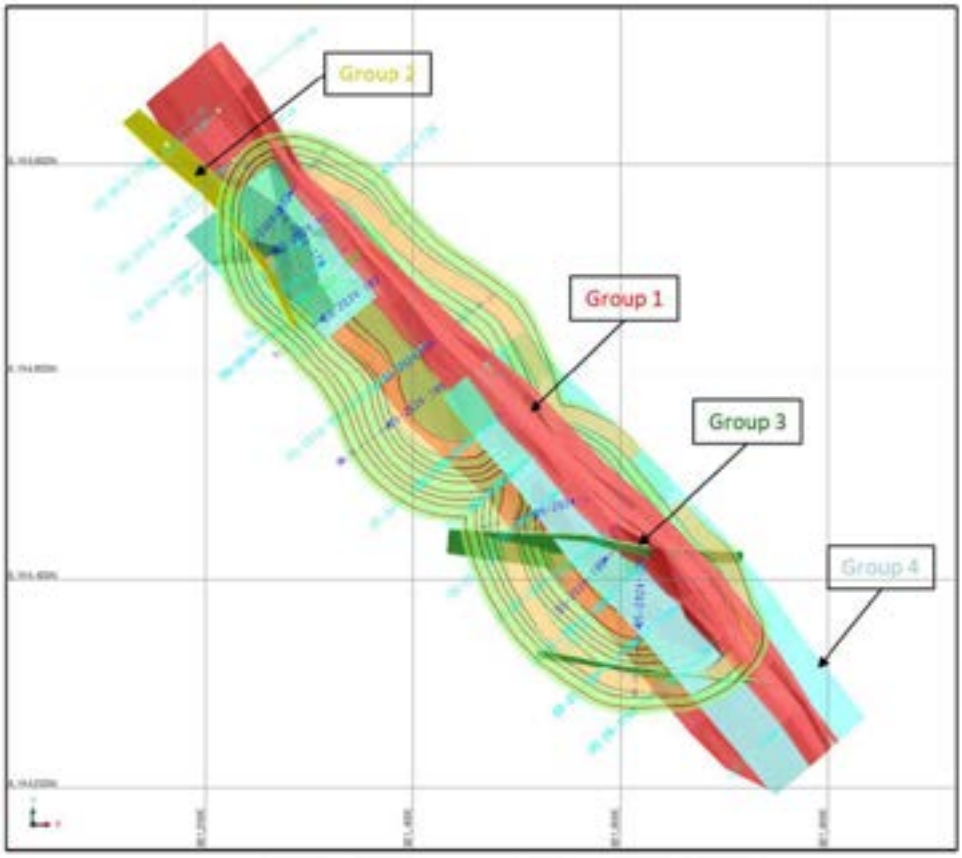


**Figure 4-3: Plan View of Interpreted Major Structural Feature Groups Incorporated in the Hydrogeological Conceptual Model**

## 4.3 Hydraulic Parameters

Hydraulic parameters adopted for the South Ridge conceptual model are derived from a combination of site-specific hydraulic testing (2024 packer tests and the February 2026 pumping test program) and supporting regional information, with the objective of defining representative hydraulic behaviour for conceptualisation and numerical groundwater modelling. Based on the conceptual hydrogeological domains discussed previously, representative hydraulic parameters have been defined from the available test results, as summarised below:

- Overburden and Weathered Zone

  Estimated hydraulic conductivity values for the overburden and weathered zone range from approximately $2.0 \times 10^{-7}$ to $6.0 \times 10^{-5}$ m/s, with a representative median value of approximately $6.0 \times 10^{-6}$ m/s. These values are consistent with the heterogeneous composition of the overburden, which includes silty till interbedded with sand and gravel. Hydraulic behaviour within this domain is therefore expected to be spatially variable, with preferential groundwater flow occurring through coarser-grained intervals.

- Fractured Bedrock Domain

  Hydraulic conductivity within the fractured bedrock domain is characterised using packer testing completed in selected drillholes during the 2024 program. Measured hydraulic

conductivity values within the fractured bedrock domain generally range from approximately $8.0 \times 10^{-9}$ to $4.6 \times 10^{-6}$ m/s (median $2.37 \times 10^{-7}$ m/s). No consistent monotonic trend of increasing or decreasing hydraulic conductivity with depth is observed, indicating that permeability is primarily controlled by discrete fracture networks rather than stratiform layering or systematic depth-related decay.

The February 2026 pumping test interpretation provides additional site-specific constraints on aquifer properties, indicating low transmissivity, with interpreted transmissivity values ranging from $3.6 \times 10^{-6}$ to $1.4 \times 10^{-5}$ m²/s and storativity ranging from 0.020 to 0.089 (refer Section 2.2.4 / Table 2-5). These pumping test parameters were adopted to support the updated conceptualisation and numerical model calibration.

- Major Structural Zones

  Although direct hydraulic testing within major fault and vein structures at South Ridge is limited, the available packer test results indicate the potential for localised zones of comparatively higher hydraulic conductivity associated with enhanced fracture connectivity. In the absence of domain-specific test coverage, hydraulic properties for major structural zones are represented using the fractured bedrock parameter range, with localised permeability enhancement treated through calibration and sensitivity testing during groundwater modelling.

Overall, hydraulic parameter variability at South Ridge reflects the dominance of fracture-controlled groundwater flow and structural heterogeneity. The available dataset, comprising packer tests and the February 2026 pumping test interpretation, provides a suitable basis for defining representative hydraulic properties for conceptual and numerical modelling, subject to refinement as additional monitoring and testing data become available.

## 4.4 Recharge and Discharge Mechanisms

Recharge and discharge processes at South Ridge are controlled by the combined influence of climate, topography, surface conditions, and the fracture-dominated hydrogeological framework. Groundwater recharge occurs primarily through infiltration of precipitation, while discharge is governed by topographic controls, surface water features, and excavation-induced drainage undermine operating conditions.

Recharge to the groundwater system at South Ridge is derived predominantly from precipitation and occurs through both local infiltration and recharge originating from surrounding upland areas. Although the mine site is located close to a regional surface water divide, this does not necessarily correspond to a groundwater divide within the fractured bedrock system. Consequently, groundwater recharge contributing to the Project area may originate from a combination of near-site infiltration and more distal recharge areas, depending on the continuity of fracture networks and prevailing hydraulic gradients.

In areas where bedrock is exposed or overlain by thin overburden, precipitation is expected to infiltrate relatively efficiently into the shallow subsurface. In such settings, recharge is facilitated by limited soil cover and enhanced permeability associated with weathered bedrock and near-surface fracturing. These areas are interpreted to represent effective recharge zones for the shallow groundwater system.

Where thicker overburden is present, recharge is moderated by the hydraulic properties of the superficial materials. Fine-grained components such as silty till may locally reduce infiltration

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rates; however, the presence of sand and gravel horizons provides pathways for vertical percolation. The overburden and weathered zone therefore function as a transient storage and transmission layer that attenuates recharge timing rather than preventing recharge to the underlying fractured bedrock system.

Vertical recharge to the deeper fractured bedrock domain is conceptualised to occur primarily through zones of enhanced permeability, including weathered bedrock, fracture networks, and major structural features. These features provide preferential pathways for downward flow and play an important role in transferring recharge from near-surface domains to deeper groundwater flow systems.

Groundwater discharge at South Ridge occurs where groundwater flow paths intersect the land surface, surface water bodies, or zones of reduced hydraulic head. Under natural conditions, discharge is controlled primarily by topography, with groundwater flowing toward topographic lows, wetlands, ponds, and coastal discharge zones.

Within the Project area, shallow groundwater is expected to discharge locally into ponds, wetlands, and bogs that occupy topographic depressions. These features act as hydraulic sinks for lateral groundwater flow within the overburden and weathered zone and contribute to near-surface groundwater storage and baseflow.

At depth, groundwater discharge from the fractured bedrock system is expected to be focused along structurally controlled pathways, particularly where fault zones and fracture corridors intersect surface water features or daylight at lower elevations. These structural controls are therefore considered important in defining natural groundwater discharge patterns.

At the mine scale, groundwater discharge under operational conditions is expected to occur predominantly through pit walls and excavated surfaces that intercept natural groundwater flow paths within the fractured bedrock. Excavation-induced depressurisation is anticipated to locally modify hydraulic gradients and focus groundwater discharge on the mine void, thereby altering the natural recharge–discharge balance in the vicinity of the pit.

Overall, the recharge–discharge regime at South Ridge is conceptualised as a precipitation-driven system characterised by diffuse recharge, structurally focused vertical connectivity, and discharge controlled by topography, surface water features, and mining-induced drainage. This conceptual understanding provides the framework for representing recharge and discharge processes in the numerical groundwater model and for evaluating groundwater inflows and dewatering requirements associated with future mining operations.

## 4.5 Surface Water–Groundwater Interaction

Groundwater–surface water interaction at South Ridge is influenced by shallow groundwater conditions, low-relief topography, and the widespread occurrence of ponds and wetlands within and around the Project area. These conditions indicate a close hydraulic connection between surface water bodies and the shallow groundwater system, particularly within the overburden and near-surface fractured bedrock domains.

At the regional scale, surface water bodies are interpreted to function predominantly under effluent conditions, receiving groundwater discharge driven by regional topographic gradients

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toward lower-lying valleys and the coastal margin. In this setting, surface water features primarily act as hydraulic controls on groundwater levels rather than as dominant recharge sources.

At the site scale, several ponds occur near the mine area, including Clarkes Pond, Shoal Cove Pond, and Hares Ears Pond. Historical information indicates that Clarkes Pond is in hydraulic continuity with groundwater and has functioned as a groundwater discharge feature, having been used historically as a water supply for underground mining operations. This provides direct evidence of groundwater contribution to surface water at the site. For the remaining ponds, hydraulic connectivity with groundwater is inferred based on geomorphic setting and shallow groundwater conditions; however, their specific role as recharge or discharge features may vary locally depending on hydraulic gradients.

Surface drainage features within the Project area are limited and do not directly intersect the mine footprint. Nevertheless, at the regional scale, surface water systems are interpreted to be sustained by groundwater baseflow, consistent with an effluent groundwater regime. Structural features that intersect surface water bodies may locally enhance groundwater–surface water connectivity by providing preferential discharge pathways.

Under pre-mining conditions, groundwater discharge is expected to occur primarily through diffuse discharge to ponds, wetlands, and the coastal margin, as well as along structurally controlled pathways where transmissive fractures intersect low-lying terrain. Under mining conditions, groundwater–surface water interaction is expected to be locally modified, with mine excavations acting as artificial discharge zones that intercept natural groundwater flow paths and alter local hydraulic gradients. This may reduce groundwater discharge to nearby surface water features and modify local baseflow conditions.

## 4.6 Conceptual Implications for Groundwater Inflow and Dewatering

The hydrogeological conceptual model developed for South Ridge has direct implications for the assessment and design of mine dewatering measures. The groundwater system is conceptualised as a structurally controlled, fracture-dominated aquifer characterised by pronounced spatial heterogeneity and anisotropic flow behaviour. Groundwater inflows to future mine excavations are therefore expected to be controlled by discrete transmissive features rather than by uniform drainage of the surrounding rock mass.

Groundwater inflow to open pit excavations is anticipated to occur primarily where pit walls intersect transmissive fracture networks, fault zones, and mineralised structures. These features are expected to act as preferential inflow pathways and may generate localised and persistent inflows even where the surrounding intact bedrock exhibits low hydraulic conductivity. As a result, inflow behaviour is likely to vary spatially and cannot be adequately represented using homogeneous aquifer assumptions.

The shallow overburden and weathered zone are expected to contribute to groundwater inflow mainly through indirect mechanisms, including recharge transfer to the fractured bedrock system and shallow seepage where excavations intersect near-surface groundwater levels. Direct inflow from this domain is expected to be limited in extent but may be seasonally variable due to its close hydraulic connection with surface water features and precipitation-driven recharge.

The conceptual model indicates that the effectiveness of vertical dewatering is strongly dependent on the presence and connectivity of transmissive structural features. In areas where vertical or steeply dipping fractures and fault zones provide hydraulic connectivity, vertical dewatering may

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achieve effective pressure relief over a broader volume of rock mass. Conversely, where such connectivity is limited, vertical dewatering is expected to produce only localised drawdown near pumping wells.

Given the fracture-controlled nature of the groundwater system and the limited spatial coverage of hydraulic test data, dewatering performance is best assessed using site-specific aquifer testing. In this context, the February 2026 pumping test program provides the primary basis for evaluating hydraulic connectivity, storage behaviour, and the radius of influence relevant to vertical dewatering. The pumping test interpretation indicates low transmissivity and limited sustainable pumping rates, suggesting that vertical dewatering is likely to produce localised drawdown near pumping wells and may not achieve meaningful pressure reduction beyond the immediate vicinity of individual wells.

At the mine scale, excavations are expected to act as dominant hydraulic sinks that intercept natural groundwater flow paths. Dewatering measures should therefore be designed to target structurally controlled inflow pathways and to complement natural drainage induced by mining, rather than relying solely on uniform depressurisation of the fractured bedrock

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# 5 GROUNDWATER NUMERICAL MODEL

A groundwater numerical model has been developed to support assessment of groundwater behaviour and potential dewatering requirements for the South Ridge Project. The model provides a quantitative framework that is consistent with the hydrogeological conceptual model presented in Section 4 and is intended to inform mine planning, dewatering strategy development, and assessment of potential groundwater-related impacts.

The primary objectives of the numerical groundwater modelling are to:

- Develop a numerical groundwater flow and depressurisation model to evaluate groundwater inflows, pore pressure response within pit slopes, and the potential effectiveness of conceptual dewatering measures.
- Update the pit dewatering assessment based on available field data and numerical model results, including implications for groundwater inflows, slope depressurisation, and associated infrastructure requirements.
- Provide a quantitative framework to support assessment of potential groundwater-related impacts, with particular focus on changes in groundwater quantity resulting from mining and dewatering activities.

The scope and level of confidence of the numerical modelling reflect the current stage of data availability and are intended to inform subsequent investigation, monitoring, and refinement of the groundwater assessment.

## 5.1 Modelling Approach and Conceptual Basis

The numerical groundwater model has been developed based on the hydrogeological conceptual model described in Chapter 4. The conceptual model indicates that groundwater flow within the South Ridge area is predominantly controlled by geological structures, including faults and vein systems, with limited contribution from matrix permeability.

Consistent with this conceptual understanding, the numerical model adopts a simplified representation of the groundwater system that captures:

- Anisotropic hydraulic behaviour associated with structurally controlled flow
- Preferential groundwater pathways aligned with major structural trends.
- Spatial variability in hydraulic connectivity across the model domain.
- Local-scale groundwater–surface water interactions, including the potential for changes in groundwater discharge (baseflow) to surface water receptors resulting from mining and dewatering activities

The numerical groundwater model was constructed using FEFLOW version 10.0, applying the finite element method. Fractured rock flow is represented using an Equivalent Porous Medium (EPM) approach, with hydraulic anisotropy and spatial variability implemented to reflect the structurally influenced nature of groundwater flow.

The model domain extends beyond the immediate mining area to encompass surrounding surface water catchments considered potentially relevant to the proposed mining development, including the Shoal Cove Pond catchment and selected sub-catchments of the Salt Cove Watershed. The domain extent was defined to support assessment of the potential spatial extent of groundwater

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drawdown and associated impacts beyond the mine footprint, and to minimise the influence of artificial boundary conditions on simulated drawdown and groundwater–surface water interaction responses.

While the model domain is relatively broad, spatial discretisation is locally refined in and around the mining area to ensure model resolution is sufficient to address the primary objectives related to groundwater inflows, slope pore pressure response, and dewatering effectiveness. The model domain is discretised using prismatic triangular elements, comprising approximately 2.52 million elements and 1.33 million nodes, arranged into 12 model layers. The vertical extent of the model domain is defined with a base elevation of approximately –100 mASL, ensuring that the lower boundary is sufficiently deep so as not to influence simulated groundwater flow patterns. The model layering is designed to represent key hydrostratigraphic units, with individual layer thicknesses varying from approximately 2.5 m to 12 m, providing increased vertical resolution in near-surface and mining-affected zones while maintaining computational efficiency at depth

## 5.2 Boundary Conditions

Boundary conditions applied in the numerical groundwater model are illustrated in Figure 5-1 and Figure 5-2, which show the model domain, mesh discretisation, major surface water features, and the conceptual location of boundary condition types relative to the proposed mining area.

The model domain extends beyond the immediate mine footprint to include surrounding surface water catchments considered potentially relevant to groundwater flow behaviour and impact assessment. Indicative surface water divides are shown in Figure 5-1 to provide contextual understanding of the domain extent and its relationship to surface hydrology (noting these divides are shown for reference and are not explicitly implemented as numerical boundary conditions).

Surface water features represented within the model domain include the ocean, selected ponds/lakes, and river/creek systems. The ocean is represented using a constant-head boundary condition, with assigned head values corresponding to the ground surface elevation at coastal nodes. This representation reflects the ocean acting as a regional groundwater discharge boundary. The bottom of the model was assigned a no-flow boundary condition, representing impermeable conditions.

The lake/pond and river/ creeks systems within the model domain are represented using a third type (Cauchy) boundary condition to simulate dynamic groundwater–surface water interaction. This approach allows water exchange between the aquifer and surface water bodies to vary as a function of the hydraulic head difference and a defined conductance term, rather than imposing a fixed head or fixed flux condition.

By applying a Cauchy boundary condition to the lake and river features, the model can simulate groundwater discharge to surface water features under natural conditions (baseflow) and quantify changes in discharge resulting from mining-induced drawdown. As mining progresses and groundwater levels decline, the model dynamically adjusts the exchange flux, enabling assessment of baseflow depletion and, where gradients reverse locally, potential seepage from surface water bodies to the aquifer.

The surface water bodies included within the model domain (Figure 5-1/5-2) comprise Long Pond, Hay Pook Pond, Clarkes Pond, and Hares Pond, together with the connected drainage features Shoal Cove Pond Brook and Clarkes Pond Brook, and Shoal Cove Pond (as shown on Figure 5-1/5-2). These features are represented to evaluate potential groundwater–surface water

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interactions and potential changes in hydraulic exchange resulting from mining activities and post-closure groundwater rebound.

Changes in topography associated with mining excavations are represented using seepage face boundary conditions, implemented in a time-dependent manner to reflect progressive excavation stages.

The hydraulic head at seepage face boundaries is defined by the elevation of the nodes representing the excavation surfaces at each simulation stage. The seepage face condition allows groundwater flow from the aquifer into the excavations while preventing inflow from the excavations back into the groundwater system, providing a realistic representation of pit drainage behaviour. Following mine closure, the pit was conceptually converted into a pit lake. The equilibrium pit lake level was estimated based on the lowest elevation at which the final pit shell intersects the surrounding topography, representing the natural spill point and long-term hydraulic control on lake level. This approach assumes that, once filled, the pit lake will equilibrate to this elevation and discharge via surface overflow if exceeded.

The derived water level was implemented in the numerical model using a third-type (Cauchy) boundary condition, which allows flux across the boundary to vary as a function of the hydraulic head difference between the pit lake and the surrounding groundwater system. This formulation enables simulation of bidirectional flow, whereby groundwater can either discharge into the pit lake or be recharged from the pit lake depending on local hydraulic gradients. As such, the boundary condition provides a more realistic representation of the transient hydraulic interaction between the pit lake and adjacent hydrostratigraphic units during post-closure conditions.

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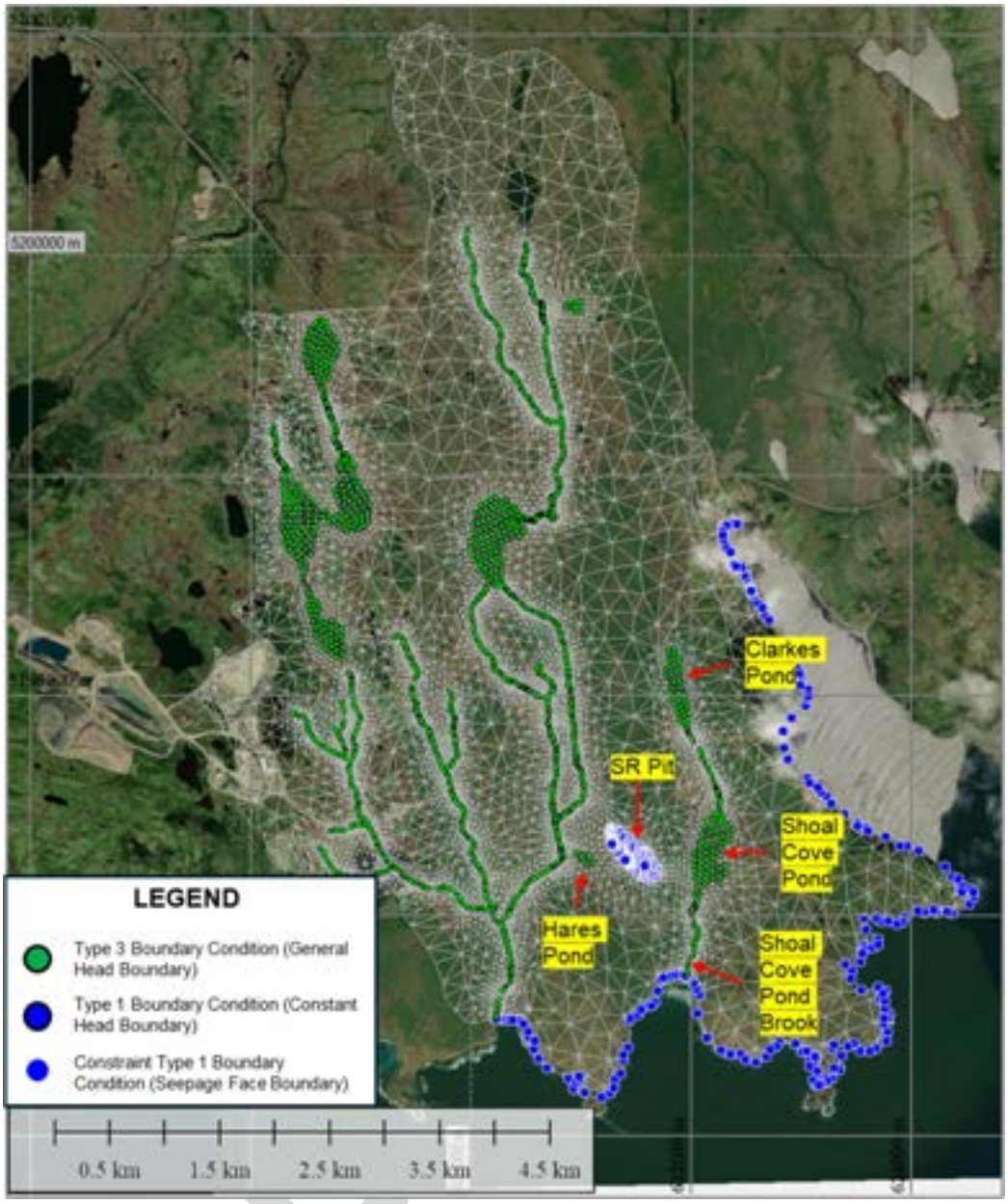


**Figure 5-1: Numerical Model Domain and Boundary Condition (Plan View)**

**Figure 5-2: Three-Dimensional View of Model Discretisation and Boundary Conditions**

## Recharge Boundary Condition

Groundwater recharge is implemented in the numerical groundwater model as a flux boundary condition applied to the uppermost active layer of the model. Recharge represents infiltration from rainfall to the groundwater system and constitutes an external forcing condition within the numerical framework.

Annual groundwater recharge is estimated to be on the order of 5% of annual rainfall. This recharge proportion is adopted as a screening-level assumption, reflecting the absence of site-specific recharge measurements and the objective of representing long-term average recharge conditions within the model. Recharge is implemented using a cyclic temporal pattern derived from average monthly rainfall data, to represent seasonal variability in recharge rates throughout the simulation period. The adopted temporal distribution of recharge is illustrated in Figure 5-3.

Recharge is assumed to be spatially uniform across the model domain. This simplification is considered appropriate given the lack of spatially distributed recharge data and the regional scale of the model. The recharge values applied represent adopted pre-calibration inputs and are subject to review and refinement.

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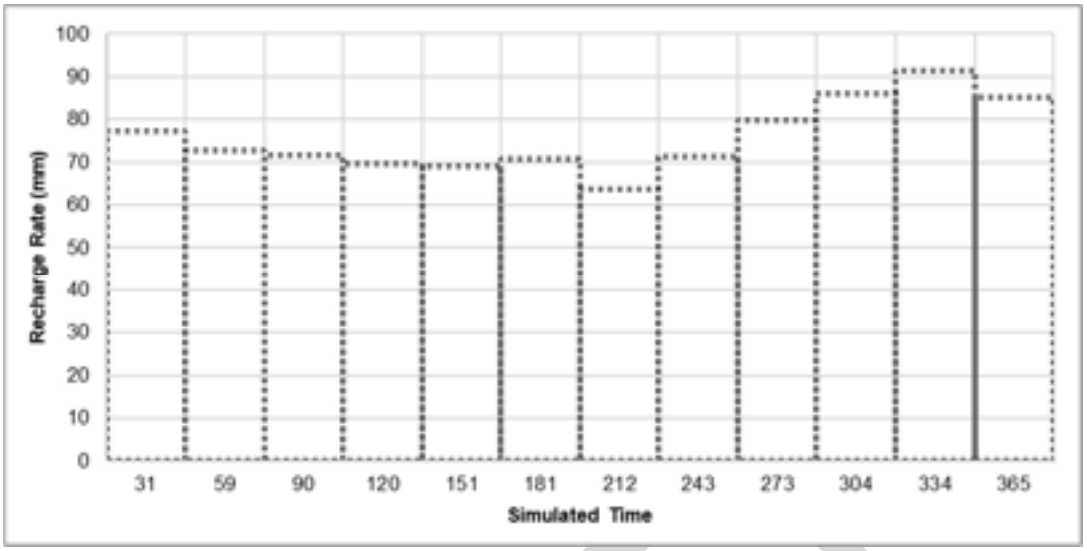


**Figure 5-3: Adopted Recharge Values**

## 5.3 Hydrogeological Domains and Parameters

Hydrogeological domains adopted in the numerical groundwater model were defined based on the conceptual model described, comprise overburden fractured bedrock, fault and mineralized zones. These domains reflect the dominant geological and hydrogeological features considered relevant to groundwater flow behaviour at the scale of assessment.

Hydraulic properties assigned to the fractured bedrock domain were informed by the results of the 2024 geotechnical–hydrogeological investigations. In contrast, material properties for the overburden and fault and mineralized zones were assigned based on parameter ranges derived from AGS material properties, reflecting the limited availability of site-specific hydrogeological data for these units.

Hydraulic parameters were refined through iterative model testing and sensitivity assessment to ensure reasonable representation of groundwater behaviour consistent with the conceptual model. Given the absence of continuous groundwater level monitoring data and site-specific aquifer test results, the adopted parameters should be regarded as indicative and suitable for screening-level assessment rather than fully calibrated values.

A summary of the hydraulic parameters adopted for each hydrogeological domain is provided in Table 5-1, including horizontal and vertical hydraulic conductivity and specific storage values. Anisotropy within the model is represented through the assignment of distinct horizontal and vertical hydraulic conductivity values for each domain. The hydraulic parameters presented in Table 5-1 represent adopted pre-calibration values used for model construction and screening-level assessment.

The spatial distribution of hydrogeological domains within the model is illustrated in Figure 5-4, which shows the representation of overburden, fault and mineralized zones, and fractured bedrock within the numerical mesh.

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**Table 5-1: Adopted Hydraulic Parameters for Numerical Modelling (Pre-Calibration)**

| PARAMETER ZONE | HORIZONTAL CONDUCTIVITY | VERTICAL CONDUCTIVITY | SPECIFIC STORAGE |
|---|---|---|---|
| | (m/s) | (m/s) | (1/m) |
| Overburden | 3.00E-06 | 3.00E-07 | 1.00E-04 |
| Fractured Bedrock | 7.00E-08 | 1.00E-07 | 1.00E-04 |
| Fault and Mineralized Zone | 1.00E-05 | 1.00E-05 | 1.00E-03 |

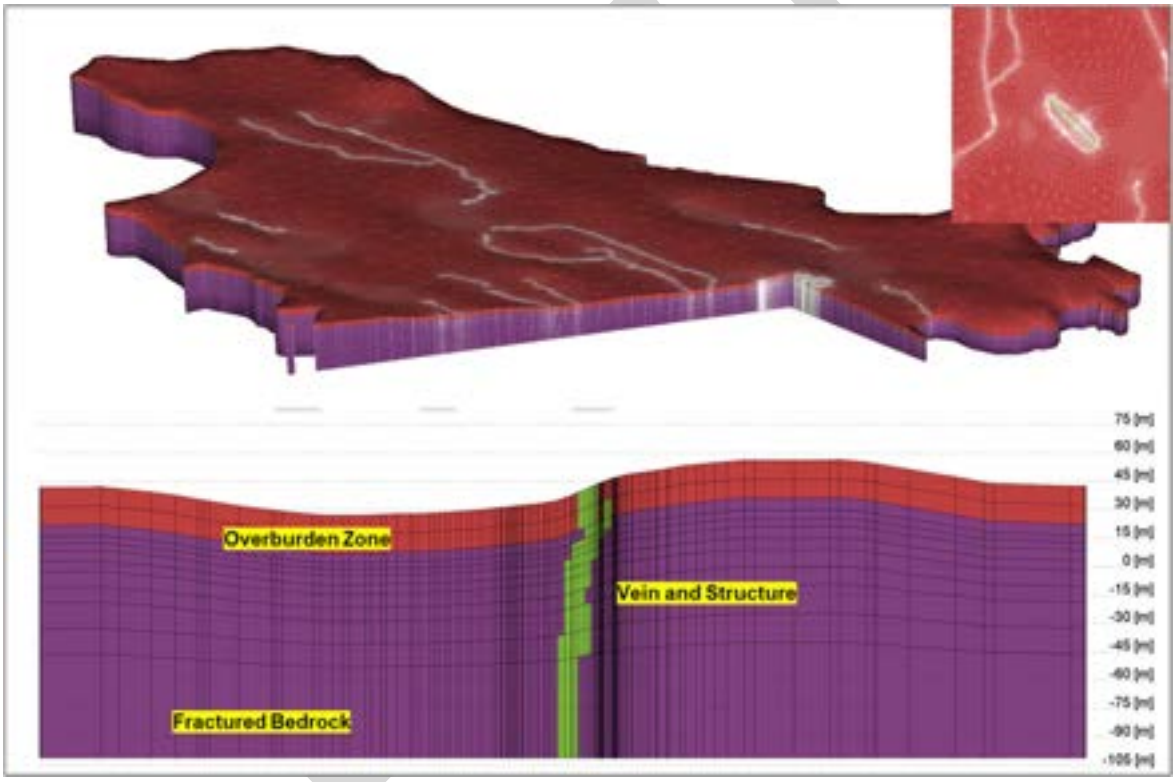


**Figure 5-4: Hydrogeological Domain Definition and Hydraulic Parameterisation**

## 5.4 Temporal Discretization

The numerical groundwater flow model was developed using a temporally discretised framework comprising three consecutive simulation phases designed to represent the evolution of groundwater conditions associated with mining development and closure. The adopted temporal framework and simulation phases are illustrated in Figure 5-5.

- Steady-State Phase (Pre-Mining Condition)

The initial simulation phase represents pre-mining conditions and is implemented as a steady-state groundwater flow simulation. This phase is intended to approximate existing groundwater conditions within the modelled hydrogeological system, assuming dynamic equilibrium between recharge and discharge processes.

The resulting hydraulic head distribution from the steady-state phase provides the initial condition for subsequent transient simulations and serves as a baseline against which mining-related groundwater impacts are assessed.

- Life-of-Mine and Construction (LOM) Design Phase

The second simulation phase represents the final Life-of-Mine (LOM) condition and is conducted as a 365-day transient simulation.. This phase is designed to quantify the maximum extent of groundwater drawdown resulting from sustained mining activities and associated dewatering stresses.

The simulation incorporates the geometry of the final LOM pit and associated dewatering conditions, thereby representing the cumulative effects of long-term groundwater abstraction and excavation on the surrounding aquifer system. Model outputs from this phase are used to assess mining-induced changes in hydraulic gradients, groundwater flow directions, and potential impacts on surface water–groundwater interactions.

- Post-Closure Phase

The final simulation phase represents post-mining closure conditions, during which active dewatering operations are assumed to cease. This phase is implemented as a transient recovery simulation to evaluate groundwater rebound as the aquifer system responds to the removal of mining-induced stresses.

The post-closure simulation captures the progressive re-establishment of groundwater levels and flow patterns, including potential pit lake formation and redistribution of groundwater within the surrounding rock mass. This phase provides insight into long-term post-closure groundwater behaviour and supports assessment of residual hydrogeological impacts associated with mine closure. A total simulation period of 3,650 days (approximately 10 years) was applied in the model to simulate the post-mining groundwater rebound following the cessation of dewatering activities. This extended simulation period was selected to ensure that the model adequately captures the transient recovery of groundwater levels as the aquifer system gradually returns toward its natural hydraulic conditions

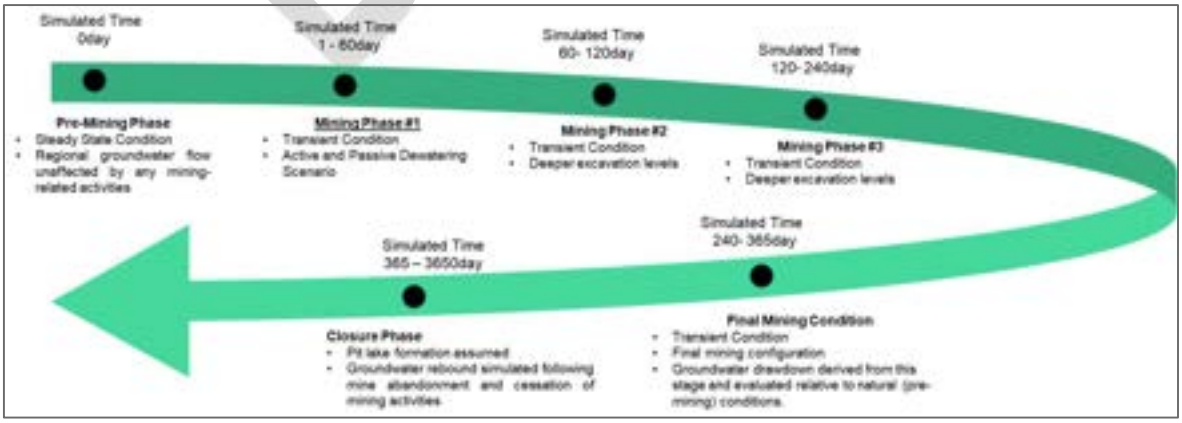


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**Figure 5-5: Temporal Discretisation and Simulation Phases of the Groundwater Model**

## 5.5 Steady-State Model Calibration

Steady-state model calibration was undertaken by comparing simulated hydraulic heads against observed groundwater levels measured at available monitoring points (DS-2024-179 to DS-2024-188). Two additional monitoring wells, BS-01 and OBS-02, installed during the 2026 field investigation, were also incorporated into the groundwater model as observation points). This calibration step was performed to establish a representative baseline groundwater condition prior to the assessment of mining-related impacts.

The calibration is based on discrete groundwater level measurements collected during previous investigation activities and represents a comparison against snapshot observations rather than long-term monitoring data. As such, the calibration focuses on reproducing the regional groundwater head distribution rather than short-term temporal variability.

Result of steady state model show that simulated heads generally align with observed groundwater levels, with most data points clustering close to the 1:1 reference line, as shown in Figure 5-6. This suggests that the steady-state model provides a reasonable representation of existing groundwater conditions at the scale of the model.

Calibration statistics further support this interpretation. A mean error ($\bar{E}$) of approximately 2.85 m indicates a slight overall bias, with simulated heads tending to moderately overestimate observed groundwater levels. The root mean square error (RMS) of approximately 3.09 m is considered acceptable given the model scale, the complexity of the hydrogeological setting, and uncertainties associated with monitoring, measurement timing, and local heterogeneity.

Localised deviations from the 1:1 line are evident at some monitoring points, where simulated heads either under- or over-predict observed values. These discrepancies are likely attributable to unresolved heterogeneities in hydraulic conductivity, partial penetration effects, or local structural features (e.g. fractures or faults) that are not explicitly represented in the scale model.

The calibrated steady-state groundwater head distribution is shown in Figure 5-7. The resulting steady-state solution is adopted as the initial condition for subsequent transient simulations evaluating mining, dewatering, and post-closure groundwater behaviour.

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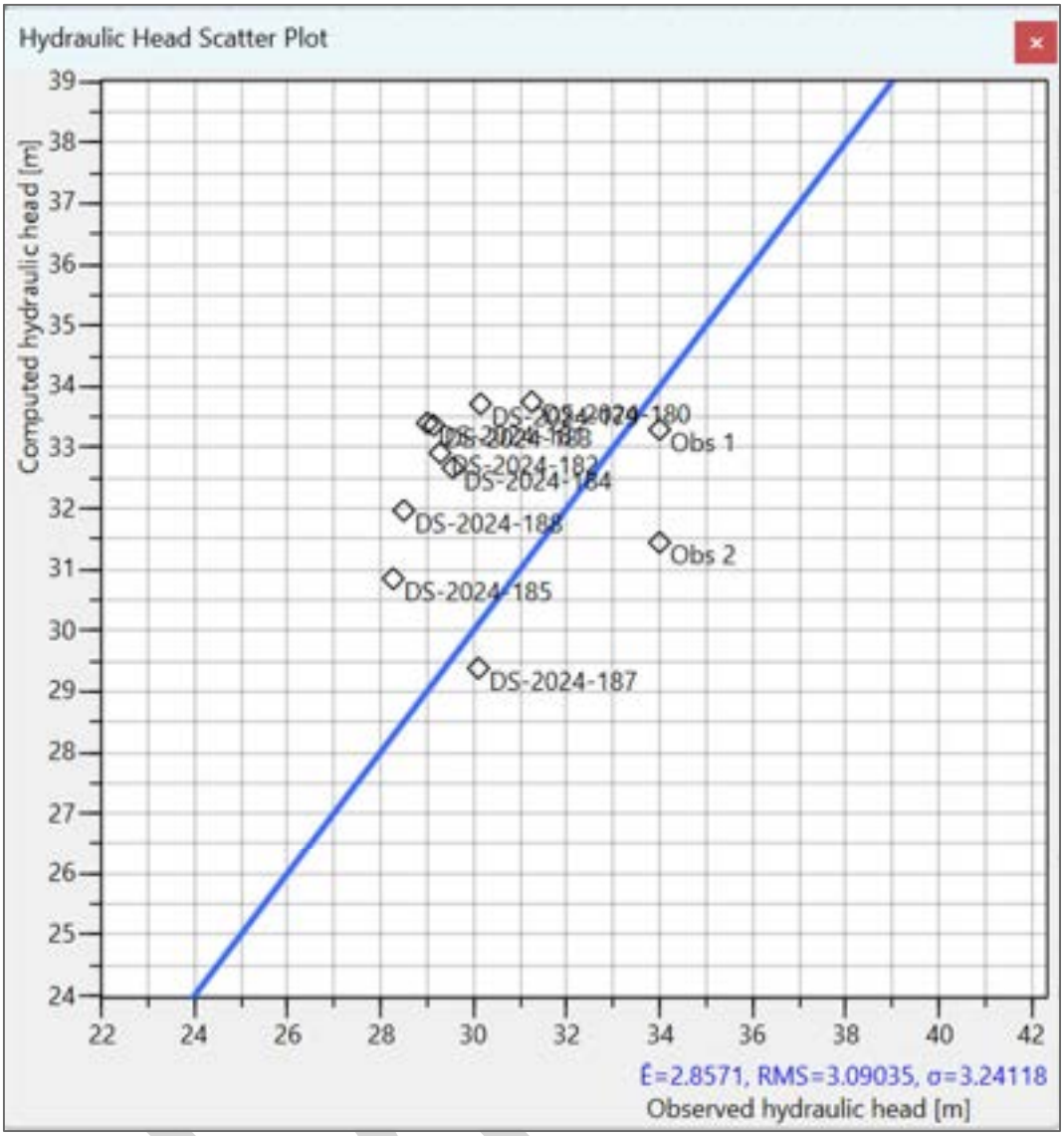


**Figure 5-6: Cross-plot of Simulated Heads Against Observed Heads**

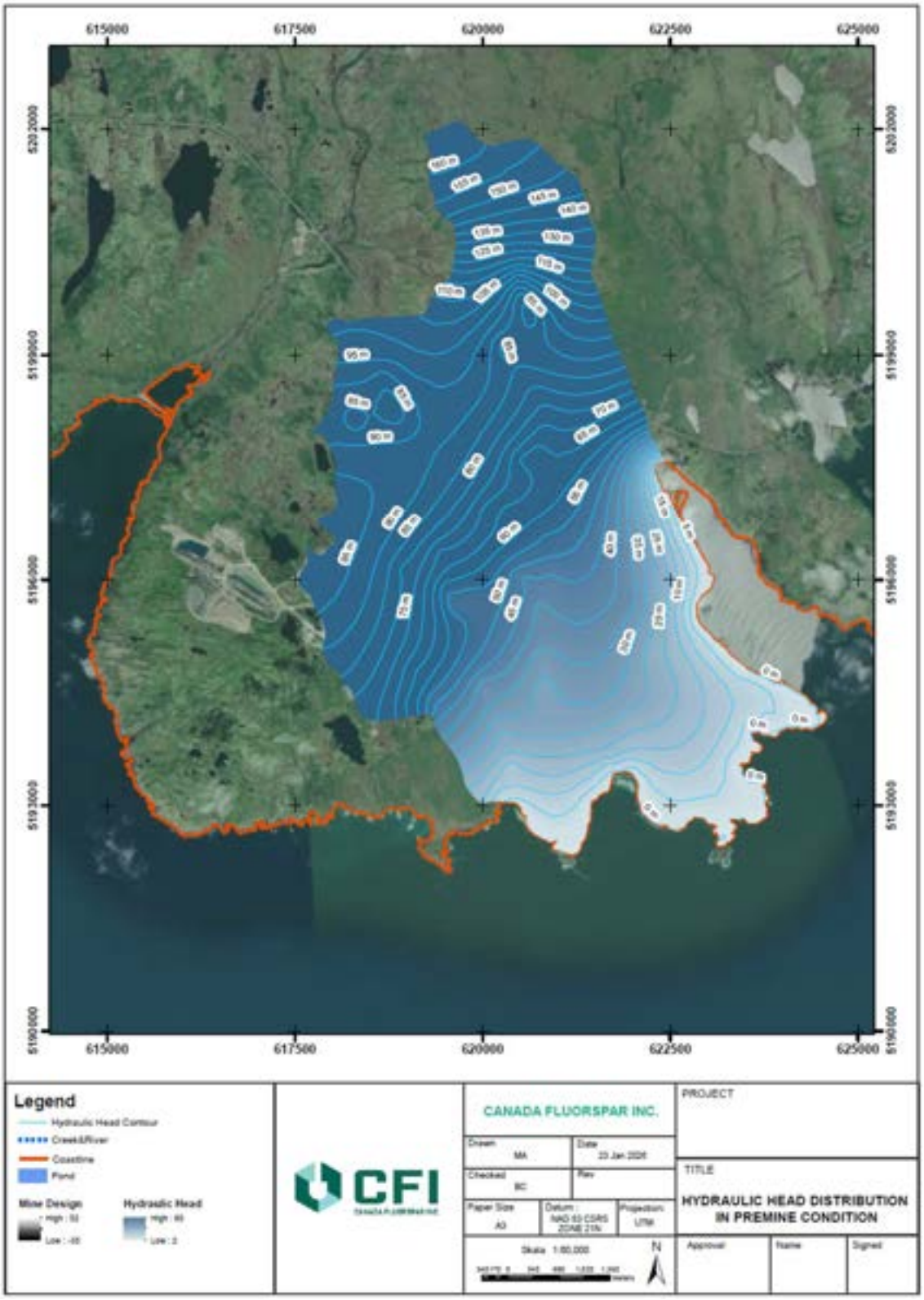


**Figure 5-7: Simulated Hydraulic Head Distribution in Steady Stade Model**

## 5.6 Short-Transient Model Calibration

The short-transient groundwater model calibration was performed to better constrain aquifer storage parameters in the aquifer storage parameters through comparison with field-derived pumping test data. The calibration focused primarily on refining the specific storage (Ss) and/or storativity (S) values, as these parameters govern the time-dependent hydraulic response and drawdown behaviour under transient conditions.

Calibration performance is illustrated by the comparison between observed and simulated groundwater head in PW-1 (Figure 5-8), which captures the key drawdown and recovery trends over the pumping period.

The calibration dataset comprised a 72-hour constant-rate pumping test conducted at 8 gallons per minute (GPM). Water level responses were continuously monitored using calibrated pressure transducers, providing high-resolution temporal drawdown and recovery data. The use of pressure transducer measurements ensured accurate capture of early-time drawdown trends, late-time stabilization behaviour, and post-pumping recovery characteristics, which are critical for reliable estimation of storage properties.

The numerical model was executed using a 0.1-day discrete time step to accurately simulate the transient hydraulic response. Pumping was initiated after 5 days of initial simulation time (to allow hydraulic stabilization under initial conditions) and continued until Day 8, representing a total pumping duration of approximately 3 days, consistent with the 72-hour field test.

The 0.1-day time discretization allowed adequate resolution of the early-time response, which is highly sensitive to storage parameters.

During calibration, storativity values ranging between 0.042 and 0.08925 were tested in the model. Considering an aquifer thickness of 64 m, these storativity values correspond to specific storage (Ss) values of $6.56 \times 10^{-4}$ 1/m to $1.39 \times 10^{-3}$ 1/m. The simulated drawdown curves were matched against observed field data by iteratively adjusting the storage parameter within this range. Particular attention was given to reproducing early-time drawdown behaviour (storage-dominated response), intermediate-time transition, and late-time recovery trends.

The calibrated transient response was used to estimate the spatial extent of drawdown propagation, expressed as an indicative radius of influence around PW-1 (Figure 5-9).

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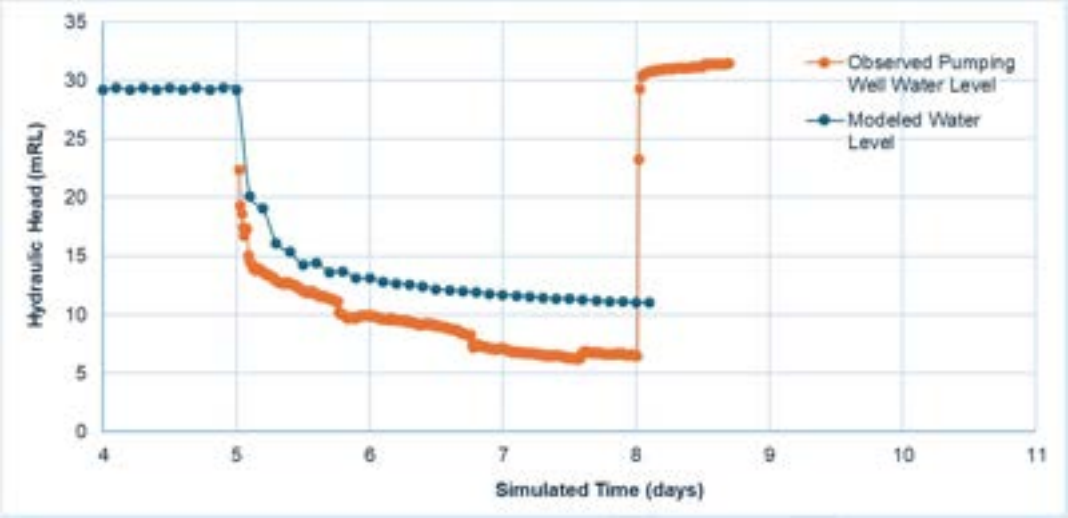


**Figure 5-8: Comparison of Observed and Modelled Groundwater Head in PW-1**

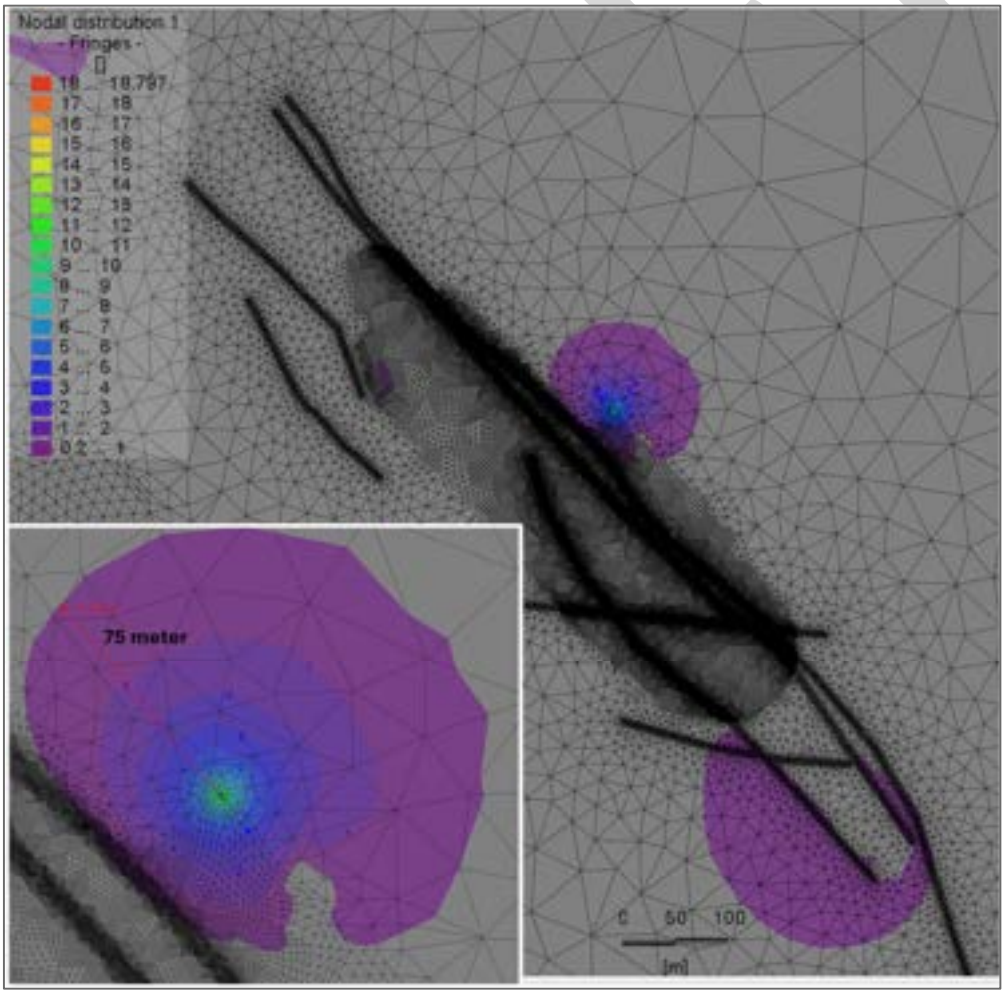


**Figure 5-9: Estimated Radius of Influence in Pumping Testing**

## 5.7 Predictive Modelling

Predictive groundwater modelling was undertaken to evaluate potential groundwater behaviour and dewatering performance under the final Life-of-Mine (LOM) pit configuration.

### 5.7.1 Model Scenario

The predictive scenarios are intended to provide a screening-level assessment of groundwater drawdown patterns, pit inflow rates, and the relative effectiveness of alternative dewatering approaches.

Two dewatering scenarios were simulated as part of the predictive modelling:

- Scenario A: Passive Groundwater Dewatering

  Scenario A represents a passive dewatering condition in which no active groundwater extraction infrastructure is implemented. Under this scenario, groundwater inflow to the pit is controlled solely by natural groundwater gradients and interception of groundwater by the open excavation.

  In the numerical model, passive dewatering is represented through seepage face boundary conditions applied to the pit walls and floor corresponding to the final LOM pit geometry. This approach allows groundwater to drain freely into the excavation in response to pit-induced depressurisation, while preventing artificial inflow from the pit back into the surrounding groundwater system.

  This scenario establishes a reference case for the predictive modelling and provides a baseline against which the effectiveness of active dewatering measures can be evaluated.

- Scenario B: Vertical Dewatering

  Scenario B represents an active dewatering configuration in which groundwater extraction wells are implemented around the up-gradient perimeter of the pit to intercept groundwater prior to entry into the excavation.

  In this scenario, 5 (five) conceptual vertical dewatering wells are incorporated into the numerical model (Figure 5-10). Pumping from the well reduces piezometric heads in the surrounding rock mass, thereby limiting groundwater inflow to the pit and contributing to depressurisation of pit slopes.

  For predictive modelling purposes, preliminary pumping rates in the order of 1 L/s per well (approximately 86 $m^3$/day per well) were assigned. These rates are based on pumping test in previous hydrogeological investigation within fractured bedrock. A total of 5 L/s of vertical dewatering wells were assessed.

- Scenario C: Horizontal Dewatering

  This Scenario presents the proposed usage of horizontal drain dewatering system intended to reduce groundwater pressure within fractured bedrock along the mapped slope face. The objective of the system is to improve slope stability by lowering pore water pressures acting within structurally controlled discontinuities.

  The modelled horizontal drainage system consists of a total of fifteen horizontal drains installed across three bench elevations at RL 0 m, RL 10 m, and RL 20 m. Each bench will contain five drains spaced at 75 metres centre-to-centre along the slope face. Each drain will extend 100 metres into the slope to ensure adequate penetration into the fractured bedrock

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mass beyond the near-surface disturbed zone. The drains will be installed sub-horizontally with a slight upward inclination, typically between 1 and 3 degrees, to promote gravity-driven discharge toward the slope face (Figure 5-11).

All predictive scenarios were simulated using the calibrated groundwater flow model framework and consistent numerical settings, including model domain, boundary conditions, hydraulic parameters, and recharge assumptions. This approach ensures that differences in simulated groundwater response between scenarios are attributable solely to the dewatering configuration applied.

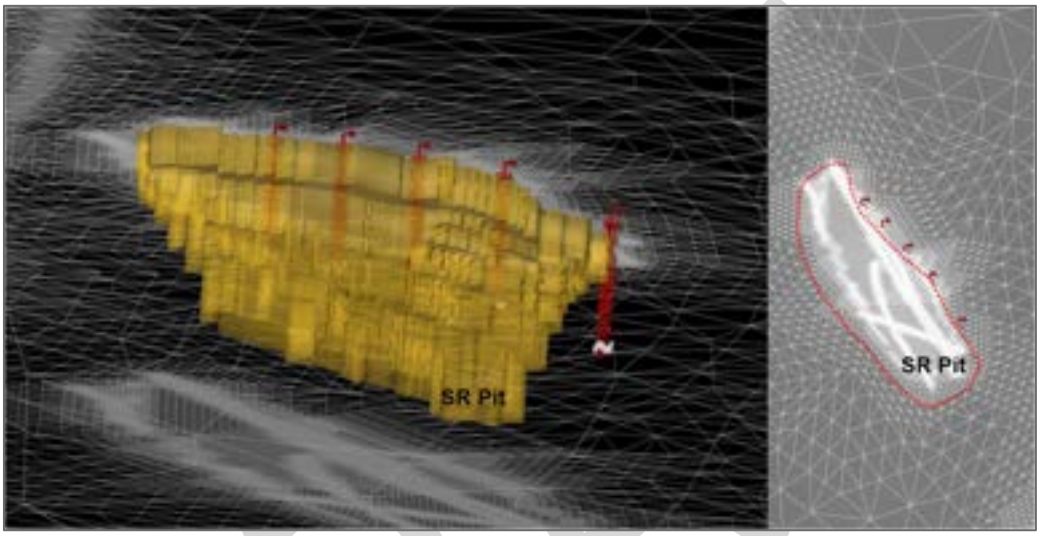


**Figure 5-10: Modelled Pumping Scenario**

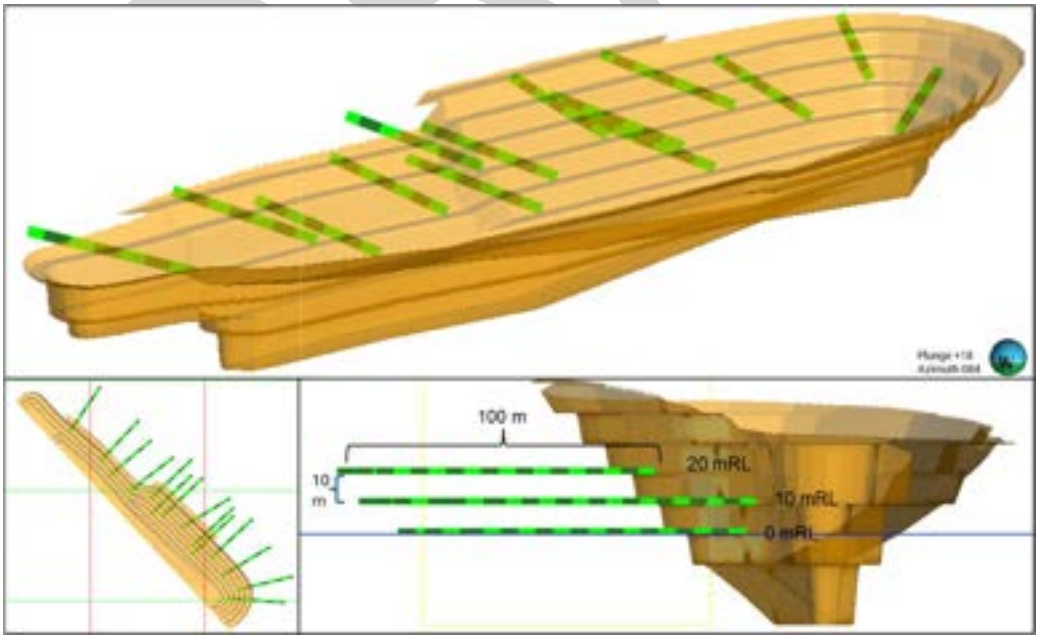


**Figure 5-11: Modelled Horizontal Drainage Array**

### 5.7.2 Groundwater Inflow Response

The inflow response over the simulated 350-day period shows distinct hydraulic behaviour under Scenarios A, B, and C. Scenario A (passive condition) consistently records the highest groundwater inflow rates throughout the simulation. Initial inflow peaks are significant and remain elevated following each disturbance event, indicating limited depressurization and sustained hydraulic connectivity within the fractured system.

Scenario B (active pumping at 4 × 50 m³/day) demonstrates a substantial reduction in inflow compared to Scenario A. The early-time inflow declines more rapidly, reflecting effective groundwater abstraction and depressurization. However, periodic spikes are observed, likely corresponding to stress changes or recharge events, after which inflow stabilizes at a lower rate than the passive case.

Scenario C (horizontal dewatering with 16 boreholes between 0–30 mRL) shows intermediate but controlled inflow behaviour. While initial peaks are comparable during early stages, the overall inflow stabilizes at a lower level than Scenario A and slightly below Scenario B during later simulation time. The distributed drainage system provides sustained pressure relief, resulting in a more regulated and gradually declining inflow trend

Accordingly, Scen_C (horizontal dewatering) is considered the most effective and defensible dewatering approach for design purposes because it provides a practical means of depressurisation in a low-K setting, with implementation less sensitive to pumping capacity limitations. The Scen_C results therefore provide the preferred basis for dewatering strategy selection, with Scen_B retained as a sensitivity case representing an optimistic vertical dewatering performance envelope.

**Table 5-2: Summary of Prediction Model Inflow Results**

| Parameter | Scenario A | Scenario B | Scenario C |
|---|---|---|---|
| Max | 8215.94 | 4081.69 | 5492.2 |
| Median | 1712.14 | 959.96 | 1060.82 |
| Percentile 75% | 3277.77 | 2161.8 | 2984.43 |

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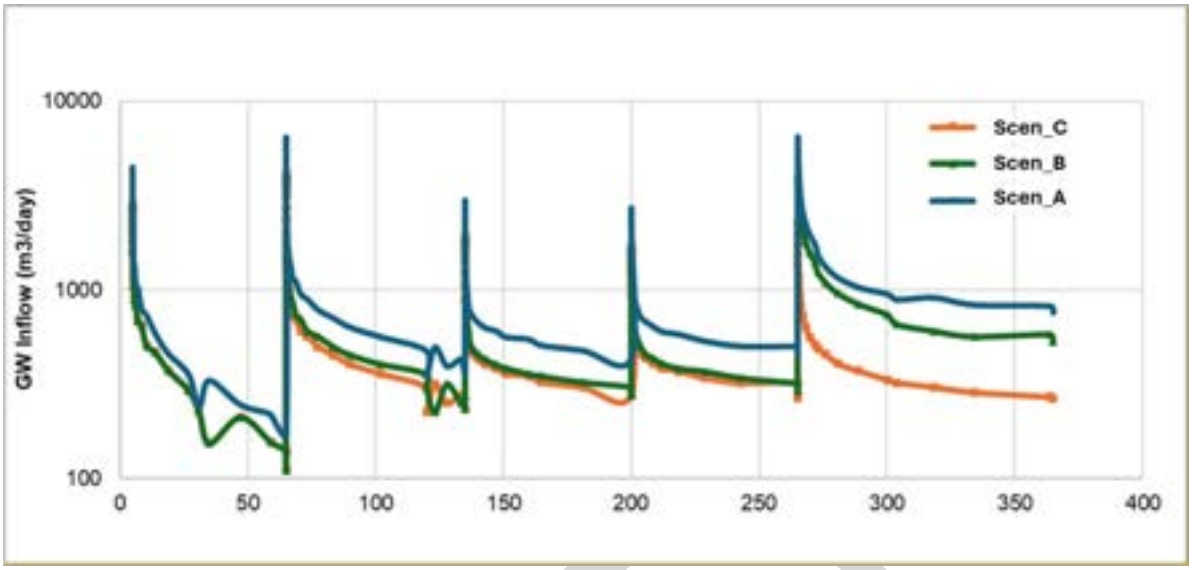


**Figure 5-12: Groundwater Inflow Response Over Simulated Time**

The simulated groundwater inflow following mining cessation shows a rapid decline during the early stages of pit rebound, followed by a gradual stabilization over time. Immediately after mining stops, groundwater inflow is relatively high, reflecting the strong hydraulic gradient between the surrounding aquifer and the depleted pit. As the pit begins to refill and groundwater levels recover, the hydraulic gradient decreases, resulting in a steady reduction in inflow rates. The model results indicate that inflow declines sharply within the first several hundred days, after which the rate of decrease becomes more gradual. Over the longer term, the groundwater inflow approaches a relatively stable condition, reaching approximately 40–50 m³/day toward the end of the simulation period (around 3,600 days). This trend suggests that the pit system gradually approaches hydraulic equilibrium with the surrounding groundwater system as rebound progresses.

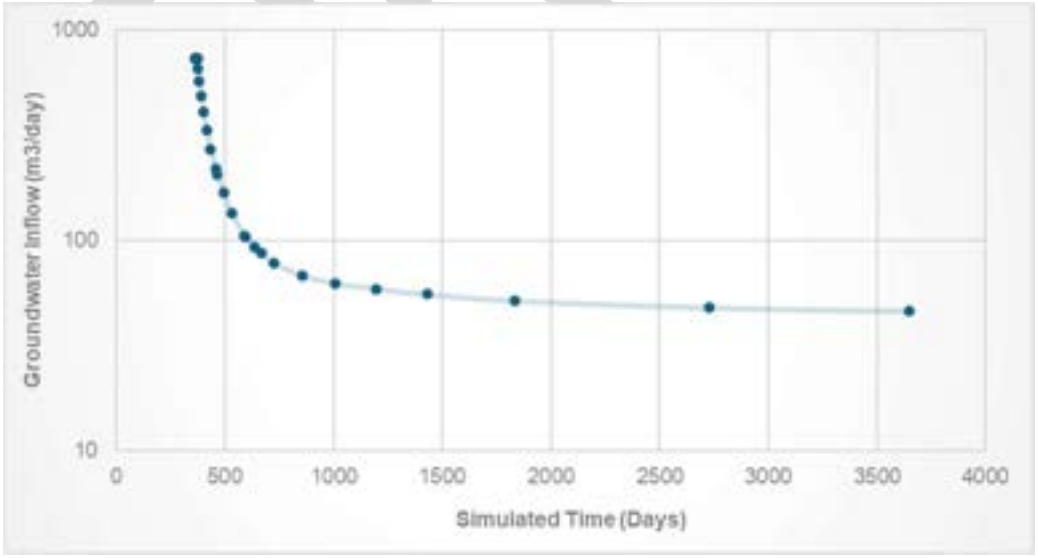


**Figure 5-13: Groundwater Inflow Response After Mining Cessation**

### 5.7.3 Hydraulic Head Distribution

Simulated hydraulic head distributions for the final Life-of-Mine (LOM) pit configuration are presented in Figure 5-14 and Figure 5-15. In both figures, Scenario A (passive dewatering) is used as the base case for comparison, while Scenario B and Scenario C represent artificial dewatering options (vertical and horizontal dewatering, respectively).

Under Scenario A, hydraulic heads remain relatively elevated in the up-gradient areas surrounding the pit, producing steeper hydraulic gradients directed toward the excavation. The head contours indicate that depressurisation is largely confined to the immediate vicinity of the pit and is driven primarily by excavation-induced drainage rather than broader regional drawdown.

Figure 5-14 compares Scenario A with Scenario B (vertical dewatering). The simulated head distributions for Scenarios A and B are broadly similar, with only limited additional reduction in hydraulic head evident under Scenario B. This indicates that vertical dewatering provides minimal incremental depressurisation relative to the passive base case, consistent with the low-permeability setting and practical constraints on vertical well yield and result of pumping testing conducted in 2026.

Figure 5-15 compares Scenario A with Scenario C (horizontal dewatering). In contrast to Scenario B, Scenario C produces a more discernible zone of reduced hydraulic heads around and ahead of the pit footprint, reflecting more effective pre-emptive depressurisation. Relative to Scenario A, the reduced heads under Scenario C increase the hydraulic gradients toward the excavation and increase the hydraulic driving force for groundwater inflow.

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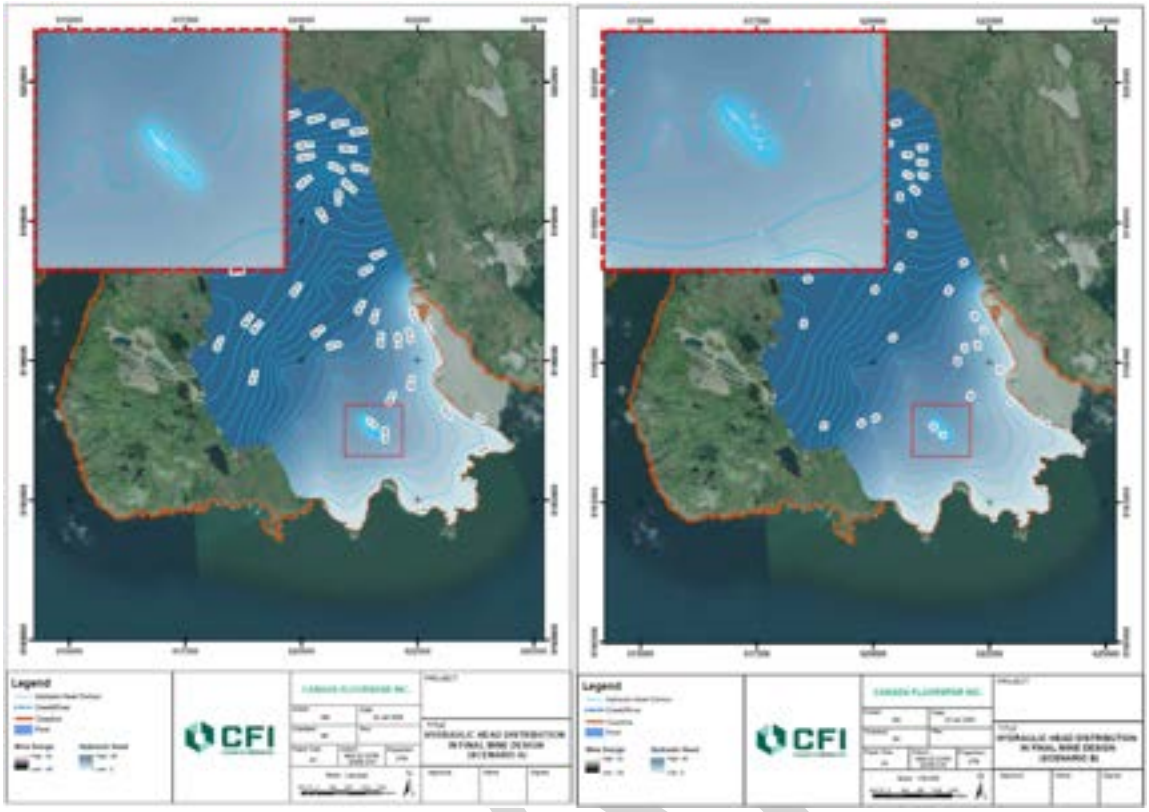

**Figure 5-14: Comparation of simulated hydraulic head distributions under passive (Scenario A) and active (Scenario B) dewatering conditions**

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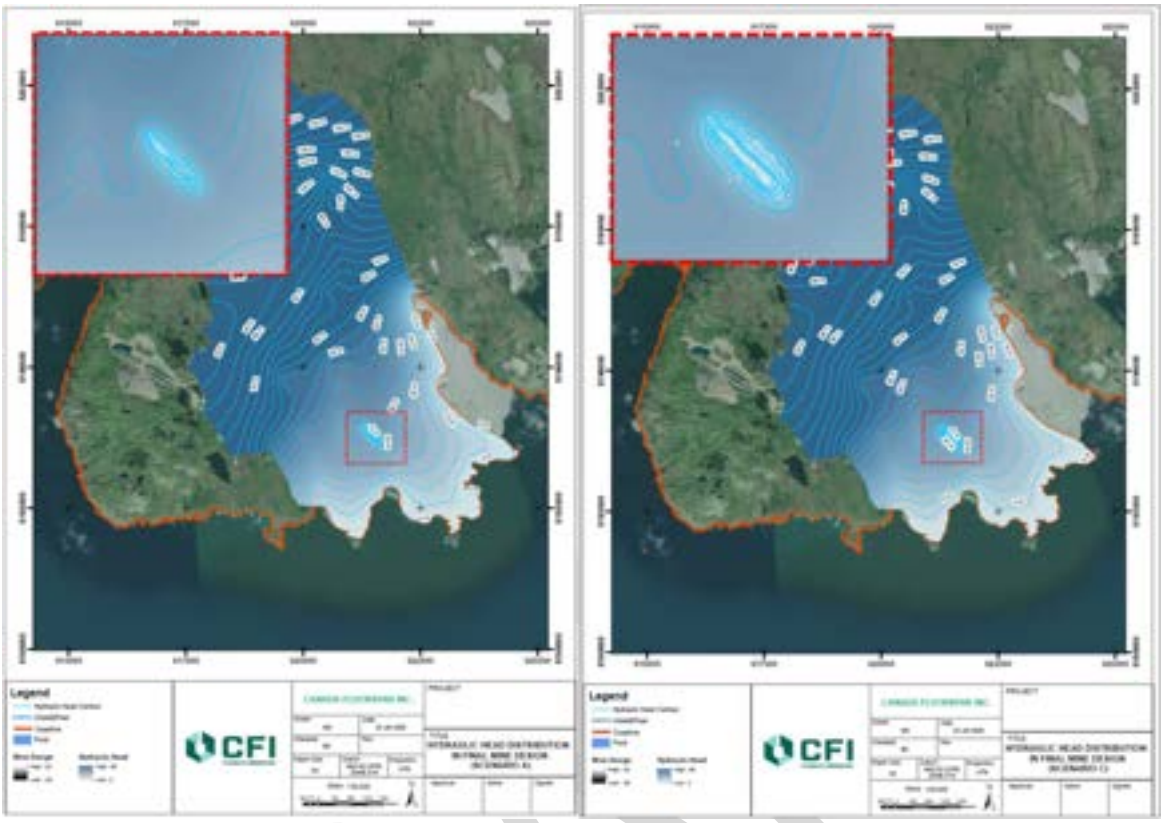

**Figure 5-15: Comparation simulated hydraulic head distributions under passive (Scenario A) and active (Scenario C) dewatering conditions**

### 5.7.4 Drawdown Extent

Predicted groundwater drawdown extents associated with the final Life-of-Mine (LOM) pit configuration are illustrated in Figure 5-16 and Figure 5-17. In both figures, Scenario A (passive dewatering) is presented as the base case, while Scenario B (vertical dewatering) and Scenario C (horizontal dewatering) represent artificial dewatering options.

Figure 5-16 compares Scenario A and Scenario B. The drawdown distribution under Scenario B is broadly similar to the passive base case, indicating that vertical dewatering provides limited additional drawdown extent and only minor changes in the spatial pattern of depressurisation. This is consistent with the low-permeability setting and practical constraints on vertical well yield identified from pumping test outcomes.

Figure 5-17 compares Scenario A and Scenario C. In contrast, Scenario C shows a more discernible modification to the drawdown footprint, with drawdown extending more effectively ahead of the pit and across areas targeted by horizontal dewatering. Relative to Scenario A, this indicates more effective pre-emptive depressurisation and reduction of hydraulic driving force for inflow.

A comparison of groundwater surface profiles for all scenarios is provided in Figure 5-18 , which highlights that Scenario C achieves the most meaningful lowering of the groundwater surface relative to the passive base case, whereas Scenario B remains close to Scenario A. These results support adoption of Scenario C as the preferred dewatering approach for PFS level assessment.

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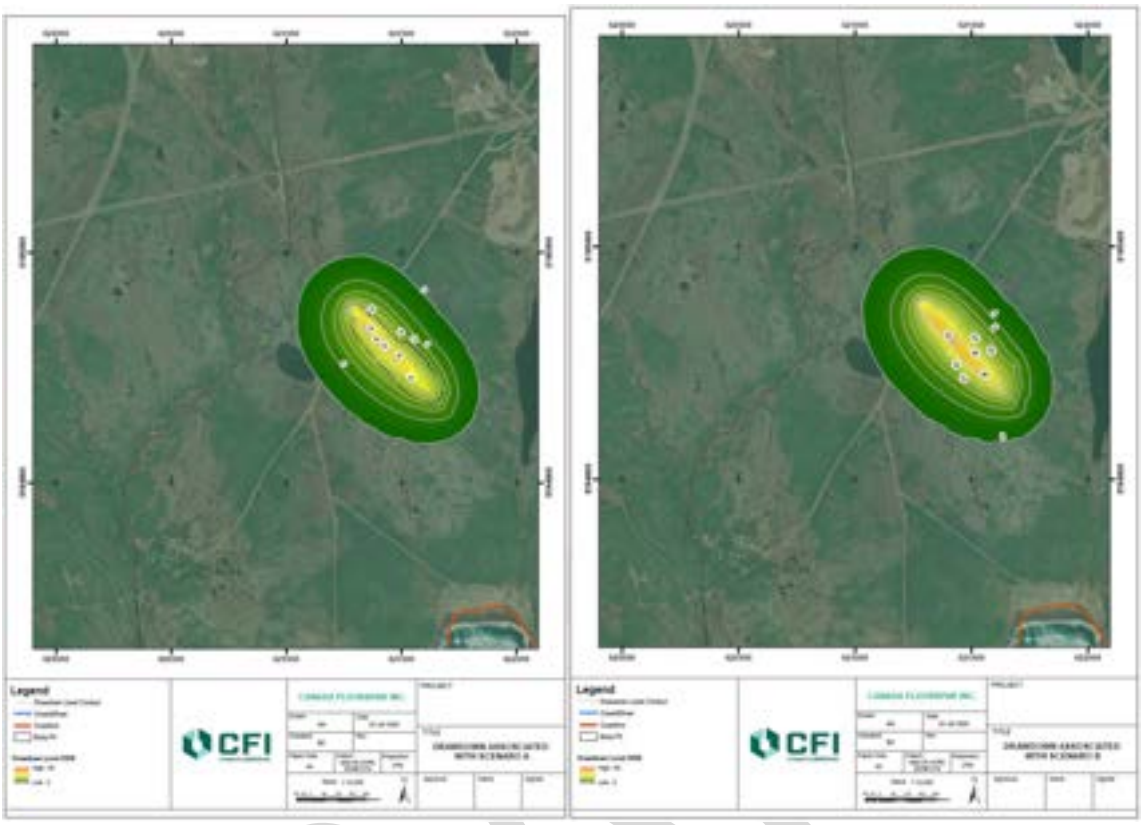


**Figure 5-16: Predicted groundwater drawdown distribution comparing passive (Scenario A) and active (Scenario B) for the final Life-of-Mine pit configuration**

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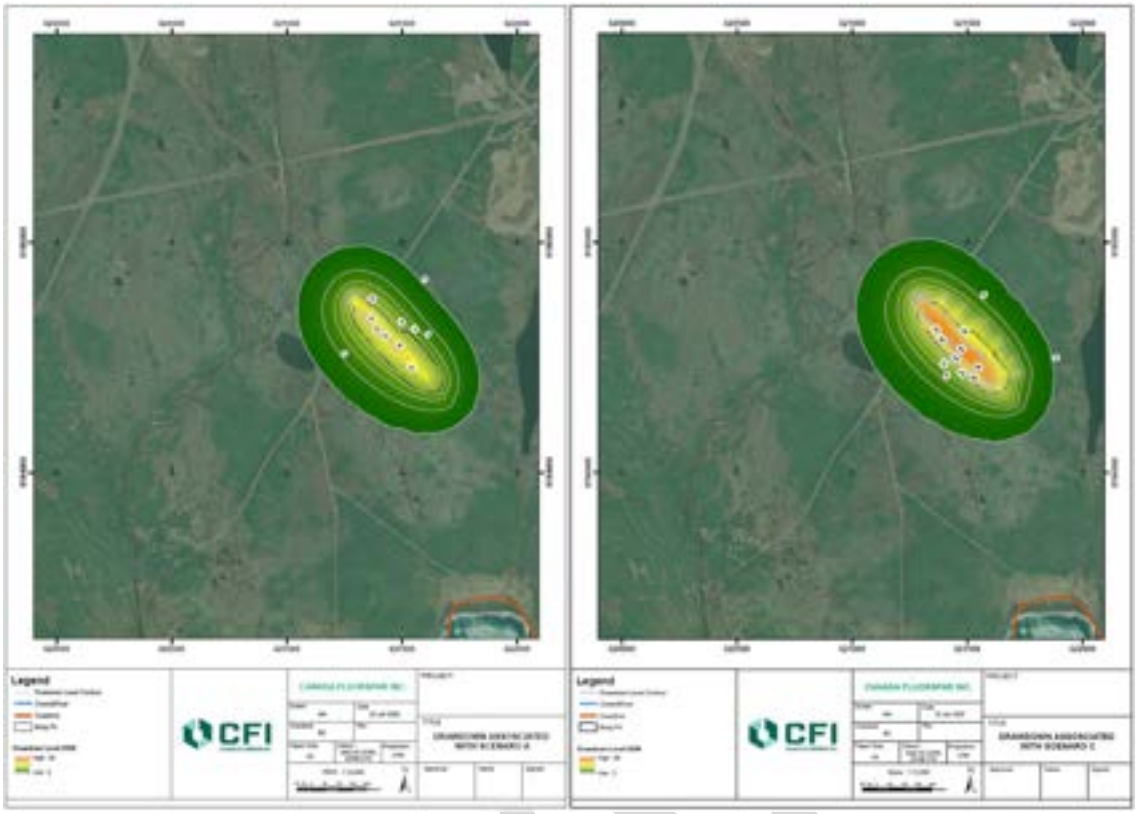


**Figure 5-17: Predicted groundwater drawdown distribution comparing passive (Scenario A) and active (Scenario C) for the final Life-of-Mine pit configuration**

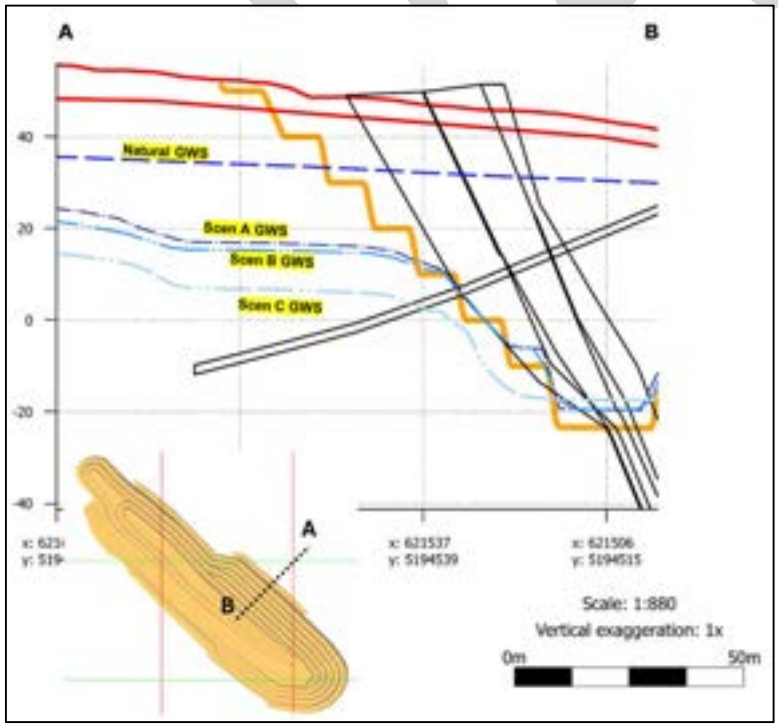


**Figure 5-18: Groundwater Surface Comparison for Each Scenarios**

### 5.7.5 Post-Mining Groundwater Recovery

Following cessation of mining activities, simulated groundwater heads indicate a progressive recovery across all model observation points. The recovery response reflects the removal of excavation-induced hydraulic sinks and the re-establishment of regional groundwater flow conditions within the model domain.

The simulated groundwater rebound following cessation of mining indicates a progressive recovery of hydraulic heads toward pre-mining conditions across all monitoring locations. The percentage rebound values represent the proportion of recovery relative to the original groundwater level prior to mining-induced drawdown.

During the early stages of recovery (Day 399 to Day 1056), groundwater levels increase rapidly across most monitoring points, reflecting the initial response of the aquifer system once dewatering activities cease. This stage is characterized by relatively steep recovery trends, particularly at monitoring points DS-2024-179, DS-2024-180, and DS-2024-181, which exceed approximately 90% rebound by around Day 851–1056. Monitoring points located closer to the former pit or areas of greater drawdown, such as DS-2024-186 and DS-2024-187, exhibit a slower recovery response due to the larger hydraulic deficit and longer time required for pressure equilibration within the aquifer system.

By approximately Day 1606, most monitoring points have recovered to between 96% and 100% of their pre-mining groundwater levels, although several locations still remain slightly below full recovery. Continued recovery occurs between Day 1606 and Day 2020 as regional groundwater gradients gradually re-establish, and recharge and boundary inflows continue to replenish the system.

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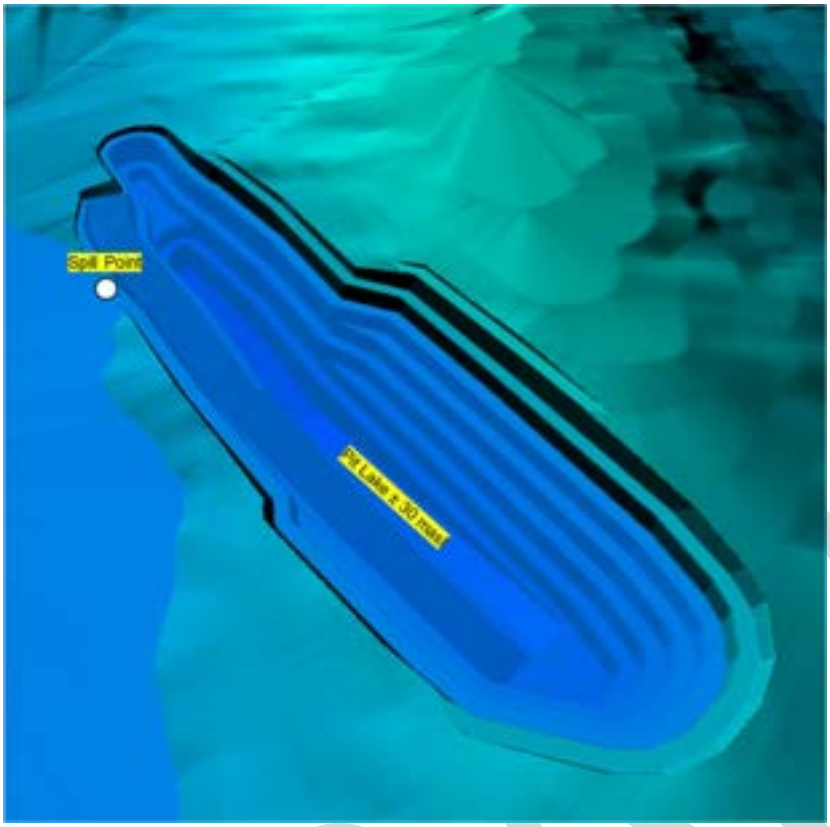


Figure 5-19: Estimated Pit Lake Level Derived from Final Pit Topography and Overflow ElevationBeyond this point, the model results show minimal additional increases in groundwater levels, with recovery curves flattening significantly. Between Day 2645 and Day 3575, the rebound percentages remain essentially unchanged, indicating that the groundwater system has approached a new hydraulic equilibrium under post-closure conditions. This stabilization suggests that the regional flow system has fully re-established and that any remaining differences from pre-mining groundwater levels are minor and persistent due to local hydrogeological factors rather than ongoing recovery processes.

**Table 5-3: Indicative Groundwater Head Recovery at Model Observation Points Following Mining Cessation**

| Day after Mine cessation | DS-2024-179 | DS-2024-180 | DS-2024-181 | DS-2024-182 | DS-2024-183 | DS-2024-184 | DS-2024-185 | DS-2024-186 | DS-2024-187 | DS-2024-188 |
|---|---|---|---|---|---|---|---|---|---|---|
| 34 | 48% | 49% | 49% | 12% | 19% | 5% | -6% | -3% | 17% | 22% |
| 50 | 55% | 55% | 56% | 26% | 32% | 18% | 10% | 9% | 28% | 31% |
| 70 | 63% | 62% | 64% | 40% | 45% | 32% | 27% | 21% | 40% | 41% |
| 100 | 70% | 69% | 71% | 53% | 57% | 46% | 42% | 32% | 52% | 52% |
| 144 | 73% | 71% | 74% | 57% | 61% | 50% | 48% | 36% | 55% | 55% |
| 165 | 77% | 76% | 78% | 64% | 69% | 59% | 57% | 42% | 62% | 62% |
| 218 | 78% | 76% | 79% | 66% | 70% | 60% | 59% | 43% | 64% | 63% |
| 230 | 82% | 80% | 83% | 72% | 76% | 67% | 66% | 48% | 69% | 69% |

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| Day after Mine cessation | DS-2024-179 | DS-2024-180 | DS-2024-181 | DS-2024-182 | DS-2024-183 | DS-2024-184 | DS-2024-185 | DS-2024-186 | DS-2024-187 | DS-2024-188 |
|---|---|---|---|---|---|---|---|---|---|---|
| 298 | 82% | 80% | 83% | 73% | 76% | 67% | 66% | 48% | 69% | 69% |
| 300 | 85% | 82% | 86% | 76% | 80% | 72% | 71% | 51% | 72% | 73% |
| 360 | 89% | 86% | 90% | 82% | 86% | 78% | 77% | 55% | 76% | 79% |
| 486 | 93% | 90% | 94% | 88% | 91% | 85% | 83% | 59% | 79% | 85% |
| 691 | 96% | 93% | 98% | 92% | 95% | 89% | 88% | 61% | 82% | 90% |
| 936 | 98% | 95% | 101% | 96% | 99% | 93% | 92% | 64% | 85% | 94% |
| 1241 | 100% | 98% | 100% | 100% | 100% | 97% | 96% | 92% | 87% | 98% |
| 1655 | 100% | 100% | 100% | 100% | 100% | 100% | 99% | 93% | 90% | 100% |
| 2280 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 93% | 100% |
| 3210 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 93% | 100% |

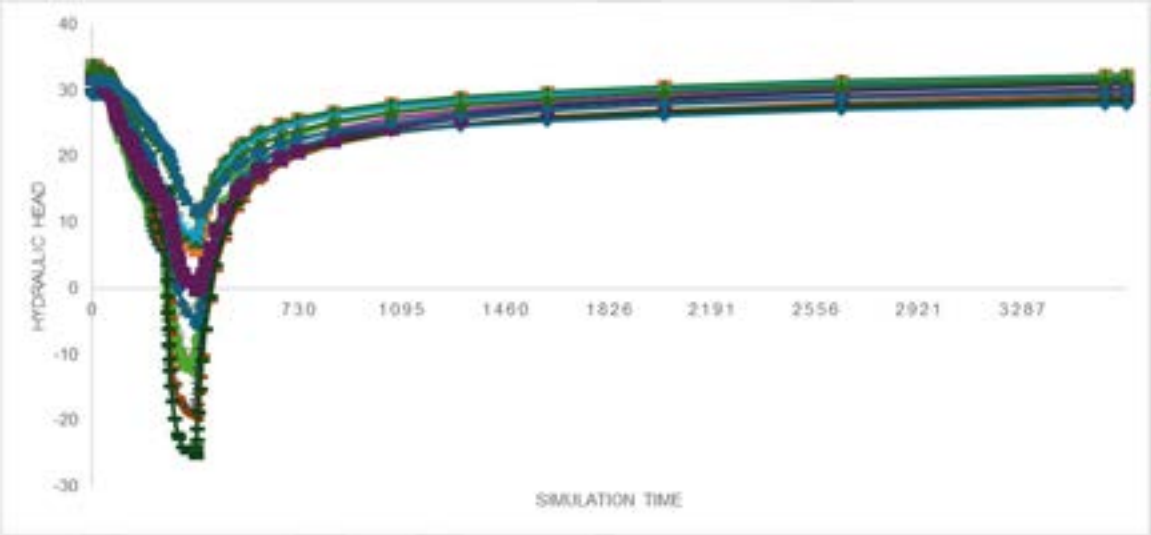


**Figure 5-20: Simulated Groundwater Head Evolution at Observation Points During Mining and Post-Mining Phases**

## 5.8 Sensitivity Analysis

A hydraulic parameter sensitivity analysis was conducted to evaluate the influence of uncertainty in fractured bedrock hydraulic properties on groundwater model predictions. The fractured bedrock unit represents the primary groundwater flow domain at the site and controls regional groundwater movement and inflow to the mine. Accordingly, the sensitivity analysis was restricted to fractured bedrock parameters only.

The sensitivity analysis was undertaken by systematically varying selected hydraulic properties assigned to the fractured bedrock domain within the calibrated groundwater model. Three sensitivity scenarios were developed by modifying hydraulic conductivity (K) and specific storage (Ss) relative to the base-case model. The base-case model adopts the calibrated parameter values described in Section 5.5.

All other hydrogeological units, boundary conditions, recharge inputs, and stress period configurations were held constant to isolate the effects of fractured bedrock parameter uncertainty on model behaviour. The detailed parameter variations applied in each sensitivity scenario are summarised in Table 5-4.

**Table 5-4: Hydraulic Parameter Variations Applied in Sensitivity Analysis**

| Parameter | Unit | Base Case | Sens_01 | Sens_02 | Sens_03 |
|---|---|---|---|---|---|
| Parameter Changes | - | - | K / 10 | Ss x 10 | Ss / 10 |
| Horizontal Hydraulic Conductivity | m/s | 7.00E-08 | 7.00E-09 | 7.00E-08 | 7.00E-08 |
| Vertical Hydraulic Conductivity | | 1.00E-07 | 1.00E-08 | 1.00E-07 | 1.00E-07 |
| Specific Storage | [1/m] | 1.00E-04 | 1.00E-04 | 1.00E-03 | 1.00E-05 |

The simulated groundwater inflow results indicate that the model response is sensitive to variations in fractured bedrock hydraulic properties relative to the base case. All sensitivity scenarios display a consistent temporal response, characterised by sharp inflow peaks following mining stage transitions and gradual recession thereafter. However, the magnitude of inflow varies depending on the parameter modified (Table 5-5; Figure 5-21).

Sens_01, in which hydraulic conductivity is reduced by one order of magnitude (K ÷ 10), results in the lowest simulated inflow response. The maximum inflow is limited to approximately 4,900 m³/day, while the median inflow decreases to approximately 350 m³/day, confirming that reduced permeability significantly restricts groundwater movement and inflow to the pit.

Sens_02 and Sens_03 examine the sensitivity of model results to specific storage. Increasing specific storage by one order of magnitude (Sens_02; Ss × 10) produces moderately higher inflows during transient periods, particularly at higher percentiles, but does not substantially alter long-term median inflow relative to the base case. Conversely, reducing specific storage by one order of magnitude (Sens_03; Ss ÷ 10) results in sharper and higher inflow peaks, reflected by elevated upper-percentile inflow values, while median inflows remain broadly comparable to the base case.

Overall, the sensitivity analysis demonstrates that groundwater inflow predictions are most sensitive to uncertainty in fractured bedrock hydraulic conductivity, with order-of-magnitude variations producing the largest differences in both peak and sustained inflow. Variations in specific storage primarily influence the transient response and peak inflow behaviour, with a lesser effect on longer-term inflow magnitude. The pumping test conducted in 2026 has helped reduce the uncertainty associated with the specific storage parameter, providing improved confidence in the values adopted in the groundwater model.

**Table 5-5: Summary of Sensitivity Analysis Groundwater Inflow Results (unit in m3/day)**

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| Parameter | Base Case | Sens_01 | Sens_02 | Sens_03 |
|---|---|---|---|---|
| Max | 8949 | 4913 | 5876 | 8461 |
| Median | 1145 | 354 | 1570 | 1392 |
| 85%Percentile | 4290 | 1392 | 4320 | 5740 |
| 75% Percentile | 2516 | 926 | 3079 | 3642 |
| 65% Percentile | 1734 | 692 | 2149 | 2707 |

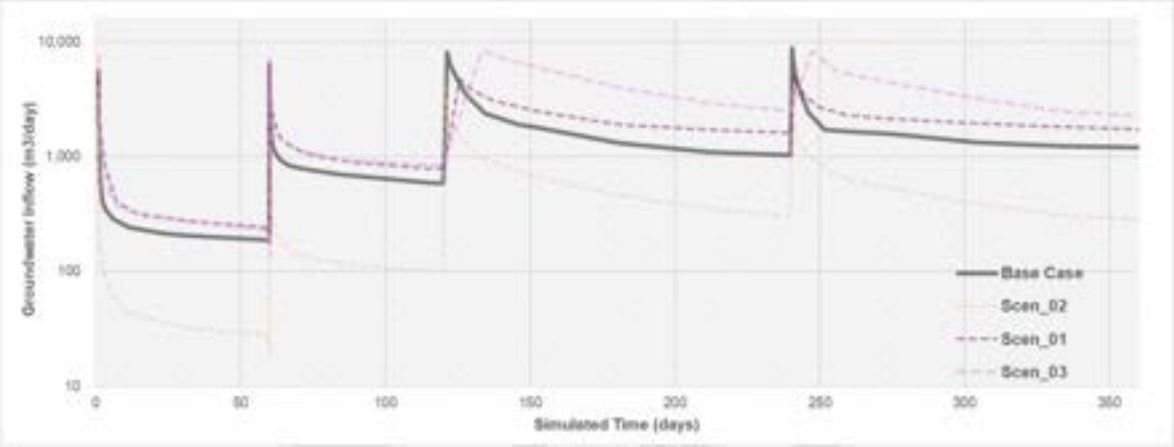


**Figure 5-21: Groundwater Inflow Response to Hydraulic Parameter Sensitivity Scenarios Over Simulated Time**

## 5.9 Water Budget

A water budget analysis is conducted at the watershed scale to quantify and evaluate the contribution of each hydrologic component to overall system. External stresses, such as land development, can alter the balance between these components and impact system stability.

Water budget analysis can be used to assess and predict the effects of such stresses on peak flows and groundwater discharge. Baseflow consists of groundwater discharge from the saturated zone to streams, combined with interflow from the unsaturated zone. In the numerical model, the baseflow component represented is groundwater discharge.

At mining sites, pit dewatering represents an additional stress on the hydrologic system, as it intercepts natural groundwater flow paths and reduces discharge to surrounding streams and wetlands. Modelling pit dewatering allows estimation of its impact on baseflow, groundwater levels, and downstream surface water, supporting the design of dewatering systems while minimizing effects on the surrounding hydrologic regime.

A water balance provides a systematic assessment of the inputs, storage, and outputs within a groundwater system. Defining each component of the water balance enables the model to evaluate the impacts of groundwater extraction within the watershed.

The model can be used to understand how potential changes in dewatering mine conditions may affect discharge conditions on the major rivers within the model. It may also be used to estimate

the cumulative impacts of many smaller removals on the overall water budget of either the sub watershed or watershed scale.

In terms of baseflow discharge to the rivers and streams, the water balance component that is of interest is the groundwater flux through the river boundaries. FEFLOW interface allows for the quantification of volumes and fluxes to be summed over any area or river reach, into and out of the model.

A water budget for a defined area can be understood as the balance between water entering the system, water leaving the system, and any changes in storage within that area. In simple terms, all water inputs—such as recharge from precipitation, groundwater inflows, or surface water inflows—must be balanced by water outputs, including municipal pumping, groundwater discharge, and surface water outflows, together with any increase or decrease in water stored within the system. This relationship can be expressed as:

**Inputs = Outputs + Change in Storage**

**Water Budget Analysis**

Groundwater inflow through General Head Boundaries (GHB) is also reduced following mine closure. The model shows a median GHB inflow of approximately 145.12 m³/day during mining, which decreases slightly to approximately 140.11 m³/day post closure. The relatively small change in GHB inflow suggests that the external boundary conditions remain broadly similar between scenarios and that the main difference in system behaviour is associated with the reduction in groundwater extraction and the subsequent rebalancing of groundwater discharge pathways.

At the individual surface water features, such as Clarkes Pond Brook, East Branch of Salt Cove Brook, Shoal Cove Pond, Shoal Cove Brook Hare Ears Ponds and the Unnamed Tributary, groundwater interactions remain broadly consistent between mining and post-closure conditions, although some localized changes in groundwater discharge are evident. For example, groundwater discharge to East Branch Salt Cove Brook increases slightly in the post-closure scenario, with median outflows increasing from approximately –485.52 m³/day during mining to –491.21 m³/day post closure, indicating a partial recovery of baseflow contributions to this stream once the mine-induced drawdown dissipates. Similarly, Salt Cove Brook shows a modest increase in groundwater discharge after closure, suggesting that the surface water system progressively recovers as groundwater levels rebound.

The source term, which represents distributed recharge entering the groundwater system, remains constant between mining and post-closure scenarios, with a median value of approximately 6,789.75 m³/day during mining and 7,458.44 m³/day post closure. This indicates that recharge is assumed to remain unchanged in the model and that variations in groundwater flow are primarily controlled by changes in hydraulic gradients rather than recharge conditions.

Changes in groundwater storage also highlight the dynamic response of the aquifer system. During mining, the model shows a relatively high storage inflow, with a median value of approximately 3,141.91 m³/day, reflecting the release and redistribution of water within the aquifer as groundwater levels adjust to the imposed drawdown conditions. Following mine closure, the median storage inflow decreases significantly to approximately 716.77 m³/day, indicating that the system gradually approaches a new equilibrium condition as groundwater levels recover.

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Conversely, storage outflows increase in magnitude during the post-closure scenario, with the median value changing from approximately –1,430.17 m³/day during mining to –2,117.08 m³/day post closure. This reflects the continued redistribution of groundwater within the system as hydraulic heads recover, and the aquifer releases stored water to re-establish regional flow patterns.

Groundwater discharge to the coastal boundary (BC1) also shows a slight increase following mine closure, with median outflow increasing from approximately –2,225.47 m³/day during mining to –2,263.86 m³/day post closure. This suggests that, as groundwater levels rebound, a greater proportion of groundwater flow is directed toward the coastal boundary, which likely represents the natural regional discharge zone of the aquifer system.

The water balance results indicate that mine dewatering significantly alters groundwater flow patterns by increasing groundwater discharge from the system and redistributing storage within the aquifer. Following mine closure, the groundwater system progressively recovers, resulting in reduced boundary outflows, partial restoration of baseflow to surface water features, and stabilization of aquifer storage conditions. These results demonstrate that the groundwater system gradually returns toward a post-closure hydraulic equilibrium, consistent with the rebound trends observed in the simulated groundwater levels.

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**Table 5-6: Simulated Water Budget for the Model with Budget Zones Assigned to Surrounding Surface Water Bodies**

| Location | Parameter | Pre-mine | Mining | | | Post Closure | | |
|---|---|---|---|---|---|---|---|---|
| | | | Max | Median | Percentile 75% | Max | Median | Percentile 75% |
| Model | GHB In | 107.90 | 1483.59 | 145.12 | 145.39 | 144.31 | 140.11 | 141.29 |
| Clarkes Pond Brook | GHB In | 12.40 | 15.32 | 13.9 | 14.03 | 13.87 | 13.12 | 13.48 |
| Hares Ears Pond | GHB In | 0 | 0.09 | 0 | 0 | 0.02 | 0 | 0 |
| East Branch of Salt Cove Brook | GHB In | 1.37 | 0.78 | 0.67 | 0.67 | 0.69 | 0.62 | 0.63 |
| Salt Cove Brook | GHB In | 1.38 | 0.94 | 0.67 | 0.67 | 0.78 | 0.62 | 0.63 |
| Unnamed Tributary to Shoal Cove | GHB In | 77.22 | 72.46 | 72.06 | 72.07 | 70.96 | 70.42 | 70.77 |
| Shoal Cove Pond | GHB In | 1.00 | 0.61 | 0 | 0 | 0.34 | 0 | 0 |
| | | | | | | | | |
| Model | GHB Out | -5932.28 | -14779.1 | -9160.95 | -12187 | -6341.75 | -6064.38 | -6118.39 |
| Clarkes Pond Brook | GHB Out | -106.94 | -115.17 | -113.67 | -113.73 | -121.63 | -115.5 | -116.98 |
| Hares Ears Pond | GHB Out | -0.31 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shoal Cove Pond | GHB Out | 30.63 | -23.63 | -23.37 | -23.39 | -24.11 | -23.68 | -23.78 |
| East Branch of Salt Cove Brook | GHB Out | -585.72 | -490.34 | -485.52 | -485.91 | -511.61 | -491.21 | -493.61 |
| Salt Cove Brook | GHB Out | -1263.45 | -1125.61 | -1116.99 | -1117.72 | -1179.83 | -1127.55 | -1134.71 |
| Unnamed Tributary | GHB Out | -36.87 | -40.79 | -39.62 | -39.7 | -41.92 | -40.53 | -41 |
| | | | | | | | | |
| Model | Source | 5802.36 | 8834.34 | 6789.75 | 7458.44 | 7458.44 | 7458.44 | 7458.44 |
| | | | | | | | | |
| Model | Storage In | 0 | 10591.13 | 3141.91 | 6498.02 | 1648.56 | 716.77 | 1504.32 |
| Clarkes Pond Brook | Storage In | 2.64 | 0.71 | 0.01 | 0.05 | 0.27 | 0.01 | 0.06 |
| Hares Ears Pond | Storage In | 0.00 | 3.23 | 0.26 | 1.16 | 4.46 | 3.28 | 3.91 |
| Shoal Cove Pond | Storage In | 0.01 | 0.31 | 0 | 0 | 3.36 | 0.1 | 0.88 |
| East Branch of Salt Cove Brook | Storage In | 0.02 | 0.07 | 0 | 0 | 0.26 | 0.04 | 0.13 |

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| Location | Parameter | Pre-mine | Mining | | | Post Closure | | |
|---|---|---|---|---|---|---|---|---|
| | | | Max | Median | Percentile 75% | Max | Median | Percentile 75% |
| Salt Cove Brook | Storage In | 0.05 | 0.18 | 0 | 0 | 0.26 | 0.04 | 0.13 |
| Unnamed Tributary | Storage In | 0.00 | 4.76 | 0.05 | 1.15 | 7.63 | 4.78 | 6.36 |
| | | | | | | | | |
| Model | Storage Out | -116.93 | -3280.31 | -1430.17 | -1890.06 | -1248.42 | -2117.08 | -3003.27 |
| Clarkes Pond Brook | Storage Out | -6.71 | -1.65 | -0.24 | -0.31 | -0.53 | -0.18 | -0.23 |
| Hares Ears Pond | Storage Out | -0.31 | -0.46 | -0.03 | -0.21 | -0.67 | 0 | 0 |
| Shoal Cove | Storage Out | -1.36 | -9.52 | -2.92 | -5.86 | -4.26 | -3.49 | -3.8 |
| East Branch of Salt Cove Brook | Storage Out | -0.08 | -1.84 | -0.57 | -1.11 | -0.8 | -0.7 | -0.75 |
| Salt Cove Brook | Storage Out | -0.08 | -5.16 | -1.57 | -3.1 | -2.41 | -2.14 | -2.34 |
| Unnamed Tributary | Storage Out | -2.17 | -4.36 | -1.3 | -2.54 | -0.38 | -1.29 | -1.44 |
| | | | | | | | | |
| Coast | BC1 Out | -2165.43 | -2271.99 | -2225.47 | -2227.02 | -2365.96 | -2263.86 | -2256.58 |

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## 5.10 Model Limitation and Uncertainty

### 5.10.1 Model Limitations

The numerical groundwater model has been developed at a Pre-Feasibility Study (PFS) level to support predictive assessment of groundwater inflow, drawdown, and dewatering performance. As such, the model is subject to limitations related to data availability, conceptual simplifications, and the level of detail appropriate for PFS-level evaluation.

Key limitations of the numerical model include:

- Calibration data constraints, as model calibration is primarily based on snapshot groundwater level measurements collected during drilling programs rather than long-term continuous groundwater monitoring records. This limits the ability to fully constrain transient system behaviour.
- Scale of hydraulic testing data, with hydraulic properties informed mainly by interval-scale packer testing and limited field observations. There are one site-specific long duration pumping test data are available to at a representative aquifer scale.
- Conceptual representation of dewatering, whereby active dewatering scenarios adopt indicative well configurations and pumping rates for screening-level modelling purposes only. These configurations do not represent an optimised or engineered dewatering system design.
- Simplified representation of geological and structural features, consistent with PFS-level modelling objectives, which may not fully capture small-scale heterogeneity or the detailed hydraulic behaviour of individual faults and fracture zones.
- Waste dumps and other mining infrastructure were not explicitly represented in the model, as they are not expected to directly influence the saturated groundwater system. These features are primarily surface or near-surface structures that mainly affect surface runoff or infiltration processes within the unsaturated zone. Since the groundwater model focuses on the behaviour of the saturated aquifer and regional groundwater flow, the presence of these facilities is considered unlikely to significantly alter groundwater levels or flow patterns within the saturated domain.
- The groundwater model was developed in a data-constrained environment, particularly with respect to surface water stage information for rivers and ponds surrounding the site of interest. Available hydrometric data sourced from the Newfoundland and Labrador Department of Environment and Climate Change Automatic Data Retrieval System (ADRS) indicate that continuous stage monitoring stations are limited in spatial coverage within the immediate project area. No long-term gauging stations are located directly within the primary creeks or smaller ponds hydraulically connected to the site.
- Due to this limitation, river and pond stage elevations could not be defined using continuous observed hydrographs. Instead, surface water levels were approximated based on:
    - Regional topographic elevation data
    - Observed pond water surface elevations from mapping sources
    - Inferred hydraulic gradients from surrounding catchment morphology
    - Conceptual understanding of groundwater–surface water interaction

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- Baseflow estimates were cross-checked using recharge-based water balance calculations to ensure simulated discharge magnitudes were physically reasonable relative to catchment area and estimated recharge rates.
- The simplified hydrogeological framework (overburden and fractured bedrock) was adopted to reflect the available level of subsurface data. Hydraulic properties were assigned based on literature values for fractured rock terrains and adjusted during calibration to achieve realistic groundwater–surface water interaction.

These model limitations reflect the current stage of project development and are consistent with the intended use of the model as a predictive and decision-support tool at PFS level. Further refinement of the numerical model is expected as additional hydrogeological data become available.

### 5.10.2 Model Uncertainty

Uncertainty in the numerical model predictions arises primarily from natural variability in fractured bedrock hydraulic properties and from assumptions required to represent complex groundwater processes within a numerical modelling framework.

The principal sources of model uncertainty include:

- Spatial variability of fractured bedrock hydraulic conductivity and storage properties, which may vary significantly over short distances due to differences in fracture density, connectivity, and weathering.
- Uncertainty in the hydraulic behaviour and continuity of structural features, including faults and fracture zones, which may influence groundwater flow pathways beyond what can be explicitly resolved in the model.
- Recharge and boundary condition assumptions, which represent simplified approximations of natural processes and do not explicitly account for temporal climatic variability.
- Transient groundwater response, given the limited availability of time-series groundwater data to constrain storage parameters and dynamic system behaviour.

These uncertainties were explicitly evaluated through a structured sensitivity analysis focusing on key fractured bedrock parameters. The sensitivity results indicate that, while predicted groundwater inflow magnitudes and drawdown levels vary across plausible parameter ranges, the overall spatial patterns of drawdown, relative performance of dewatering scenarios, and groundwater recovery trends during closure remain consistent.

Accordingly, the numerical groundwater model is considered suitable for PFS-level and EA evaluation of groundwater behaviour and dewatering performance. Model outputs should be interpreted as indicative and order-of-magnitude estimates rather than definitive predictions, providing a robust technical basis for mine planning and groundwater risk assessment, with further refinement anticipated as additional site-specific hydrogeological data are collected.

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# 6 CONCLUSION AND RECCOMENDATIONS

## 6.1 Conclusions

This Technical Note summarises the current understanding of groundwater quantity conditions at South Ridge and presents a three-dimensional numerical groundwater model developed to provide screening-level predictions of pit inflow, drawdown behaviour, and the relative effectiveness of conceptual dewatering measures in support of the Environmental Assessment.

Key conclusions are as follows:

- The groundwater assessment is supported by two investigation phases: (i) snapshot groundwater level measurements and packer testing during the 2023–2024 drilling program, and (ii) a February 2026 hydrogeological program including construction of dedicated wells and a 72-hour pumping test. The 2026 test provides aquifer-scale constraints on transmissivity and storage to refine model parameterisation.
- Long-term groundwater level records are not yet available to characterise seasonal variability. Available data indicate groundwater flow is controlled by a fractured bedrock system with variable hydraulic conductivity, providing a suitable conceptual basis for PFS-level assessment.
- Available data indicate groundwater flow is controlled by a fractured bedrock system with relatively low hydraulic conductivity and limited well yield. Pumping test outcomes indicate that sustainable pumping rates or vertical dewatering wells are modest (on the order of ~8 GPM per well), which is a key practical constraint for vertical dewatering performance.
- Predictive simulations for the final LOM pit indicate that passive (base case) conditions produce higher groundwater inflows than artificial dewatering scenarios. However, updated scenario comparisons indicate that vertical dewatering (Scenario B) provides only limited incremental depressurisation relative to the passive base case, whereas horizontal dewatering (Scenario C) provides a more meaningful and practical depressurisation mechanism in the low-K setting. The preferred dewatering approach for design-level assessment is therefore aligned with Scenario C.
- Numerical modelling indicates that mining-induced drawdown is spatially limited and largely confined to the vicinity of the pit. Under the passive base case, the predicted drawdown footprint remains localised; vertical dewatering does not materially extend drawdown relative to the base case, while horizontal dewatering produces a more discernible modification to the drawdown footprint in targeted directions. This redistribution of drawdown also results in localised changes in simulated groundwater discharge (baseflow) to nearby surface water features, as reflected by changes in groundwater flux through the river/creek boundary conditions.
- Predicted drawdown is spatially limited under the current screening-level assessment and is largely confined to the vicinity of the pit. Following cessation of mining and dewatering, simulated groundwater heads indicate progressive recovery toward pre-mining conditions across all model observation points. Recovery is rapid in the early post-closure period, with most locations exceeding ~90% rebound by approximately Day 851–1056 and reaching ~96–100% rebound by around Day 1606. Thereafter, recovery trends flatten, with rebound percentages remaining essentially unchanged between approximately Day 2645 and Day

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3575, indicating the groundwater system has approached a post-closure hydraulic equilibrium and that any residual differences from pre-mining levels are minor.

- Sensitivity analysis indicates that predictions remain most influenced by uncertainty in fractured bedrock hydraulic parameters and structural connectivity. The February 2026 field investigation and pumping test program has reduced uncertainty in key hydraulic parameters (transmissivity and storativity) at South Ridge; however, residual uncertainty remains due to spatial variability and limited test coverage. Despite uncertainty in absolute magnitudes, the relative conclusions regarding localised drawdown and the comparative effectiveness of dewatering options remain consistent and suitable for screening/PFS-level decision-making.

## 6.2 Recommendations

Based on the groundwater modelling results, sensitivity analysis, and identified uncertainties, the following recommendations are provided to support groundwater management during mine development, operation, and closure:

- Groundwater Monitoring Program

  A targeted groundwater monitoring program should be implemented prior to and during mining operations to verify model predictions and support adaptive groundwater management. The monitoring program should be designed to:

  - Capture temporal and spatial variations in groundwater levels and groundwater quality under pre-mining, mining, and post-closure conditions.
  - Track the development and extent of mining-induced groundwater drawdown, particularly along structurally controlled flow paths.
  - Confirm groundwater recovery trends following cessation of dewatering, while providing early warning of unanticipated groundwater responses.
  - Establish continuous (logger-based) groundwater level monitoring across key hydrostratigraphic units, with monitoring points located at varying distances from the pit (e.g., near-field within the predicted drawdown footprint/area of influence, intermediate locations, and far-field/background locations beyond the expected influence); and
  - Where practicable, include nested piezometers to characterise vertical hydraulic gradients and distinguish responses between the overburden/weathered zone and fractured bedrock.

- Dewatering System Optimisation

  The artificial dewatering configuration assessed in the predictive modelling should be reviewed and optimised as additional hydrogeological data become available. Reliable datasets to refine groundwater inflow estimates and evaluate the feasibility and effectiveness of potential depressurization methods.

- Model Update and Refinement

  The groundwater model should be periodically updated as new groundwater level data, inflow measurements, and geological information become updated. Model refinement will improve confidence in inflow predictions, drawdown extent, and recovery timeframes over the life of the project.

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# Appendix 6.4-2: Groundwater Quality Existing Conditions: South Ridge Project

# GROUNDWATER QUALITY EXISTING CONDITIONS: SOUTH RIDGE PROJECT

PREPARED FOR:
CANADA FLUORSPAR INC.

CFI-25-01-02

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# EXECUTIVE SUMMARY

This report describes the existing groundwater quality conditions for the South Ridge Project to support the Environmental Assessment. The site setting, hydrogeological conceptualisation, and existing groundwater quantity conditions for the South Ridge Project are documented in a separate Technical Note prepared by others. The Regional Study Area and Local Study Area extents for groundwater are consistent with those defined for surface water. The groundwater system within the South Ridge Project area is characterised by shallow groundwater in overburden and weathered materials overlying a low permeability, fracture dominated crystalline bedrock aquifer, with groundwater occurrence and flow strongly influenced by structural features. The groundwater quality existing conditions characterization included a review of water rights licenses, groundwater use, and a limited review of historical groundwater quality results from the AGS Mine area. Because no site-specific groundwater quality data were available for the South Ridge Project area, a targeted field investigation was undertaken in February 2026. Existing groundwater quality was characterized from two rounds of samples collected by CFI from one pumping well and two observation wells during a 72-hour constant-rate pumping test. The 2026 groundwater quality laboratory results were assessed by comparing detectable concentrations to provincial and federal water quality guidelines. Samples were compared to drinking water guidelines as a screening exercise only and it is emphasized that the guidelines do not strictly apply since the samples were not collected from a point of drinking water consumption. Newfoundland and Labrador does not have groundwater quality guidelines for the protection of aquatic life, so samples were conservatively screened against federal surface water guidelines.

For total chlorine, hexavalent chromium, cobalt, copper, mercury, and selenium, laboratory Reporting Detection Limits were at or above applicable water quality guidelines so re-sampling and analysis with lower RDLs would be required to determine whether sample concentrations exceeded guidelines.

Samples collected in the South Ridge Project area in February 2026 met Newfoundland and Labrador Environmental Control Water and Sewage Regulations 65/03 and the CFI Certificate of Approval guidelines. Samples collected from all locations exceeded long-term chronic CCME/FEQG and drinking water guidelines for fluoride. Samples collected from PW1 exceeded CCME/FEQG short-term acute and drinking water guidelines for total and dissolved uranium while samples from the observation wells did not exceed any guidelines for uranium. At least one sample from all locations exceeded drinking water guidelines for manganese and CCME/FEQG long-term chronic guidelines for cadmium. For the observation wells, an exceedance of CCME/FEQG long-term chronic guidelines was observed in at least one sample for total chlorine, WAD cyanide, aluminum, cobalt, copper, iron, manganese, silver, and zinc.

Except for uranium, the South Ridge groundwater chemistry and exceedances are consistent with the groundwater quality monitoring conducted by CFI around the AGS Mine and Tarefare intake in past years.

As the focus of the groundwater assessment was on the pit dewatering, the wells were located within the immediate vicinity of the pit. Groundwater quality in the aquifer outside of the immediate vicinity of the pit should be confirmed by drilling and collecting samples from groundwater monitoring wells installed in the aquifer at various depths at the upgradient and downgradient Project boundaries as part of a targeted groundwater monitoring program implemented prior to and during mining operations to verify groundwater and surface water numerical model predictions and support adaptive groundwater management.

# ACKNOWLEDGMENTS

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# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| **µS/cm** | microsiemens per centimetre |
| **Ca** | Calcium |
| **CCME** | Canadian Council of Ministers of the Environment |
| **CFI** | Canada Fluorspar Inc. |
| **Cl** | Chloride |
| **ECCC** | Environment and Climate Change Canada |
| **ECWSR** | Environmental Control Water and Sewage Regulations |
| **FEQG** | Federal Environmental Quality Guidelines |
| **HC** | Health Canada |
| **$HCO_3$** | Sodium Carbonate |
| **LSA** | Local Study Area |
| **m** | metres |
| **masl** | metres above sea level |
| **mbgs** | meters below ground surface |
| **mg/L** | milligrams per litre |
| **mg-N/L** | milligrams nitrogen per litre |
| **mg-P/L** | milligrams phosphorus per litre |
| **MPN/100 mL** | most probable number per 100 millilitres |
| **Na** | Sodium |
| **NL** | Newfoundland and Labrador |
| **NPI** | Newfoundland Power Inc. |
| **NTU** | nephelometric turbidity unit |
| **QA/QC** | Quality Assurance/Quality Control |
| **RDL** | Reporting Detection Limit |
| **RSA** | Regional Study Area |
| **TCU** | true colour unit |
| **UTM** | Universal Transverse Mercator |
| **WAD** | Weak Acid Dissociable |

# 1 BACKGROUND

## 1.1 SITE SETTING

The site setting, hydrogeological conceptualisation, and existing groundwater quantity conditions for the South Ridge Project (the "Project") are documented in a separate Technical Note prepared by others to support the Project Environmental Assessment (Mining One 2026). The Regional Study Area (RSA) and Local Study Area (LSA) extents for groundwater are defined as being consistent with those for surface water and are shown on Figure 1.2-1. The groundwater system within the South Ridge Project area is characterised by shallow groundwater in overburden and weathered materials overlying a low-permeability, fracture-dominated crystalline bedrock aquifer, with groundwater occurrence and flow strongly influenced by structural features. Because historical groundwater quality data was limited to the AGS Mine area and no site-specific groundwater quality data were available for the South Ridge Pit area, a targeted field investigation was undertaken in early 2026 to establish existing groundwater conditions, including water quality. Locations of the South Ridge Pit groundwater quality sampling locations are shown on Figure 1.2-3.

## 1.2 INFORMATION REVIEW AND GAP ANALYSIS

The groundwater quality existing conditions characterization included a review of available information and data gap analysis (Mining One 2025) that informed the scope of work for the field sampling and data analysis. Sources of information reviewed included:

- St. Lawrence Fluorspar Project Pre-Feasibility Study: Hydrological Aspects. Technical Report, October 2009 (Scott Wilson 2009).
- St. Lawrence Fluorspar Project Mine Development Plan (CFI 2025).
- Hydrogeology Phase 1 Investigation. Report prepared for Canada Fluorspar Inc. (Golder 2015a).
- Factual Report. Fluorspar Mine Site – Phase 2 Hydrogeology Work (Golder 2015b).
- Environmental Preview Report Pursuant to the Newfoundland and Labrador Environmental Protection Act. AGS Fluorspar Project St. Lawrence, NL, Volume 2, Appendix F – Surface Water and Groundwater Quality Monitoring Program (CFI 2015).
- Fluorspar Mine Site – Numerical Groundwater Flow Modelling of Groundwater Inflow and Drawdown (Golder 2016).
- St. Lawrence Fluorspar Project – Site-Wide Water Management Plan (Knight Piésold Ltd. 2017).
- Hydrogeological Observations and Results from Phase I and Phase II Geotechnical Drilling Program in the AGS Pit Area and South Ridge (Director Surface) Resource Area (Piran 2024).
- Water Quality Monitoring Well Relocation (Piran 2024).
- Hydrogeology Field Investigation Work Plan (Mining One 2025).
- Groundwater quality monitoring program maps and data provided by Canada Fluorspar Inc. (CFI 2026).
- Publicly available water resources information and mapping from Newfoundland and Labrador Water Resources Portal (NL 2026).
- The groundwater conceptual model for South Ridge existing conditions (Mining One 2026).

Locations of historical and recently drilled monitoring wells are shown on Figure 1.2-2 for the AGS Mine area and Figure 1.2-3 for the South Ridge area. A summary of well construction information, including screened interval is provided in Table 1.2-1.

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# SOUTH RIDGE MINE

## FIGURE 1-1
## REGIONAL AND LOCAL STUDY AREAS

APRIL, 2026

- Proposed New Road
- Existing Road Upgrades
- Local Study Area
- Regional Study Area
- Proposed Project Infrastructure

Monitoring Locations

- Intake
- Active Monitoring Well
- Inactive Monitoring Well
- Pumping Well

Scale: 1:40,000
when printed on 11 by 17 inch paper

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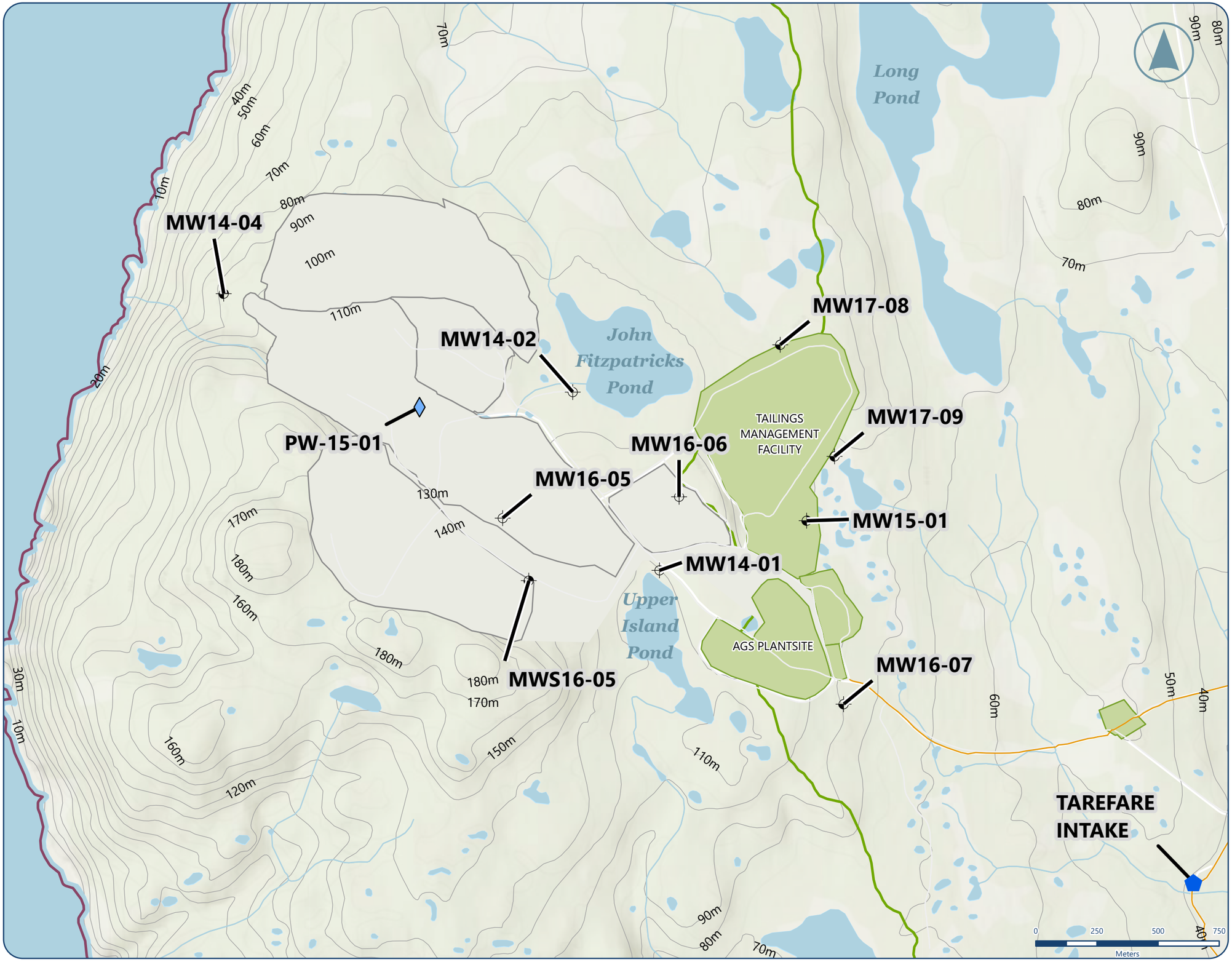


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# SOUTH RIDGE MINE

## FIGURE 1-2
## GROUNDWATER MONITORING LOCATIONS – AGS MINE AREA

APRIL, 2026

- Proposed New Road
- Existing Road Upgrades
- CanVec Contour
- Local Study Area
- Regional Study Area
- Existing AGS Mine Infrastructure
- Shared AGS Mine Infrastructure
- Proposed Project Infrastructure

Monitoring Locations

- Active Monitoring Well
- Inactive Monitoring Well
- Intake
- Pumping Well

Scale: 1:15,000
when printed on 11 by 17 inch paper

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# SOUTH RIDGE MINE

## FIGURE 1-3
## GROUNDWATER MONITORING LOCATIONS - SOUTH RIDGE AREA

APRIL, 2026

- Proposed New Road
- Existing Road Upgrades
- CanVec Contour
- Local Study Area
- Regional Study Area
- Proposed Project Infrastructure

Monitoring Locations

- Active Monitoring Well
- Inactive Monitoring Well
- Pumping Well

Scale: 1:15,000
when printed on 11 by 17 inch paper

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BH1
OBS-01 (DS-2025-234)
PW1 (DS-2025-236)
BH8
OBS-02 (DS-2025-235)
TOPSOIL STOCKPILE
OVERBURDEN STOCKPILE
MINE ROCK STOCKPILE
SOUTH RIDGE PIT
IRON SPRINGS CAMPSITE
Blue Beach Cove
Shoal Cove Pond
Hares Ears Pond
Shoal Cove Brook
Salt Cove Brook
Shoal Cove
Salt Cove
0 250 500 750
Meters

**Table 1.2-1: Summary of Existing Monitoring Wells at AGS Mine and South Ridge**

| Borehole ID | Status | Well Depth [mbgs] | Screen Top [mbgs] | Top of Bedrock [mbgs) | Screened Material | Water Level [mbgs] |
|---|---|---|---|---|---|---|
| MW14-01A | Inactive | 6.4 | 4.9 | 6.8 | Gravel and cobbles | 0.28 |
| MW14-01B | Inactive | 1.9 | 0.4 | - | Sand & gravel; some silt | 0.41 |
| MW14-02A | Inactive | 8.5 | 7.0 | 4.8 | Bedrock | 2.90 |
| MW14-02B | Inactive | 1.8 | 0.3 | - | Gravelly; silty sand | 0.74 |
| MW14-03A | Inactive | 5.5 | 4.0 | 2.4 | Bedrock | 0.60 |
| MW14-03B | Inactive | 1.8 | 0.3 | - | Sandy gravel; trace silt | 0.14 |
| MW14-04A | Active | 6.4 | 4.9 | 2.0 | Bedrock | 0.49 |
| MW14-04B | Inactive | 1.6 | 0.1 | - | Sandy gravel; trace silt | 0.03 |
| MW-15-01 | Active | 100.6 | N/A | - | Not screened - open hole bedrock | - |
| MW-15-02 | Inactive | 100.6 | N/A | - | Not screened - open hole bedrock | - |
| MW16-05 (old) | Inactive | - | - | - | - | - |
| MW16-05-D (new) | Active | 10.8 | 9.7 | 5.4 | Bedrock | 8.20 |
| MW16-05-S (new) | Active | 4.8 | 3.9 | 5.9 | Fine to medium sand | 4.40 |
| MW16-06 | Inactive | - | - | - | - | - |
| MW16-07 | Active | - | - | - | - | - |
| MW17-08 | Active | - | - | - | - | - |
| MW17-09 | Active | - | - | - | - | - |
| PW1 (DS-2025-236) | Active | 80.0 | 10.0 | 16.7 | Bedrock | 22.43 |
| OBS-01 (DS-2025-234) | Active | 80.0 | 6.5 | 17.4 | Bedrock | 10.85 |
| OBS-02 (DS-2025-235) | Active | 80.0 | 6.5 | 7.0 | Bedrock | 16.75 |

*Note: - Indicates data not available and N/A indicates not applicable.*

## 1.3 WATER RIGHTS LICENSES AND GROUNDWATER USE

Within the LSA and RSA, no public water supply supplies, intakes, or wellheads were identified, and the only water rights licenses identified were for industrial use by CFI or water power rental generation (waterpower) by Newfoundland Power Inc. The identified water rights licenses are for surface water sources, except one CFI license for Tarefare intake, which is a groundwater source and is shown on Figure 1.2-2. CFI indicated there is not currently any water used at the AGS Mine for potable purposes nor will there be for the Project. Land use in the area as described within the AGS Mine Development Plan (CFI 2025) indicates that there are some homes (permanent residential dwellings) located on privately owned properties and some registered cabins in the Project area. The water sources for these dwellings were not identified; however, given that regional hydrogeological conditions indicate that the underlying bedrock is low to moderate yield and no wells or intakes are mapped in the area (NL 2026), it is inferred that there are no water supply wells within the LSA or RSA.

**Table 1.3-1: Summary of Active Water Rights Licenses within RSA**

| Water Use License No. | Licensee | Designated Purpose | Title | Issue Date | Expiry Date | Study Area Within |
|---|---|---|---|---|---|---|
| WUL-24-14018 | CFI | Industrial (Mining) | Water Withdrawal and Use from Tarefare Mine Shaft (near St. Lawrence) | 2024-10-22 | 2029-10-22 | LSA, RSA |
| WUL-24-13533 | CFI | Industrial (General Purpose) | Water Withdrawal and Use from Clarke's Pond (near St. Lawrence) | 2024-03-12 | 2029-03-12 | LSA, RSA |
| WUL-23-12987 | CFI | Industrial (General Purpose) | Water Withdrawal and Use from Upper Island Pond near the Town of St. Lawrence | 2023-03-09 | 2028-03-09 | RSA |
| WUL-22-12853 | CFI | Industrial (General Purpose) | Water Withdrawal and Use from John Fitzpatricks Pond near St. Lawrence for Industrial Purposes | 2022-11-17 | 2027-11-17 | RSA |
| WUL-22-12852 | CFI | Industrial (Mining) | Water Withdrawal and Use from Unnamed Bodies of Water to Maintain Operation Water Volume for Tailings and Polishing Ponds of St. Lawrence Fluorspar Project near the Town of St. Lawrence | 2022-11-17 | 2027-11-17 | LSA, RSA |
| WUL-22-12351 | NPI | Water Power Generation | Water Use for West Brook Hydroelectric Power Generating Plant, St. Lawrence | 2022-05-12 | 2027-05-12 | RSA |
| WUL-22-12344 | NPI | Water Power Generation | Water Use for Fall Pond Hydroelectric Power Generating Plant, Little St. Lawrence | 2022-03-31 | 2027-03-31 | RSA |

*CFI= Canada Fluorspar Inc., NPI = Newfoundland Power Inc.*

## 1.4 HISTORICAL GROUNDWATER QUALITY

No historical groundwater quality information is available for the South Ridge area although the AGS Mine Environmental Preview Report Appendix F Surface Water and Groundwater Quality Monitoring Program (CFI 2015), shows two sets of boreholes adjacent to Shoal Cove Pond, BH1 and BH2 (Figure 1.2-3 in this report).

Historical groundwater quality samples were collected in the AGS Mine area in 2014 and 2015 as part of the groundwater existing conditions assessment for the Environmental Preview Report (Golder 2015a and 2015b). Samples collected in 2014 were only compared to drinking water guidelines (Health Canada [HC]) by Golder and all noted exceedances were for aesthetic guidelines. Samples collected in 2015 were compared to drinking water guidelines (HC), the CCME surface water quality guidelines for the protection of aquatic life (CCME 1999), and the Newfoundland and Labrador (NL) Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003) by Golder. Results of 2015 sampling indicated that groundwater from some locations exceeded guidelines for fluoride and some metals, as shown in Table 1.4-1, which summarizes the locations where at least one sample exceeded the water quality guideline in the 2014 and 2015 sampling programs as reported in the original documents.

**Table 1.4-1: Summary of 2015 AGS Mine Area Groundwater Quality Guideline Exceedances as Reported in Original Reports**

| Parameter | ECWSR | CCME Short-Term Acute | Drinking Water[(a)] |
|---|---|---|---|
| Fluoride | - | PW-15-01, Tarefare | PW-15-01 |
| Total Cadmium | - | PW-15-01 | - |
| Total Copper | - | PW-15-01 | - |
| Total Lead | - | PW-15-01 | PW-15-01 |
| Total Manganese | - | - | Tarefare |
| Total Phosphorous | - | PW-15-01, Tarefare | - |
| Total Zinc | PW-15-01, Tarefare | PW-15-01 | - |
| Dissolved Zinc | - | OBS-01 | - |

*(a) Drinking water quality guidelines shown for maximum acceptable concentration as defined by Health Canada in 2014 to 2015 and excludes aesthetic objectives.*

Groundwater quality sampling in the AGS Mine area has continued since the 2014 to 2015 existing conditions study with some monitoring wells being deactivated and some new monitoring wells being drilled. Groundwater quality sampling is currently conducted by CFI on a quarterly basis as in accordance with the Certificate of Approval No. AA22-085691 (NL 2022). Results are screened against the certificate's effluent discharge criteria and reported to regulatory agencies as required. The AGS Mine area monitoring well with the longest period of record and located upgradient of the mine activities is MW14-04, which has monitoring results available for the period from September 2016 to December 2025 at the time of writing. The only recorded Certificate of Approval effluent guideline which has been exceeded in MW14-04 is for turbidity.

# 2 FEBRUARY 2026 GROUNDWATER QUALITY METHODS

## 2.1 FIELD SAMPLING

A dedicated hydrogeological field program was completed in January and February 2026 to support aquifer testing and to establish groundwater monitoring infrastructure at the South Ridge Mine area. Drilling, well construction, and pumping test activities were designed by Mining One, which provided field supervision of contractors and documented the results in a Technical Note for the Project Environmental Assessment (Mining One 2026).

During this program, one pumping well (PW1) and two observation wells (OBS-01 and OBS-02) were installed (Table 2.1-1). PW1 was installed centrally within the test area adjacent to the northern boundary of the proposed South Ridge Pit, with the observation wells (OBS-01 and OBS-02) located approximately 100 m to the northwest and southeast (Table 2.1-1). All three wells were drilled vertically. Two groundwater samples from each of the three wells were collected by CFI and submitted for laboratory analysis to evaluate the existing water quality conditions. Falkirk advised CFI on the timing of sample collection from the locations during the pumping test, recommended quality assurance/quality control (QA/QC) samples, and water quality parameters for analysis. The first set of samples was collected one hour after the start of the constant-rate pumping test, and the second set of samples was collected before the end of the constant-rate pumping test to evaluate potential changes in groundwater chemistry during the pumping test.

**Table 2.1-1: Summary of February 2026 Groundwater Quality Sampling Locations and Parameters**

| Site ID | Collar Coordinate (UTM 21T) | | Elevation (masl) | Total Depth (mbgs) | Screen Top (mbgs) | Dominant Lithology | Sample Count |
|---|---|---|---|---|---|---|---|
| | Easting | Northing | | | | | |
| PW-1 | 621516 | 5194629 | 52.02 | 80 | 10 | Bedrock | 2 |
| OBS-01 | 621452 | 5194705 | 50.28 | 80 | 6.5 | Bedrock | 2 |
| OBS-02 | 621595 | 5194566 | 52.87 | 80 | 6.5 | Bedrock | 2 |
| Sampling Parameters | **Field Measured**: Field pH, Field specific conductivity, Field water temperature, Field dissolved oxygen<br>**Conventional Parameters**: Acidity (as $CaCO_3$), pH, Conductivity, Hardness, Total alkalinity (as $CaCO_3$), Total dissolved solids, Total suspended solids, Total organic carbon, Dissolved organic carbon, Colour, Turbidity<br>**Major Ions**: Bromide, Calcium, Chloride, Fluoride, Magnesium, Potassium, Sodium, Sulphate<br>**Nutrients**: Total ammonia (as N), Nitrate (as N), Nitrite (as N), Total Kjeldahl nitrogen, Total nitrogen, Ortho-phosphate, Total phosphorus, Dissolved phosphorus, Cyanide (WAD)<br>**Other Parameters**: Radium 226, Phenols, Sulphide, Total Chlorine, Coliform-faecal, Coliform-total<br>**Total Metals**: Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc<br>**Dissolved Metals**: Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silicon, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc | | | | | | |
| QA/QC Samples | One field blank and one trip blank was collected for each set of groundwater samples. | | | | | | |

*masl = metres above sea level; $CaCO_3$ = calcium carbonate; WAD = weak acid dissociable.*

QA/QC procedures govern all aspects of data collection and analysis including field methods, laboratory analysis, data management and analysis, and reporting. The procedures are applied to demonstrate that the data collected are of acceptable quality to address the objectives of each program.

Quality control (QC) samples are used to detect and quantify systemic errors that can occur during sampling and laboratory analysis. One field blank and one trip blank QA/QC sample were collected for each set of groundwater samples for the February 2026 groundwater field program. The laboratory analyses included standard quality assurance analyses such as laboratory duplicates, reference samples, method blank spike, and matrix spikes.

Trip and field blank samples were used to assess the potential sources of contamination related to conditions during sample collection, shipping, and laboratory analysis. For trip blanks, deionized water was provided in sampling bottles by the analytical laboratory and remained unopened in the field. For field blanks, deionized water was provided in jugs and was used by CFI to fill sampling bottles provided by the analytical laboratory while in the field. Blank samples were shipped, handled, stored, treated the same as other samples collected during the field program, and were submitted to the analytical laboratory along

with the field samples. Analytical results were considered notable when concentrations in blank samples exceeded five times the reporting detection limit (RDL).

## 2.2 Data Analysis

Newfoundland and Labrador does not have provincial guidelines that are specific to groundwater quality. Therefore, detectable groundwater quality results were compared to the following guidelines:

- Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines for surface water (FEQGs; ECCC 2024).
- Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG.
- Guidelines for Drinking Water Quality in Newfoundland and Labrador (NL 2025) and/or Guidelines for Canadian Drinking Water Quality (HC 2025) maximum acceptable concentrations.
- Newfoundland and Labrador (NL) Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003).
- CFI Certificate of Approval No. AA22-085691 - Effluent Discharge Criteria.

Water quality guideline values were calculated for each individual sample using sample-specific exposure and toxicity modifying factors (ETMFs), including dissolved organic carbon (DOC), hardness, pH, and/or temperature, as applicable. Guideline exceedances were identified for detectable concentrations. Instances of RDLs exceeding guidelines are discussed in Section 3.2.

All metal results were compared to guidelines for both total and dissolved metal fractions for the purposes of this assessment. In the absence of an FEQG, results were screened against CCME long-term/chronic and short-term/acute surface water quality guidelines for the protection of aquatic life, as groundwater dewatered from the pit will be pumped to settling ponds prior to discharge to surface water.

Results were compared to Canadian Drinking Water Quality guidelines as a screening exercise only. It is emphasized that these guidelines do not strictly apply since the samples were not collected from a point of drinking water consumption.

# 3 FEBRUARY 2026 GROUNDWATER QUALITY RESULTS

Groundwater quality results characterization for samples from PW-1, OBS-01 and OBS-02 are summarized below. Detailed laboratory results tables are provided in Appendix A.

## 3.1 Groundwater Quality Screening

### 3.1.1 PW-1

Groundwater at PW-1 is characterized as fresh (total dissolved solids range of 152 to 194 mg/L) calcium–bicarbonate water with secondary chloride influence. The water was slightly alkaline with field pH values ranging from 7.5 to 8.1, and alkalinity ranging from 98 to 151 mg/L as $CaCO_3$. This water is moderately soft to hard (hardness range of 101 to 162 mg/L), well-oxygenated (dissolved oxygen range of 6.5 to

14 mg/L), and low organic carbon content (total organic carbon of 1.2 to 2.7 mg/L and DOC range of 1.0 to 2.4 mg/L).

The concentrations of most parameters measured at PW-1 were below the relevant guidelines, or within the guideline range for pH, except for the parameters shown in Table 3.1-1 and summarized below, in at least one sample:

**Short-Term Acute (FEQG/CCME):**

- Total and dissolved uranium

**Long-Term Chronic (FEQG/CCME):**

- Fluoride
- Total cadmium
- Total and dissolved uranium

**Drinking Water (NL/HC):**

- Fluoride
- Total coliforms
- Total manganese
- Dissolved manganese
- Total and dissolved uranium

**Table 3.1-1: Summary of Guideline Exceedances at PW-1**

| Parameter | Units | PW1 | |
|---|---|---|---|
| | | 2-Feb-26 | 5-Feb-2026 |
| Fluoride | mg/L | 1.44$^{(LC)}$ | 1.85$^{(LC, D)}$ |
| Coliform - total | MPN/100 mL | 2$^{(D)}$ | - |
| Total Cadmium | mg/L | 0.00017$^{(LC)}$ | - |
| Total Manganese | mg/L | 0.499$^{(D)}$ | - |
| Total Uranium | mg/L | 0.0419$^{(SA, LC, D)}$ | 0.0516$^{(SA, LC, D)}$ |
| Dissolved Manganese | mg/L | 0.473$^{(D)}$ | - |
| Dissolved Uranium | mg/L | 0.039$^{(SA, LC, D)}$ | 0.0512$^{(SA, LC, D)}$ |

*(SA) = concentration above the short-term acute FEQG or CCME guideline for the protection of aquatic life.*
*(LC) = concentration above the long-term chronic FEQG or CCME guideline for the protection of aquatic life.*
*(D) = concentration above drinking water guidelines (NL and/or HC).*
*MPN/100 mL = most probable number per 100 millilitres; - = no exceedances.*

### 3.1.2 OBS-01

Groundwater at OBS-01 was characterized as fresh (total dissolved solids from 90 to 94 mg/L calcium–bicarbonate water with notable sodium and chloride influence. This water is soft (hardness range of 54 to 56 mg/L), well oxygenated (7.6 to 9.6 mg/L dissolved oxygen), and with low organic carbon content (total organic carbon range of 1.3 to 2.8 mg/L and DOC range of 0.8 to 1.2 mg/L). The water was neutral to

slightly acidic with field pH values ranging from 6.8 to 8.2 and with alkalinity ranging from 43 to 47 mg/L as $CaCO_3$.

Parameters measured at OBS-01 were below the relevant guidelines, or within the guideline range for pH, except for the following parameters in at least one sample (Table 3.1-2):

**Long-Term Chronic (FEQG/CCME):**

- Fluoride
- Weak acid dissociable cyanide
- Total and dissolved aluminum
- Total and dissolved cadmium
- Total copper
- Total iron
- Total silver
- Total and dissolved zinc

**Drinking Water (NL/HC):**

- Fluoride
- Faecal coliforms
- Total coliforms
- Total manganese

**Table 3.1-2: Summary of Guideline Exceedances at OBS-01**

| Parameter | Units | OBS-01 | |
|---|---|---|---|
| | | 3-Feb-2026 | 5-Feb-2026 |
| Fluoride | mg/L | 2.49(LC, D) | 2.22(LC, D) |
| Cyanide (WAD) | mg/L | - | 0.007(LC) |
| Coliform - faecal | MPN/100 mL | - | 1(D) |
| Coliform - total | MPN/100 mL | 32(D) | 37(D) |
| Total Aluminum | mg/L | 1.25(LC) | 1.15(LC) |
| Total Cadmium | mg/L | 0.00018(LC) | 0.0002(LC) |
| Total Copper | mg/L | 0.008(LC) | - |
| Total Iron | mg/L | 1.05(LC) | 0.688(LC) |
| Total Manganese | mg/L | 0.15(D) | 0.128(D) |
| Total Silver | mg/L | - | 0.0006(LC) |
| Total Zinc | mg/L | 0.016(LC) | 0.029(LC) |
| Dissolved Aluminum | mg/L | 0.618(LC) | 0.759(LC) |
| Dissolved Cadmium | mg/L | 0.00013(LC) | 0.00015(LC) |
| Dissolved Zinc | mg/L | 0.007(LC) | - |

*(LC) = concentration above the long-term chronic FEQG or CCME guideline for the protection of aquatic life.*
*(D) = concentration above the Drinking Water Guidelines (NL and/or HC).*
*WAD = weak acid dissociable; MPN/100 mL = most probable number per 100 millilitres; - = no exceedances.*

### 3.1.3 OBS-02

Groundwater at OBS-02 was characterized as a fresh (dissolved solids range from153 to 164 mg/L) calcium–bicarbonate water with minor chloride influence. The water was slightly acidic to slightly basic with field pH values of 6.8 to 7.4, with alkalinity ranging from 105 to 113 mg/L as $CaCO_3$. It is moderately hard (hardness of 112 to 128 mg/L), well oxygenated (6.9 to 9.6 mg/L dissolved oxygen), and with low organic carbon content (DOC range of 0.9 to 2.6 mg/L and total organic carbon range of 1.0 to 1.7 mg/L).

Parameters measured at OBS-02 were below the relevant guidelines, or within the guideline range for pH, except for the following parameters in at least one sample (Table 3.1-3):

**Long-Term Chronic (FEQG/CCME):**

- Fluoride
- Total chlorine
- Total aluminum
- Total and dissolved cadmium
- Total cobalt
- Total iron
- Dissolved manganese

**Drinking Water (NL/HC):**

- Fluoride
- Faecal coliforms
- Total coliforms
- Total and dissolved manganese

**Table 3.1-3: Summary of Guideline Exceedances at OBS-02**

| Parameter | Units | OBS-02 | |
|---|---|---|---|
| | | 03-Feb-2026 | 05-Feb-2026 |
| Fluoride | mg/L | 1.71 (LC, D) | 1.21 (LC) |
| Total Chlorine | mg/L | - | 0.07 (LC) |
| Coliform - faecal | MPN/100 mL | - | 4 (D) |
| Coliform - total | MPN/100 mL | 10 (D) | 22 (D) |
| Total Aluminum | mg/L | 1.01 (LC) | 1.01 (LC) |
| Total Cadmium | mg/L | 0.00064 (LC) | 0.00075 (LC) |
| Total Cobalt | mg/L | 0.002 (LC) | 0.002 (LC) |
| Total Copper | mg/L | - | 0.011 (LC) |
| Total Iron | mg/L | 1.39 (LC) | 1.48 (LC) |
| Total Manganese | mg/L | 1.79 (LC, D) | 1.89 (LC, D) |
| Dissolved Cadmium | mg/L | 0.00049 (LC) | 0.0004 (LC) |
| Dissolved Manganese | mg/L | 1.38 (LC, D) | 1.3 (LC, D) |

*(LC) = concentration above the long-term chronic FEQG or CCME guideline for the protection of aquatic life.*
*(D) = concentration above Drinking Water Guidelines (NL and/or HC).*
*MPN/100 mL = most probable number per 100 millilitres; - = no exceedances.*

## 3.2 QA/QC

Results of the laboratory analyses for the two field blank samples and the two trip blank samples are presented in Appendix B. Blank samples with results exceeding the quality control criterion of five times the RDL (US EPA 2000) are summarized in Table 3.2-1. Concentrations met the quality control criteria for all parameters in field blanks and for >96% of the tested parameters in trip blanks. The results of the QA/QC program indicate low potential for contamination during sampling, shipping, and analysis.

**Table 3.2-1: Groundwater Blank Samples Exceeding the Quality Control Criteria**

| Parameter | Unit | RDL | Trip Blank 2026-02-03 7458046 | Trip Blank 2026-02-05 7466182 |
|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1 | - | 7 |
| Reactive Silica | mg/L | 0.5 | - | 3.9 |
| Sodium | mg/L | 0.1 | - | 2.4 |
| Total Aluminum | µg/L | 5 | 39 | - |
| Total Zinc | µg/L | 5 | - | 167 |

*Note: Grey shaded cells indicate concentrations were greater than five times the RDL quality control criteria and were considered notable.*
*RDL = reporting detection limit, - = no exceedances.*

Total phosphorus results analyzed using colorimetric method were retained in the dataset; it was noted that total phosphorus results analyzed using inductively coupled mass spectrometry (ICP-MS) were consistently higher than the colorimetric results by up to three orders of magnitude in all groundwater samples. For some parameters, laboratory RDLs were greater than or equal to the water quality guidelines, and detection limits were too high to determine whether concentrations met or exceeded water quality guidelines (Table 3.2-2). Re-sampling using analytical methods with lower RDLs would be required to determine whether sample concentrations exceeded guidelines.

**Table 3.2-2: Parameter RDLs Equal to or Exceeding Guideline Values**

| Parameter | Unit | RDL | Guideline |
|---|---|---|---|
| Total Chlorine | mg/L | 0.05 | 0.0005[(b)] |
| Hexavalent Chromium | mg/L | 0.005 | 0.005[(a)] |
| Cobalt | mg/L | 0.001 | 0.00079 - 0.0012[(a)] |
| Copper | mg/L | 0.001 (total); 0.002 (dissolved) | 0.00024 - 0.0015[(a)] |
| Mercury | mg/L | 0.000026 | 0.000026[(b)] |
| Selenium | mg/L | 0.001 | 0.001[(b)] |

*Note: The reporting detection limit (RDL) is for both total and dissolved fraction unless otherwise noted.*
*(a) Federal Environmental Quality Guideline for surface water (ECCC 2024). The range presented is for February 2026 samples.*
*(b) Guideline is the Canadian Council of Ministers of the Environment (CCME) long-term chronic surface water quality guideline for the protection of aquatic life (CCME 1999).*

## 3.3 SPATIAL AND TEMPORAL PATTERNS

Plots prepared to visually assess for potential spatial and temporal patterns in results of the February 2026 groundwater quality sampling include a piper plot (Figure 3.3-1) and comparison plots of key field parameters and parameters exceeding one or more guidelines (Appendix C).

Hydrochemically, PW1 and OBS-02 are classified as Ca–$HCO_3$-type waters, whereas OBS-01 is also Ca–$HCO_3$-type, but trends toward a mixed Ca–Na–$HCO_3$–Cl composition. Field pH, and concentrations of fluoride were similar for all locations. Concentrations of dissolved and total uranium were greater at PW1 than for the observation wells (OBS-01 and OBS-02). For WAD cyanide and most metals that exceeded long-term chronic guidelines (dissolved and total aluminum, dissolved and total cadmium, dissolved and total copper, total iron and dissolved and total manganese) concentrations tended to be greater in the observation wells than in the pumping well. This is most likely attributed to well development and sampling factors since total suspended solids and turbidity were generally higher in the observation wells, which were sampled using a small diameter inertial pump that can entrain fine-grained sediment. In contrast, the pumping well is likely more developed due to pumping with the submersible pump.

No clear temporal trends were identified due to only two sampling events.

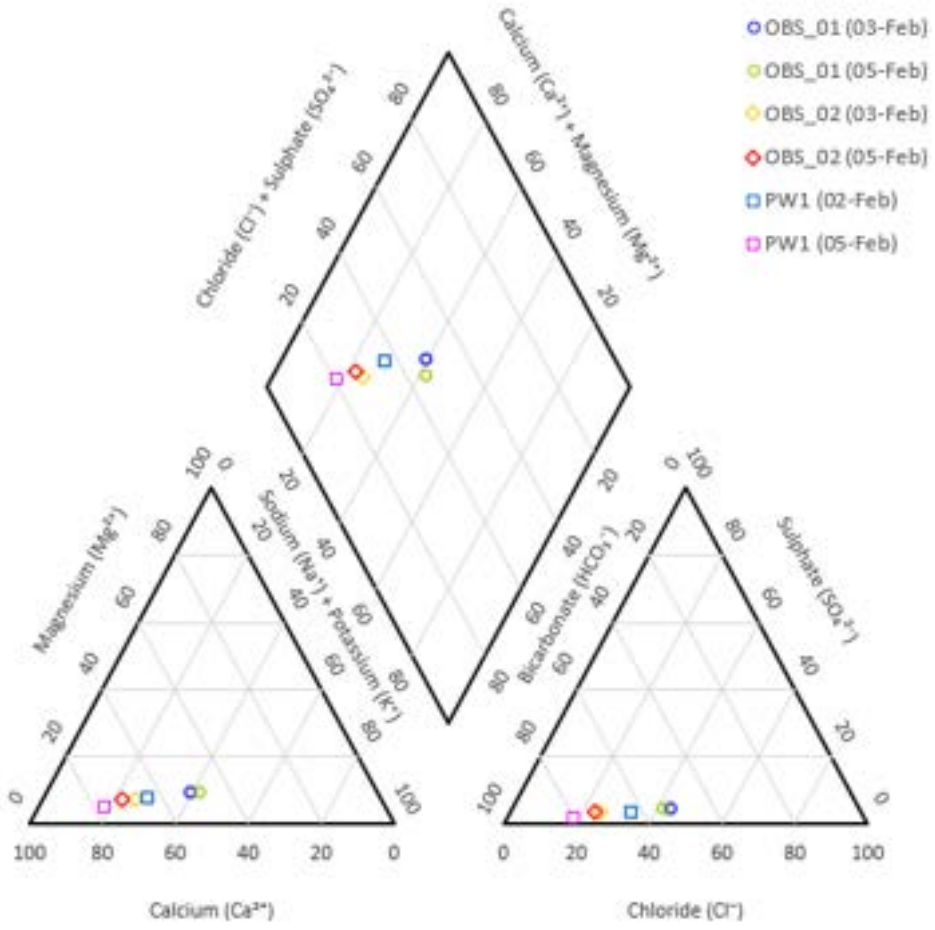


**Figure 3.3-1: Piper Plot for February 2026 Groundwater Samples**

# 4 CONCLUSIONS

Groundwater quality at the Project area was characterized using a limited dataset comprising two sampling events from one pumping well (PW-1) and two observation wells (OBS-01 and OBS-02) during the February 2026 hydrogeological field program. Although the dataset is limited, results provide an initial snapshot of groundwater chemistry in the South Ridge pit area.

Samples collected in the South Ridge Project area in February 2026 met Newfoundland and Labrador Environmental Control Water and Sewage Regulations 65/03 and the CFI Certificate of Approval guidelines.

Although not strictly applicable because the samples were not collected from drinking water points of consumption, the samples were conservatively screened against drinking water guidelines. Drinking water guidelines for metals apply to the total concentration of constituents at the point of consumption. The following key observations were noted regarding groundwater chemistry:

- At least one sample from each of the three wells exceeded drinking water guidelines (NL and HC) for fluoride.
- Total and dissolved uranium samples collected from PW1 exceeded drinking water guidelines (NL and HC) while no samples from the observation wells exceeded any guidelines for uranium.
- For total manganese all samples from the observation wells and one of the two samples from PW1 exceeded drinking water guidelines (NL and HC) while for dissolved manganese two samples from OBS-02 and one sample from PW1 exceeded drinking water guidelines.

Newfoundland and Labrador does not have groundwater quality guidelines for the protection of aquatic life. Because groundwater dewatered from the pit will be pumped to settling ponds prior to discharge to surface water the groundwater quality samples were conservatively screened against federal surface water guidelines and all metal results were compared to guidelines for both total and dissolved metal fractions. In the absence of an FEQG, results were screened against CCME long-term/chronic and short-term/acute surface water quality guidelines for the protection of aquatic life.

Parameters with RDLs equal to or exceeding long-term chronic guidelines were:

- Total chlorine (CCME)
- Hexavalent chromium (FEQG)
- Cobalt (FEQG)
- Copper (FEQG)
- Mercury (CCME)
- Selenium (CCME)

The following key observations were noted for groundwater chemistry in relation to federal surface water quality guidelines:

All samples from the three wells (PW1, OBS-01 and OBS-02) exceeded CCME/FEQG long-term chronic guidelines for fluoride.

- Total and dissolved uranium in both samples collected from PW1 exceeded CCME/FEQG short-term acute and long-term chronic guidelines.

- For total cadmium one of the two samples from PW1 and both samples from each observation wells exceeded CCME/FEQG long-term chronic guidelines while for dissolved cadmium all samples from the observation wells exceeded the CCME/FEQG long-term chronic guideline.
- For the observation wells, an exceedance of CCME/FEQG long-term chronic guidelines was observed in at least one sample for WAD cyanide, aluminum, iron, manganese, silver, and zinc, which are parameters where the RDLs were less than the guideline.
- For the observation wells, an exceedance of CCME/FEQG long-term chronic guidelines was observed in at least one sample for total chlorine, cobalt, and copper, which are parameters where the RDLs were greater than or equal to the guideline.

For most metals that exceeded long-term chronic guidelines concentrations tended to be greater in the observation wells than in the pumping well. This is most likely attributed to well development and sampling factors since total suspended solids and turbidity tended to also be greater in the observation wells, which were sampled using a small diameter inertial pump that can entrain fine-grained sediment while the pumping well would have been more developed due to pumping with the submersible pump.

Except for uranium, the South Ridge groundwater chemistry and exceedances are consistent with the groundwater quality monitoring conducted by CFI around the AGS Mine and Tarefare intake in past years.

The main purpose of this groundwater quality assessment is to characterize the discharge from dewatering wells. This groundwater quality assessment is considered conservative for several reasons:

- Samples were only collected from wells that are screened in the immediate vicinity of the pit, which is expected to have elevated concentrations of fluoride;
- Samples were screened against drinking water guidelines although there is no evidence of groundwater being used as a drinking water source within the RSA or LSA; and
- Samples were screened directly against ambient surface water quality guidelines, which do not account for a groundwater being mixed with other water sources at site (e.g. site runoff) prior discharge to the receiving environment, and/or initial mixing dilution zone in a surface water body and/or natural dilution when groundwater discharges to surface water.

# 5 RECOMMENDATIONS

The limited number of samples and the short duration of the sampling program limit the interpretation of temporal variability, seasonal effects, and longer-term groundwater quality trends. The results should be considered representative of existing conditions at the time of sampling rather than definitive characterization of long-term groundwater quality. Additional monitoring would be required to better understand variability over time and to confirm the persistence or magnitude of observed exceedances.

Parameters where the laboratory RDL was greater than or equal to the surface water long term chronic water quality screening guideline for aquatic life were total hexavalent chromium, as well as total and dissolved cobalt, copper, mercury, and selenium. For these parameters, it is not possible to confirm whether concentrations meet water quality criteria unless the locations are re-sampled and analyzed using methods with RDLs below the guideline value. This approach is recommended for future sampling programs.

Total phosphorus results analyzed using colorimetric method were retained in the dataset; it was noted that total phosphorus results analyzed using inductively coupled mass spectrometry (ICP-MS) were consistently higher than the colorimetric results by up to three orders of magnitude in all groundwater samples.

A targeted groundwater monitoring program should be implemented prior to and during mining operations to verify groundwater and surface water numerical model predictions and support adaptive groundwater management.

The groundwater monitoring program should:

- Be designed to capture temporal and spatial variations in groundwater levels and groundwater quality under pre-mining, mining, closure, and post-closure conditions.
- In addition to the recently installed PW1, OBS-01 and OBS-02, include monitoring locations that have been strategically positioned up-gradient and down-gradient of the pit and stockpile footprints and historical mining activities (e.g. tailings disposal in Shoal Cove Pond), where practicable, aligned with key structural features controlling groundwater flow.
- Include a quality assurance/quality control program that includes collecting blank and duplicate samples.

# 6 STUDY LIMITATIONS

It is important to acknowledge certain limitations inherent in the process of preparing technical documents. This section aims to outline some limitations and provide transparency into the potential impact on the findings and conclusions presented herein. It is recommended that readers of this report consider these limitations while interpreting and applying the information presented. Future investigations or additional studies may be necessary to further explore and validate the findings and overcome these limitations.

**Scope and Generalizability**: Every effort has been made by Falkirk Environmental Consultants Ltd. (Falkirk) to conduct a thorough and accurate study. No warranty, express or implied, is made. Results presented in this document may not be applicable in all circumstances or settings and should be limited to the spatial and temporal scope presented alone. Variations in conditions, resources, and contextual factors could influence outcomes and conclusions.

**Data Limitations**: The findings and recommendations presented in this document are based on data provided to Falkirk, which may extend outside any data collected and analyzed within the defined scope of work. The accuracy and reliability of the study rely on the quality and availability of data. While efforts are made to verify data integrity, certain limitations such as data accessibility, accuracy, or completeness may influence the analysis and subsequent findings.

**Assumptions, Estimations, and Methods**: In situations where specific data points or information are unavailable, certain assumptions and estimations are made. These assumptions are based on available knowledge and expertise at the time of analysis, recognizing that variations in these assumptions could potentially affect the accuracy of the results. The study was conducted using recognized standard practices, engineering, and scientific methods. However, limitations inherent to these methods, such as sample size, bias, or measurement errors, could impact the reliability and validity of the findings.

**Duty of Care and Professional Standards**: This study has been conducted in adherence to the code of practice outlined by professional engineering and scientific associations, by exercising a level of care and skill consistent with the members of the science and engineering professions practising under similar conditions in the jurisdiction where the services are provided. However, it is important to recognize that even with the application of standard practices, unforeseen circumstances or human error may introduce limitations to the findings and conclusions presented.

**Document Control**: This document has been prepared for the sole benefit of the client to whom it is addressed. Third parties using this document do so at their own risk. Furthermore, Falkirk is not responsible for any unauthorized use or modification of this document. Electronic media is susceptible to unauthorized modification, and no party can rely solely on such versions of this document.

**Contractual Agreements**: It is important to note that nothing in the Study Limitations section will supersede clauses in existing contractual agreements, including but not limited to Master Service Agreements, Work Authorizations, and Purchase Orders that govern the scope of work outlined in this report. Any conflicting terms and conditions defined in these agreements take precedence.

# 7 CLOSURE

We trust this Report meets your present requirements. Please do not hesitate to contact the undersigned should you have any questions.

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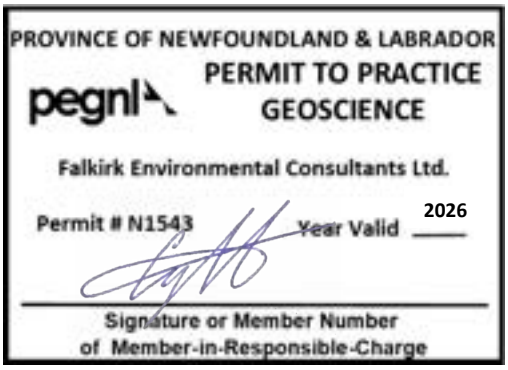

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# APPENDIX A. GROUNDWATER QUALITY SCREENING RESULTS

**Table A-1: Groundwater Quality Results Guideline Screening for PW1, OBS-01, and OBS-02, February 2026**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Drinking Water Quality[b] | Newfoundland and Labrador ECWSR[c] | Effluent Discharge Criteria[d] | PW1 | | OBS-01 | | OBS-02 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | | 02-Feb-26 | 05-Feb-2026 | 03-Feb-2026 | 05-Feb-2026 | 03-Feb-2026 | 05-Feb-2026 |
| **Field Measured** | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | - | 5.5 to 9.0 | 5.5 to 9.0 | 7.5 | 8.1 | 8.2 | 6.8 | 7.4 | 6.8 |
| Field specific conductivity | µS/cm | - | - | - | - | - | 310 | 305 | 200 | 209 | 324 | 324 |
| Field water temperature | °C | - | - | - | - | - | 8.6 | 8.5 | 5.1 | 4.8 | 5.6 | 3.8 |
| Field dissolved oxygen | mg/L | - | - | - | - | - | 14 | 6.5 | 9.6 | 7.6 | 6.9 | 9.6 |
| **Conventional Parameters** | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | - | 5.5 to 9.0 | 5.5 to 9.0 | 7.5 | 7.8 | 6.6 | 6.6 | 7.5 | 7.5 |
| Conductivity | µS/cm | - | - | - | - | - | 319 | 380 | 174 | 175 | 310 | 311 |
| Hardness, as $CaCO_3$ | mg/L | - | - | - | - | - | 101 | 162 | 54 | 56 | 112 | 128 |
| Total alkalinity, as $CaCO_3$ | mg/L | - | - | - | - | - | 98 | 151 | 43 | 47 | 105 | 113 |
| Total dissolved solids | mg/L | - | - | - | 1,000 | 1,000 | 152 | 194 | 90 | 94 | 153 | 164 |
| Total suspended solids | mg/L | - | - | - | - | - | 24 | <5.0 | 69 | 6.0 | 235 | 33 |
| Total organic carbon | mg/L | - | - | - | - | - | 2.7 | 1.2 | 1.3 | 2.8 | 0.9 | 2.6 |
| Dissolved organic carbon | mg/L | - | - | - | - | - | 2.4 | 1.0 | 0.8 | 1.2 | 1.0 | 1.7 |
| Colour | TCU | - | - | - | - | - | 6.0 | <5.0 | <0.005 | <5.0 | <0.005 | <5.0 |
| BOD | mg/L | - | - | - | 20 | - | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 4.0 |
| Reactive Silica | mg/L | - | - | - | - | - | 12 | 14 | 15 | 15 | 13 | 13 |
| Turbidity | NTU | - | - | - | - | - | 8.3 | <0.5 | 13 | 11 | 32 | 39 |
| **Major Ions** | | | | | | | | | | | | |
| Bicarbonate ($CaCO_3$) | mg/L | - | - | - | - | - | 98 | 151 | 43 | 47 | 43 | 113 |
| Carbonate ($CaCO_3$) | mg/L | - | - | - | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 |
| Bromide | mg/L | - | - | - | - | - | 0.23 | 0.09 | 0.11 | 0.15 | 0.11 | 0.24 |
| Calcium | mg/L | - | - | - | - | - | 36 | 61 | 19 | 19 | 41 | 46 |
| Chloride | mg/L | 640 | 120 | - | - | - | 30 | 20 | 21 | 21 | 21 | 21 |
| Fluoride | mg/L | - | 0.12 | 1.5 | - | - | **1.44**[(LC)] | **1.85**[(LC, D)] | **2.49**[(LC, D)] | **2.22**[(LC, D)] | **1.71**[(LC, D)] | **1.21**[(LC)] |
| Magnesium | mg/L | - | - | - | - | - | 2.6 | 2.4 | 2.0 | 2.2 | 2.7 | 2.9 |
| Potassium | mg/L | - | - | - | - | - | 1.2 | 1.0 | 1.3 | 1.4 | 1.6 | 1.8 |
| Sodium | mg/L | - | - | - | - | - | 18 | 16 | 16 | 18 | 16 | 16 |
| Sulphate | mg/L | - | - | - | - | - | 4.0 | 3.0 | 3.0 | 3.0 | 4.0 | 4.0 |
| Sulphide | mg/L | - | - | - | 0.5 | - | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Cyanides and Cyanates** | | | | | | | | | | | | |
| Cyanide (WAD) | mg/L | - | 0.005[(e)] | 0.2 | 0.025 | - | <0.002 | 0.002 | 0.005 | **0.007**[(LC)] | 0.005 | <0.002 |
| **Nutrients** | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.77 - 22 | - | 2 | 2 | <0.03 | <0.03 | <0.03 | <0.03 | 0.07 | 0.06 |
| Nitrate, as N | mg-N/L | 124 | 2.93 | 10 | 10 | 10 | 0.05 | 0.09 | <0.05 | 0.06 | <0.05 | 0.1 |
| Nitrite, as N | mg-N/L | - | 0.06 | 1 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrate + Nitrite, as N | mg-N/L | - | - | 10 | - | - | 0.05 | 0.09 | <0.05 | 0.06 | <0.05 | 0.1 |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ortho-phosphate, as P | mg-P/L | - | - | - | - | - | <0.01 | <0.01 | - | <0.01 | - | <0.01 |
| Total phosphorus, as P | mg-P/L | - | - | - | - | - | 0.007 | <0.006 | 0.017 | 0.026 | <0.006 | 0.15 |
| Total phosphate as $P_2O_5$ | mg-P/L | - | - | - | 1 | - | 0.02 | <0.01 | 0.04 | 0.06 | <0.01 | 0.35 |

**Table A-1: Groundwater Quality Results Guideline Screening for PW1, OBS-01, and OBS-02, February 2026**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Drinking Water Quality[b] | Newfoundland and Labrador ECWSR[c] | Effluent Discharge Criteria[d] | PW1 | | OBS-01 | | OBS-02 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | | 02-Feb-26 | 05-Feb-2026 | 03-Feb-2026 | 05-Feb-2026 | 03-Feb-2026 | 05-Feb-2026 |
| **Organics** | | | | | | | | | | | | |
| Benzene | mg/L | 6[f] | 0.59[f] | 0.005 | - | - | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Ethylbenzene | mg/L | 1[f] | 0.07[f] | 0.14 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| F1 (C6-C10) | mg/L | - | - | - | - | - | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| F1-BTEX | mg/L | - | - | - | - | - | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| F2 | mg/L | - | - | - | - | - | <0.049 | <0.049 | <0.049 | <0.049 | <0.049 | <0.049 |
| F3 | mg/L | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| F4 | mg/L | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| m&p-Xylene | mg/L | - | - | - | - | - | <0.0002 | <0.0002 | - | <0.0002 | - | <0.0002 |
| o-Xylene | mg/L | - | - | - | - | - | <0.0001 | <0.0001 | - | <0.0001 | - | <0.0001 |
| Toluene | mg/L | 3[f] | 0.03[f] | 0.06 | - | - | 0.0077 | 0.00094 | 0.00049 | <0.0002 | 0.001 | 0.00033 |
| Xylene | mg/L | 1[f] | 0.07[f] | 0.09 | - | - | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Phenols | mg/L | - | 0.004 | - | 0.1 | - | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Radionuclides** | | | | | | | | | | | | |
| Radium 226 | Bq/L | - | - | 5 | 0.37 | 0.37 | 0.02 | 0.02 | 0.01 | 0.007 | 0.02 | 0.01 |
| **Other** | | | | | | | | | | | | |
| Total Chlorine | mg/L | - | 0.0005 | - | 1 | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | **0.07**[LC] |
| Coliform - faecal | MPN/100 mL | - | - | 0 | 1,000 | - | <1.0 | <1.0 | <1.0 | **1**[D] | <1.0 | **4**[D] |
| Coliform - total | MPN/100 mL | - | - | 0 | 5,000 | - | **2**[D] | <1.0 | **32**[D] | **37**[D] | **10**[D] | **22**[D] |
| **Total Metals** | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.16 - 0.5[f] | 2.9 | - | - | 0.23 | 0.05 | **1.25**[LC] | **1.15**[LC] | **1.01**[LC] | **1.01**[LC] |
| Total Antimony | mg/L | - | - | 0.006 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Arsenic | mg/L | - | 0.005 | 0.01 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Barium | mg/L | - | - | 2 | 5 | 5 | 0.1 | 0.12 | 0.063 | 0.063 | 0.058 | 0.052 |
| Total Beryllium | mg/L | - | - | - | - | - | 0.005 | 0.004 | 0.012 | 0.012 | <0.002 | <0.002 |
| Total Bismuth | mg/L | - | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 5 | <0.05 | <0.05 | <0.05 | 0.051 | <0.05 | <0.05 |
| Total Cadmium | mg/L | 0.0011 - 0.0034 | 0.000096 - 0.00024 | 0.007 | 0.05 | 0.05 | **0.00017**[LC] | <0.00009 | **0.00018**[LC] | **0.0002**[LC] | **0.00064**[LC] | **0.00075**[LC] |
| Trivalent Chromium | mg/L | - | 0.0089 | - | 1 | - | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexavalent Chromium | mg/L | - | 0.005[f] | - | 0.05 | - | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total Chromium | mg/L | - | 0.005[f] | 0.05 | - | 1 | <0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 |
| Total Cobalt | mg/L | - | 0.00079 - 0.0012[f] | - | - | - | <0.001 | <0.001 | <0.001 | <0.001 | **0.002**[LC] | **0.002**[LC] |
| Total Copper | mg/L | - | 0.00024 - 0.0015[f] | 2 | 0.3 | 0.3 | <0.001 | <0.001 | **0.008**[LC] | 0.019 | <0.001 | **0.011**[LC] |
| Total Iron | mg/L | - | 0.12 - 0.28[f] | - | 10 | 10 | 0.22 | <0.05 | **1.05**[LC] | **0.688**[LC] | **1.39**[LC] | **1.48**[LC] |
| Total Lead | mg/L | - | 0.0032 - 0.0065[f] | 0.005 | 0.2 | 0.2 | 0.0008 | <0.0005 | 0.0015 | 0.0015 | 0.0023 | 0.0019 |
| Total Manganese | mg/L | 3.9 - 10 | 0.22 - 0.71 | 0.12 | - | - | **0.499**[D] | 0.1 | **0.15**[D] | **0.128**[D] | **1.79**[LC, D] | **1.89**[LC, D] |
| Total Mercury | mg/L | - | 0.000026 | 0.001 | 0.005 | - | <0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 |
| Total Molybdenum | mg/L | - | 0.073 | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Nickel | mg/L | - | 0.025 - 0.14 | - | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | 0.002 | 0.006 | 0.039 |
| Total Selenium | mg/L | - | 0.0010 | 0.05 | 0.01 | 0.01 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Total Silver | mg/L | - | 0.00025 | - | 0.05 | 0.05 | <0.0001 | <0.0001 | 0.0002 | **0.0006**[LC] | <0.0001 | 0.0002 |
| Total Strontium | mg/L | - | 2.5[f] | 7 | - | - | 0.075 | 0.1 | 0.024 | 0.024 | 0.055 | 0.056 |
| Total Thallium | mg/L | - | 0.0008 | - | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Total Tin | mg/L | - | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Titanium | mg/L | - | - | - | - | - | 0.004 | <0.002 | 0.021 | 0.015 | 0.058 | 0.069 |
| Total Uranium | mg/L | 0.033 | 0.015 | 0.02 | - | - | **0.0419**[SA, LC,D] | **0.0516**[SA, LC, D] | 0.0036 | 0.0036 | 0.0022 | 0.0024 |
| Total Vanadium | mg/L | - | 0.12[f] | - | - | - | <0.002 | 0.002 | <0.002 | 0.003 | 0.003 | 0.005 |
| Total Zinc | mg/L | 0.045 - 0.12 | 0.0054 - 0.049 | - | 0.5 | 0.5 | 0.014 | 0.007 | **0.016**[LC] | **0.029**[LC] | 0.016 | 0.02 |

**Table A-1: Groundwater Quality Results Guideline Screening for PW1, OBS-01, and OBS-02, February 2026**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Drinking Water Quality[b] | Newfoundland and Labrador ECWSR[c] | Effluent Discharge Criteria[d] | PW1 | | OBS-01 | | OBS-02 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | | 02-Feb-26 | 05-Feb-2026 | 03-Feb-2026 | 05-Feb-2026 | 03-Feb-2026 | 05-Feb-2026 |
| **Dissolved Metals** | | | | | | | | | | | | |
| Dissolved Aluminum | mg/L | - | 0.16 - 0.5[f] | 2.9 | - | - | 0.12 | 0.038 | **0.618**[LC] | **0.759**[LC] | 0.048 | 0.052 |
| Dissolved Antimony | mg/L | - | - | 0.006 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Arsenic | mg/L | - | 0.005 | 0.01 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Barium | mg/L | - | - | 2 | 5 | 5 | 0.096 | 0.12 | 0.038 | 0.049 | 0.034 | 0.043 |
| Dissolved Beryllium | mg/L | - | - | - | - | - | 0.004 | 0.003 | 0.007 | 0.009 | <0.002 | <0.002 |
| Dissolved Bismuth | mg/L | - | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Boron | mg/L | 29 | 1.5 | 5 | 5 | 5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Dissolved Cadmium | mg/L | 0.0011 - 0.0034 | 0.000096 - 0.00024 | 0.007 | 0.05 | 0.05 | 0.00012 | <0.00009 | **0.00013**[LC] | **0.00015**[LC] | **0.00049**[LC] | **0.0004**[LC] |
| Dissolved Chromium | mg/L | - | 0.005[f] | 0.05 | 0.05 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dissolved Cobalt | mg/L | - | 0.00079 - 0.0012[f] | - | - | - | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dissolved Copper | mg/L | - | 0.00024 - 0.0015[f] | 2.0 | 0.3 | 0.3 | <0.002 | <0.002 | <0.002 | 0.005 | <0.002 | <0.002 |
| Dissolved Iron | mg/L | - | 0.12 - 0.28[f] | - | 10 | 10 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Dissolved Lead | mg/L | - | 0.0032 - 0.0065[f] | 0.00500 | 0.2 | 0.2 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dissolved Manganese | mg/L | 3.9 - 10 | 0.22 - 0.71 | 0.12 | - | - | **0.473**[D] | 0.1 | 0.079 | 0.089 | **1.38**[LC, D] | **1.3**[LC, D] |
| Dissolved Mercury | mg/L | - | 0.000026 | 0.001 | 0.005 | - | <0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 |
| Dissolved Molybdenum | mg/L | - | 0.073 | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Nickel | mg/L | - | 0.025 - 0.14 | - | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | 0.002 | 0.004 |
| Dissolved Selenium | mg/L | - | 0.001 | 0.05 | 0.01 | 0.01 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dissolved Silver | mg/L | - | 0.00025 | - | 0.05 | 0.05 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Strontium | mg/L | - | 2.5[f] | 7 | - | - | 0.069 | 0.1 | 0.016 | 0.02 | 0.039 | 0.078 |
| Dissolved Thallium | mg/L | - | 0.0008 | - | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Tin | mg/L | - | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Titanium | mg/L | - | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Uranium | mg/L | 0.0330 | 0.0150 | 0.02 | - | - | **0.039**[SA, LC, D] | **0.0512**[SA, LC, D] | 0.0015 | 0.002 | 0.0017 | 0.0019 |
| Dissolved Vanadium | mg/L | - | 0.1200 | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Zinc | mg/L | 0.045 - 0.12 | 0.0054 - 0.049 | - | 0.5 | 0.5 | 0.011 | 0.005 | **0.007**[LC] | 0.017 | <0.005 | 0.008 |

Notes:

(a) Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines for surface water (FEQGs; ECCC 2024) or Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG. Guidelines are ECCC unless otherwise indicated. Guidelines that are pH, temperature, hardness, and/or dissolved organic carbon, dependent were calculated for each sample using the individual sample measurements. Grey shaded cells indicate the guideline was calculated, and the values presented are the range of guidelines calculated for the samples.

(b) Guidelines for Drinking Water Quality in Newfoundland and Labrador (NL 2025) and/or Guidelines for Canadian Drinking Water Quality (HC 2025) maximum acceptable concentrations.

(c) Newfoundland and Labrador (NL) Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003).

(d) CFI Certificate of Approval No. AA22-085691 - Effluent Discharge Criteria (NL 2022).

(e) Guideline is for free cyanide.

(f) Guideline is an FEQG for surface water (ECCC 2024).

All metals results were compared to guidelines for both total and dissolved metal fractions.

Bolded values identify concentrations above the guidelines as indicated by the following flag superscripts:

**SA** = concentration above the short-term acute FEQG or CCME guideline for the protection of aquatic life.

**LC** = concentration above the long-term chronic FEQG or CCME guideline for the protection of aquatic life.

**D** = concentration above the drinking water guidelines.

# APPENDIX B. QUALITY ASSURANCE/QUALITY CONTROL SAMPLE RESULTS TABLE

**Table B-1: Trip and Field Blank Quality Control Results, 2026**

| Parameter | Unit | RDL | Field Blank | Trip Blank | Field Blank | Trip Blank |
|---|---|---|---|---|---|---|
| | | | 2026-02-03 | 2026-02-03 | 2026-02-05 | 2026-02-05 |
| | | | 7458015 | 7458046 | 7466163 | 7466182 |
| **Conventional Parameters and Other** | | | | | | |
| pH | - | - | 5.6 | 5.6 | 5.8 | 5.6 |
| True Color | TCU | 5 | <5 | <5 | <5 | <5 |
| Turbidity | NTU | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Electrical Conductivity | µS/cm | 2 | <2 | <2 | **1** | **1** |
| BOD | mg/L | 2 | <2 | <2 | <2 | <2 |
| Total organic carbon | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dissolved organic carbon | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Total dissolved solids | mg/L | 1 | **5** | **1** | **2** | **7** |
| Total suspended solids | mg/L | 5 | <5 | <5 | <5 | <5 |
| Total alkalinity, as CaCO3 | mg/L | 6 | **6** | <6 | <5 | **6** |
| Reactive Silica | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | **3.9** |
| Hardness | mg/L | 0.5 | 0 | 0 | **0.5** | 0 |
| Hydroxide | mg/L | 5 | <5 | <5 | <5 | <5 |
| Total Chlorine | mg/L | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **Major Ions** | | | | | | |
| Bicarbonate Alkalinity (as $CaCO_3$) | mg/L | 6 | **6** | <6 | <5 | **6** |
| Carbonate Alkalinity (as $CaCO_3$) | mg/L | 10 | <10 | <10 | <10 | <10 |
| Bromide | mg/L | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Calcium | mg/L | 0.1 | <0.1 | <0.1 | **0.2** | <0.1 |
| Chloride | mg/L | 1 | <1 | <1 | <1 | <1 |
| Fluoride | mg/L | 0.12 | <0.12 | <0.12 | <0.12 | <0.12 |
| Magnesium | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Potassium | mg/L | 0.1 | <0.1 | <0.1 | **0.1** | **0.2** |
| Sodium | mg/L | 0.1 | <0.1 | **0.2** | **0.3** | **2.4** |
| Sulphate | mg/L | 2 | <2 | <2 | <2 | <2 |
| Sulphide | mg/L | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Cyanides and Cyanates** | | | | | | |
| Cyanide (WAD) | mg/L | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| **Nutrients** | | | | | | |
| Nitrate + Nitrite, as N | mg-N/L | 0.05 | **0.21** | **0.18** | **0.24** | **0.21** |
| Nitrate, as N | mg-N/L | 0.05 | **0.1** | **0.08** | **0.12** | **0.11** |
| Nitrite, as N | mg-N/L | 0.05 | **0.11** | **0.1** | **0.12** | **0.1** |
| Total ammonia, as N | mg-N/L | 0.03 | <0.03 | <0.03 | **0.05** | <0.03 |
| Total Kjeldahl nitrogen | mg-N/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Total Phosphorous as P | mg-P/L | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 |

**Table B-1: Trip and Field Blank Quality Control Results, 2026**

| Parameter | Unit | RDL | Field Blank | Trip Blank | Field Blank | Trip Blank |
|---|---|---|---|---|---|---|
| | | | 2026-02-03 | 2026-02-03 | 2026-02-05 | 2026-02-05 |
| | | | 7458015 | 7458046 | 7466163 | 7466182 |
| Ortho-phosphate, as P | mg-P/L | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total phosphorus | mg-P/L | 0.006 | <0.006 | <0.006 | <0.006 | <0.006 |
| Phosphate as $P_2O_5$ | mg/L | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Organics** | | | | | | |
| Benzene | mg/L | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/L | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Ethylbenzene | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| m&p-Xylene | mg/L | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| o-Xylene | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Xylene | mg/L | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| F1 (C6-C10) | mg/L | 25 | <25 | <25 | <25 | <25 |
| F1-BTEX | mg/L | 25 | <25 | <25 | <25 | <25 |
| F2 | mg/L | 49 | <49 | <49 | <49 | <49 |
| F3 | mg/L | 100 | <100 | <100 | <100 | <100 |
| F4 | mg/L | 100 | <100 | <100 | <100 | <100 |
| Phenols | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Radionuclides** | | | | | | |
| Radium 226 | Bq/L | 0.005 | **0.007** | <0.005 | **0.006** | <0.005 |
| **Microbiological** | | | | | | |
| Coliform - faecal | MPN/100 mL | 1 | <1 | <1 | <1 | <1 |
| Fecal Coliform (Colilert MPN) | MPN/mL | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Coliform - total | MPN/100 mL | 1 | <1 | <1 | <1 | <1 |
| Total Coliforms (Colilert MPN) | MPN/mL | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| E. coli (Colilert MPN) | MPN/100 mL | 1 | <1 | <1 | <1 | <1 |
| E. coli (Colilert MPN) | MPN/100 mL | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |

**Table B-1: Trip and Field Blank Quality Control Results, 2026**

| Parameter | Unit | RDL | Field Blank | Trip Blank | Field Blank | Trip Blank |
|---|---|---|---|---|---|---|
| | | | 2026-02-03 | 2026-02-03 | 2026-02-05 | 2026-02-05 |
| | | | 7458015 | 7458046 | 7466163 | 7466182 |
| **Total Metals** | | | | | | |
| Total Aluminum | µg/L | 5 | **9** | **39** | **8** | **9** |
| Total Antimony | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Arsenic | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Barium | µg/L | 5 | <5 | <5 | <5 | <5 |
| Total Beryllium | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Bismuth | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Boron | µg/L | 50 | <50 | <50 | <50 | <50 |
| Total Cadmium | µg/L | 0.09 | <0.09 | <0.09 | <0.09 | <0.09 |
| Trivalent Chromium | µg/L | 0.005 | **0.005** | <0.005 | <0.005 | <0.005 |
| Hexavalent Chromium | µg/L | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total Chromium | µg/L | 1 | **5** | <1 | <1 | <1 |
| Total Cobalt | µg/L | 1 | <1 | <1 | <1 | <1 |
| Total Copper | µg/L | 1 | <1 | <1 | <1 | <1 |
| Total Iron | µg/L | 50 | <50 | **68** | <50 | <50 |
| Total Lead | µg/L | 0.5 | **0.8** | <0.5 | <0.5 | <0.5 |
| Total Manganese | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Mercury | µg/L | 0.026 | <0.026 | <0.026 | <0.026 | <0.026 |
| Total Molybdenum | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Nickel | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Selenium | µg/L | 1 | <1 | <1 | <1 | <1 |
| Total Silver | µg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Total Strontium | µg/L | 5 | <5 | <5 | <5 | <5 |
| Total Thallium | µg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Total Tin | µg/L | 2 | <2 | <2 | <2 | <2 |
| Total Titanium | µg/L | 2 | <2 | **3** | <2 | <2 |
| Total Uranium | µg/L | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Total Vanadium | µg/L | 2 | <2 | <2 | **2** | **2** |
| Total Zinc | µg/L | 5 | <5 | **17** | <5 | **167** |
| Total Chromium | µg/L | 0.004 | **0.005** | <0.004 | <0.004 | <0.004 |
| **Dissolved Metals** | | | | | | |
| Dissolved Aluminum | µg/L | 5 | <5 | <5 | <5 | <5 |
| Dissolved Antimony | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Arsenic | µg/L | 2 | <2 | <2 | <2 | <2 |

**Table B-1: Trip and Field Blank Quality Control Results, 2026**

| Parameter | Unit | RDL | Field Blank | Trip Blank | Field Blank | Trip Blank |
|---|---|---|---|---|---|---|
| | | | 2026-02-03 | 2026-02-03 | 2026-02-05 | 2026-02-05 |
| | | | 7458015 | 7458046 | 7466163 | 7466182 |
| Dissolved Barium | µg/L | 5 | <5 | <5 | <5 | <5 |
| Dissolved Beryllium | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Bismuth | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Boron | µg/L | 50 | <50 | <50 | <50 | <50 |
| Dissolved Cadmium | µg/L | 0.09 | <0.09 | <0.09 | <0.09 | <0.09 |
| Dissolved Chromium | µg/L | 1 | <1 | <1 | <1 | <1 |
| Dissolved Cobalt | µg/L | 1 | <1 | <1 | <1 | <1 |
| Dissolved Copper | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Iron | µg/L | 50 | <50 | <50 | <50 | <50 |
| Dissolved Lead | µg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dissolved Manganese | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Mercury | µg/L | 0.026 | <0.026 | <0.026 | <0.026 | <0.026 |
| Dissolved Molybdenum | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Nickel | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Selenium | µg/L | 1 | <1 | <1 | <1 | <1 |
| Dissolved Silver | µg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dissolved Strontium | µg/L | 5 | <5 | <5 | <5 | <5 |
| Dissolved Thallium | µg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dissolved Tin | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Titanium | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Uranium | µg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dissolved Vanadium | µg/L | 2 | <2 | <2 | <2 | <2 |
| Dissolved Zinc | µg/L | 5 | <5 | <5 | <5 | <5 |
| **Parameter Count** | | | 116 | 116 | 116 | 116 |
| **Notable Parameter Count** | | | 0 | 1 | 0 | 4 |
| **Percent Notable Parameters** | | | 0% | 1% | 0% | 3% |

Notes: **Bolded** values indicate concentration above the RDL. Grey shaded cells indicate concentrations were greater than five times the RDL and were considered notable. Laboratory pH results were excluded from the assessment of blank samples.

WAD = weak acid dissociable; RDL = reported detection limit; µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; TCU = true colour units; mg-N/L = milligrams of nitrogen per litre; mg-P/L = milligrams of phosphorus per litre; Bq/L = becquerels per litre; - = not applicable.

# APPENDIX C. GROUNDWATER SAMPLE COMPARISON PLOTS

This appendix presents temporal plots for key parameters of interest, and the following notes apply to all plots:

- Triangle = Sample 1, collected at beginning of pumping test.
- Circle = Sample 2, collected immediately before end of pumping test.
- Open symbols indicate values below the detection limit, plotted at the detection limit.

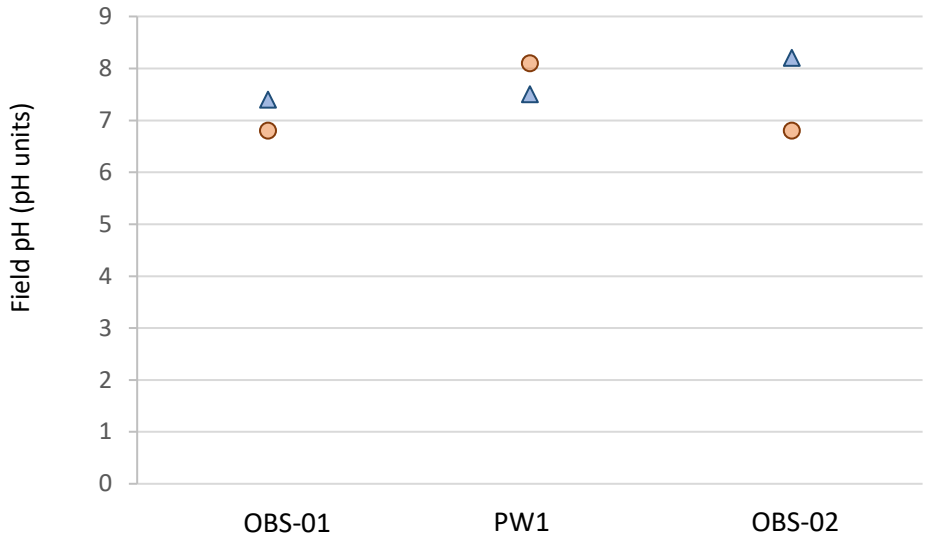


**Figure C1-1: Field pH at groundwater quality monitoring locations during February 2026 pumping test**

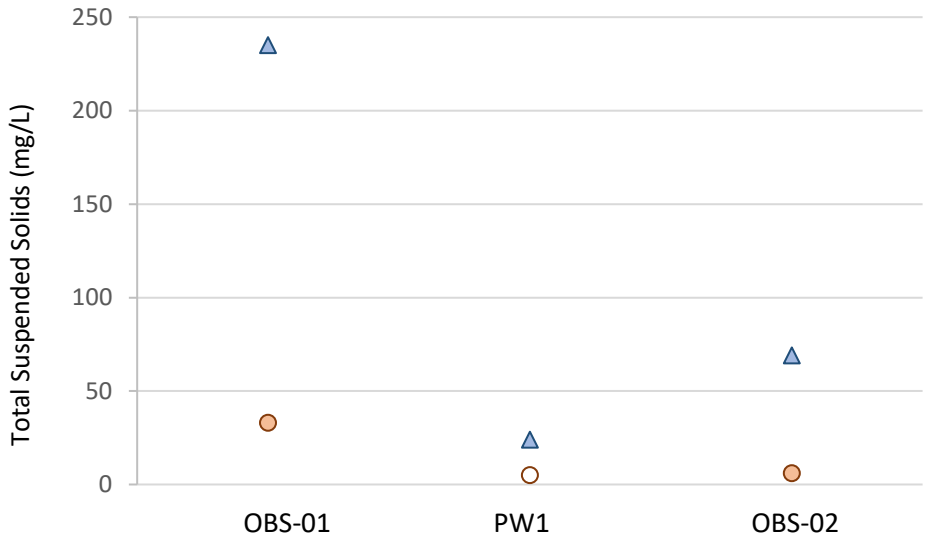


**Figure C1-2: Total Suspended Solids at groundwater quality monitoring locations during February 2026 pumping test**

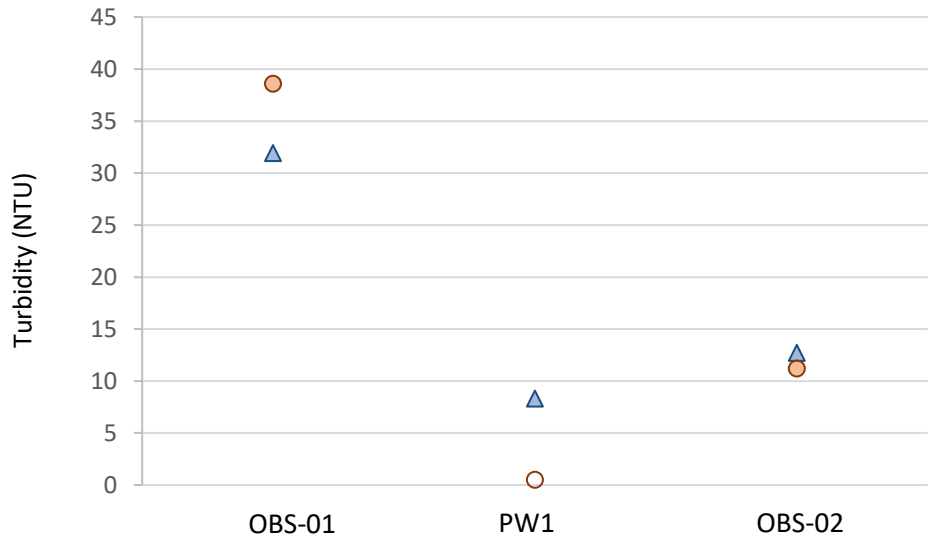


**Figure C1-3: Turbidity at groundwater quality monitoring locations during February 2026 pumping test**

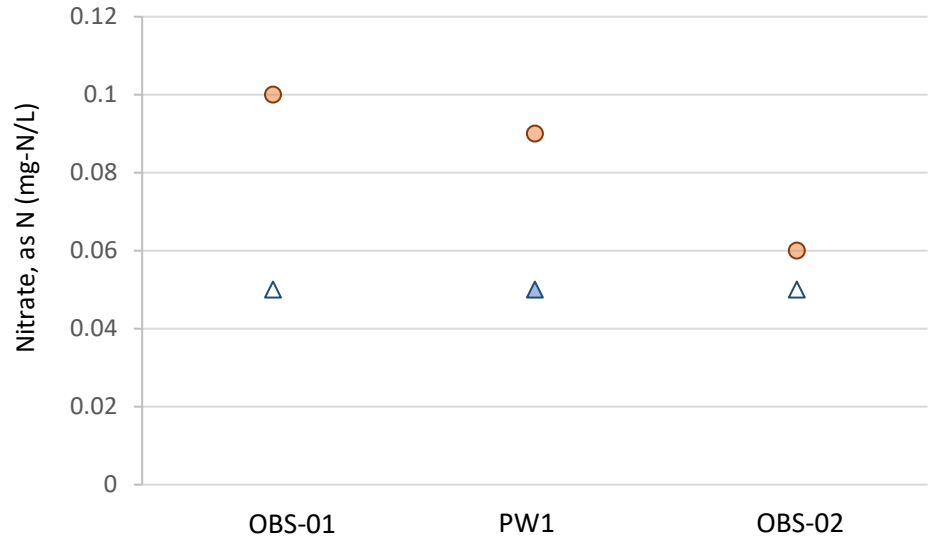


**Figure C1-4: Nitrate at groundwater quality monitoring locations during February 2026 pumping test**

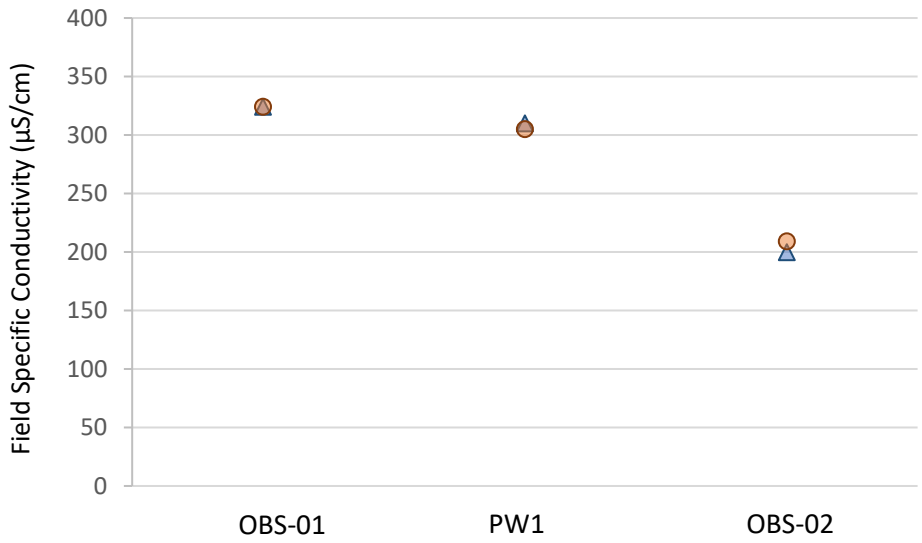


**Figure C1-5: Field specific conductivity at groundwater quality monitoring locations during February 2026 pumping test**

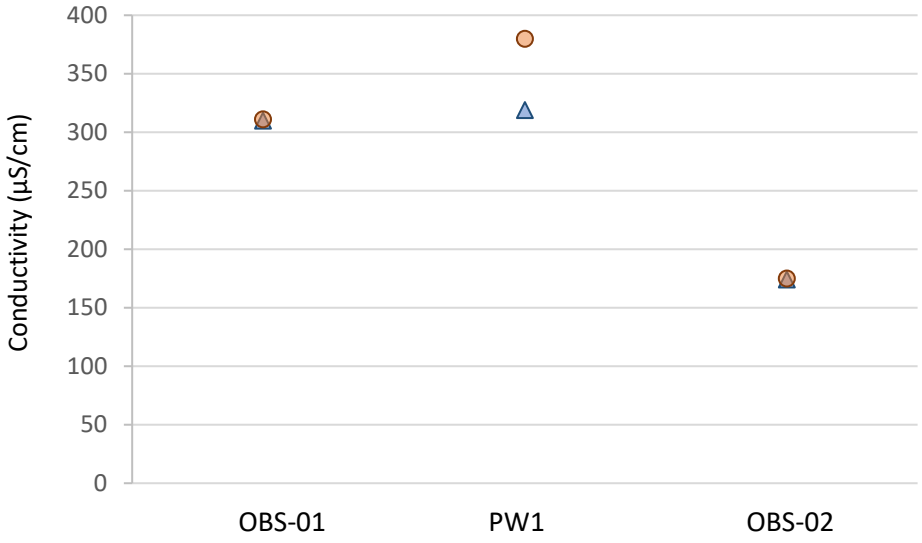


**Figure C1-6: Lab conductivity at groundwater quality monitoring locations during February 2026 pumping test**

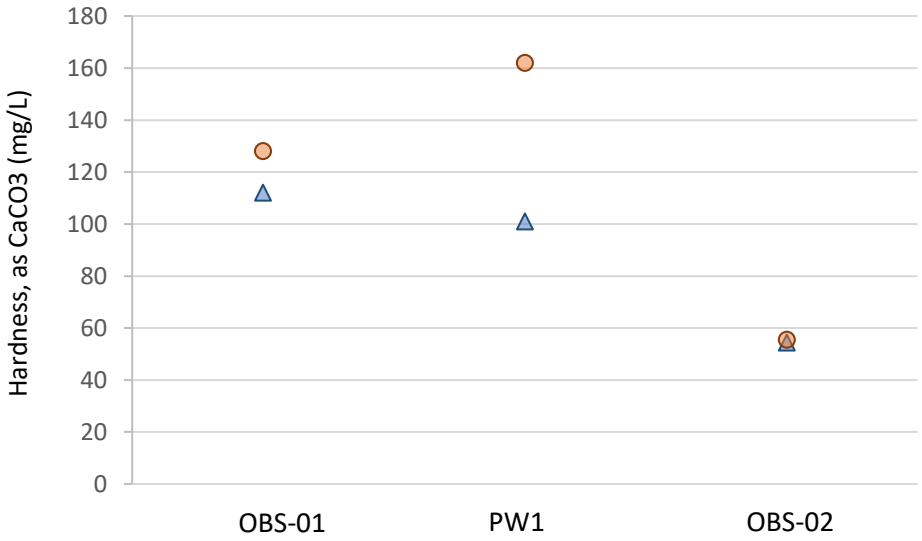


**Figure C1-7: Hardness at groundwater quality monitoring locations during February 2026 pumping test**

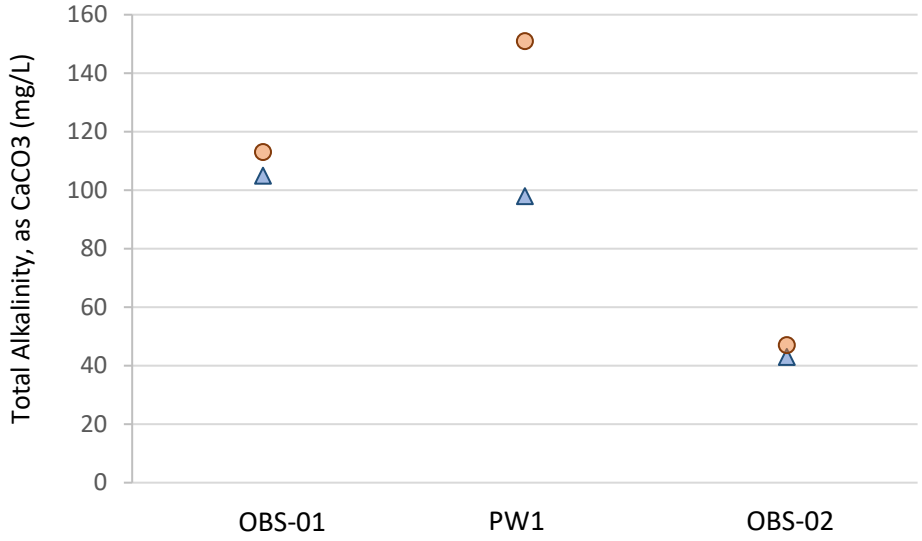


**Figure C1-8: Total alkalinity (as $CaCO_3$) at groundwater quality monitoring locations during February 2026 pumping test**

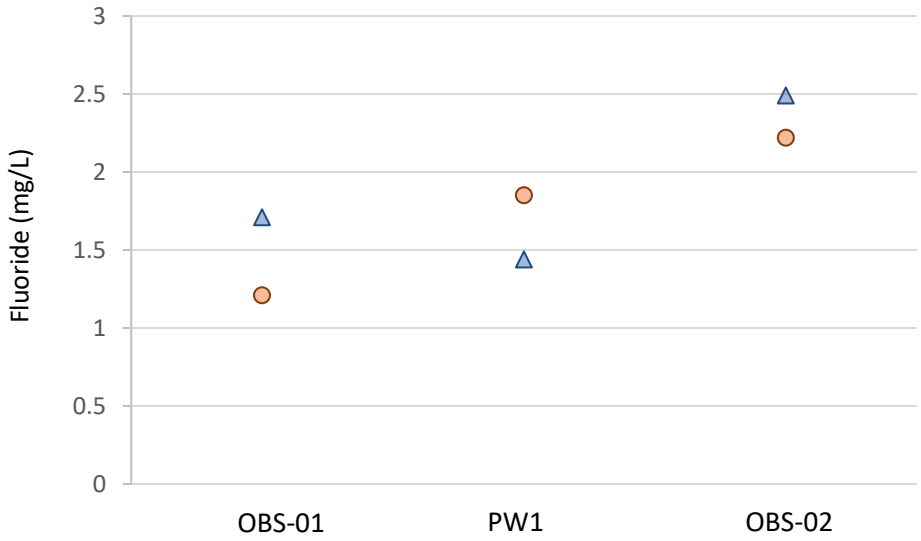


**Figure C1-9: Fluoride at groundwater quality monitoring locations during February 2026 pumping test**

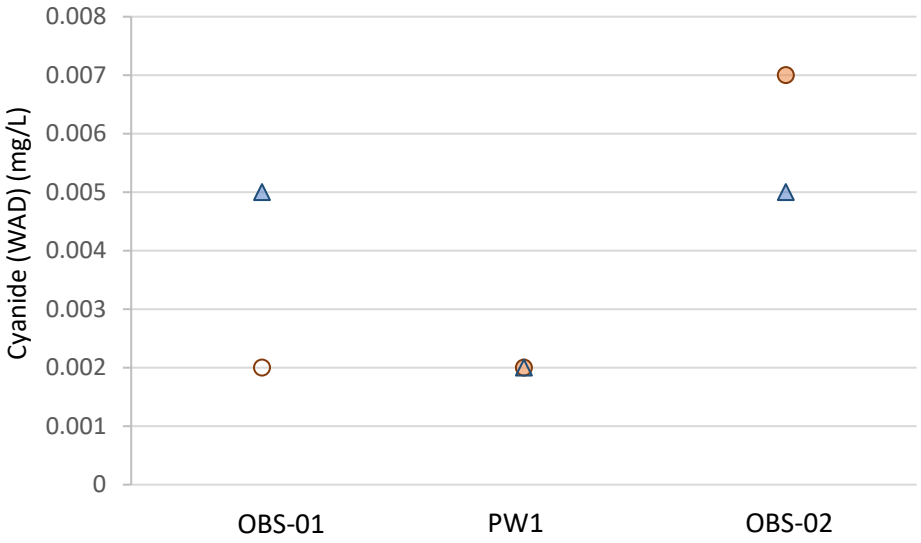


**Figure C1-10: Cyanide (WAD) at groundwater quality monitoring locations during February 2026 pumping test**

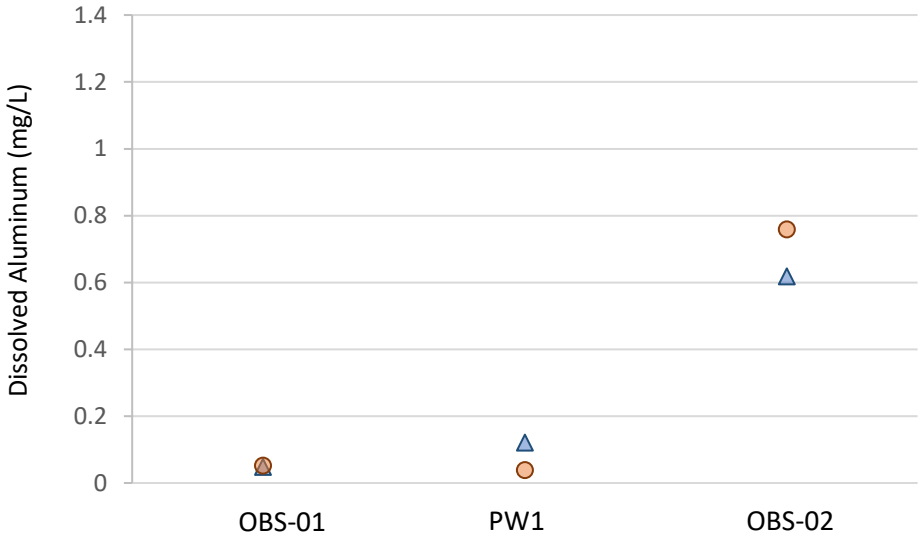


**Figure C1-11: Dissolved aluminum at groundwater quality monitoring locations during February 2026 pumping test**

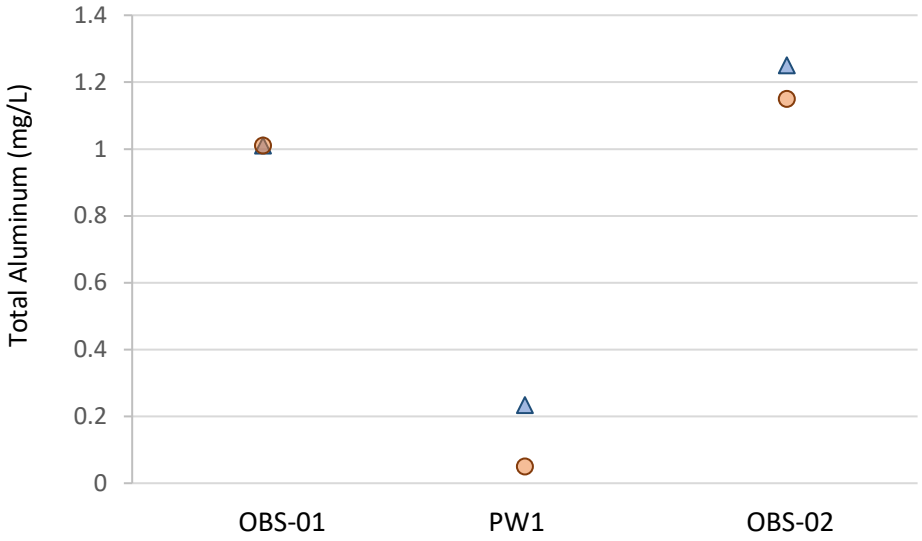


**Figure C1-12: Total aluminum at groundwater quality monitoring locations during February 2026 pumping test**

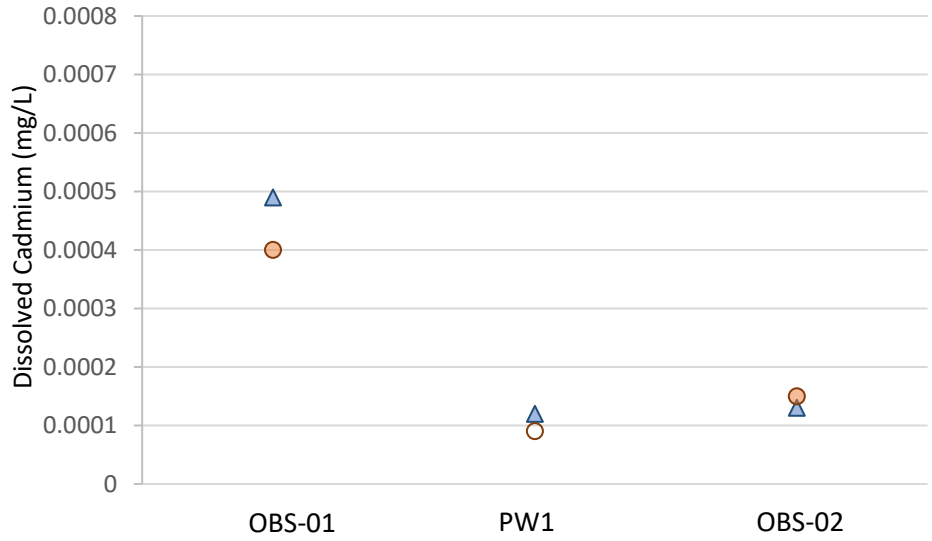


**Figure C1-13: Dissolved cadmium at groundwater quality monitoring locations during February 2026 pumping test**

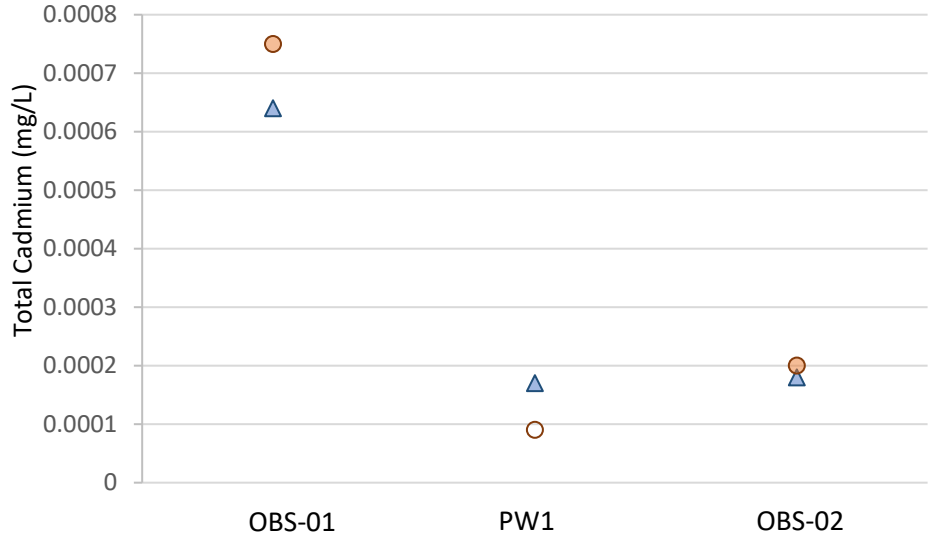


**Figure C1-14: Total cadmium at groundwater quality monitoring locations during February 2026 pumping test**

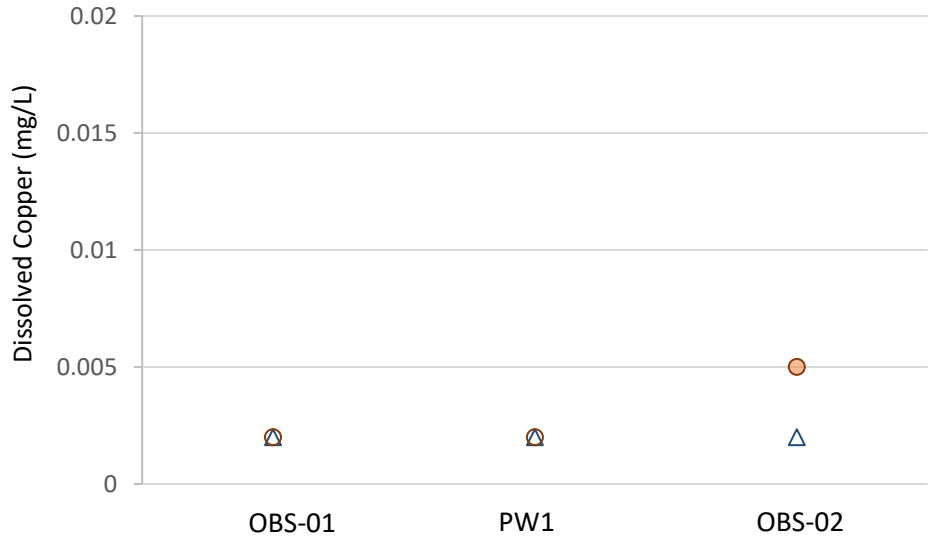


**Figure C1-15: Dissolved copper at groundwater quality monitoring locations during February 2026 pumping test**

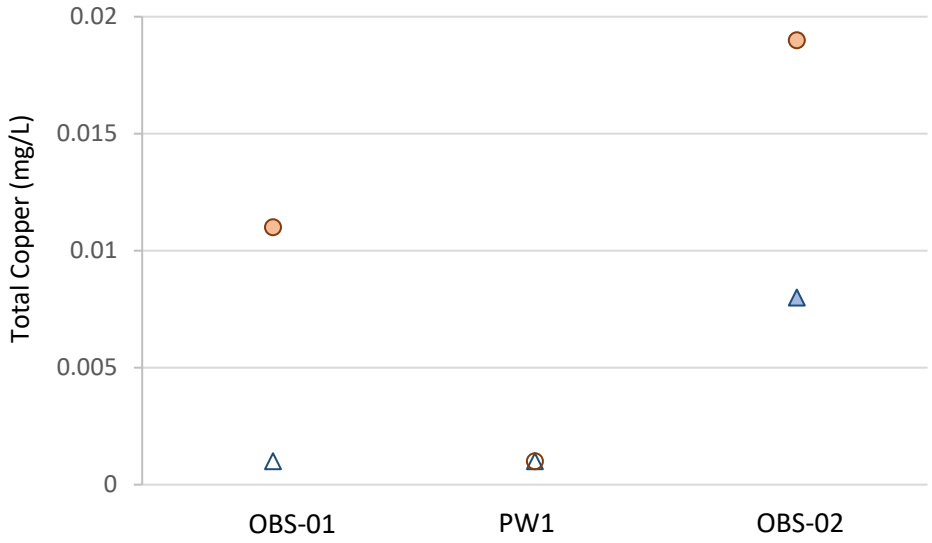


**Figure C1-16: Total copper at groundwater quality monitoring locations during February 2026 pumping test**

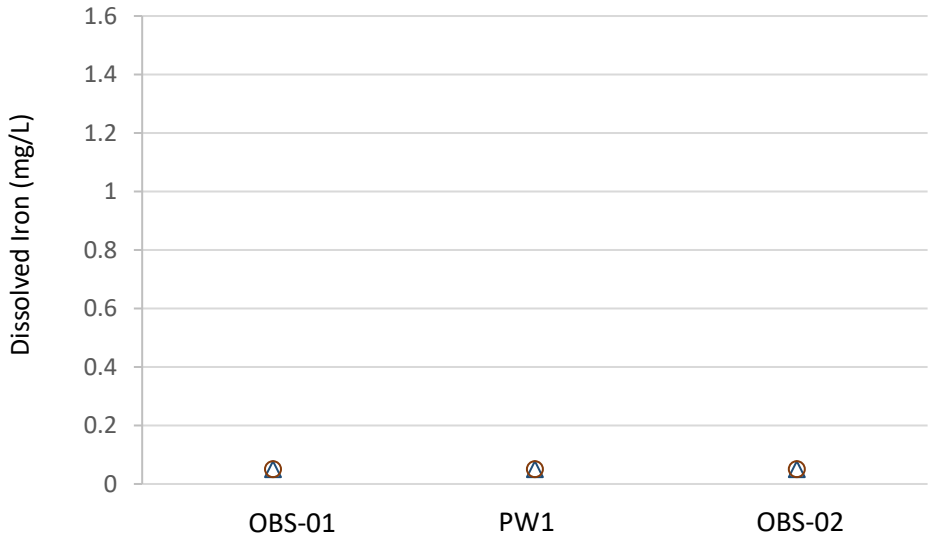


**Figure C1-17: Dissolved iron at groundwater quality monitoring locations during February 2026 pumping test**

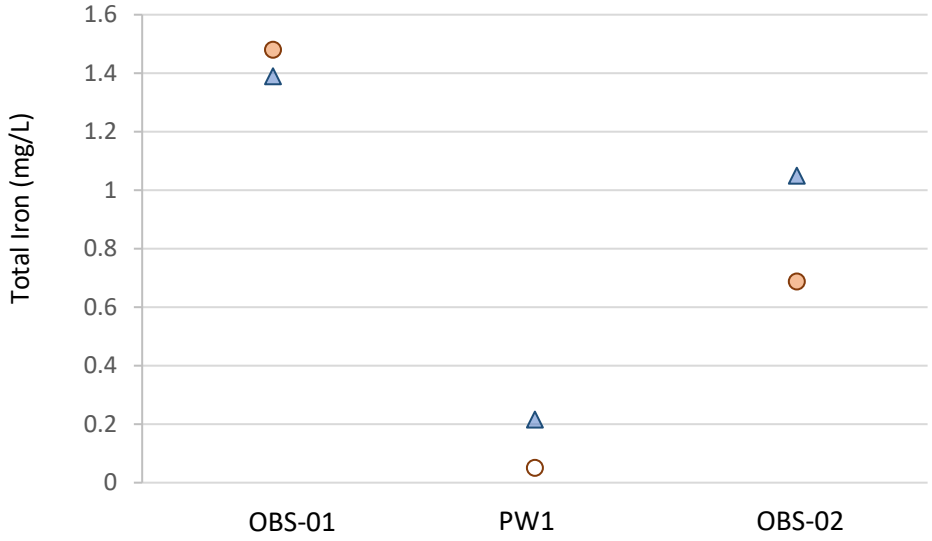


**Figure C1-18: Total iron at groundwater quality monitoring locations during February 2026 pumping test**

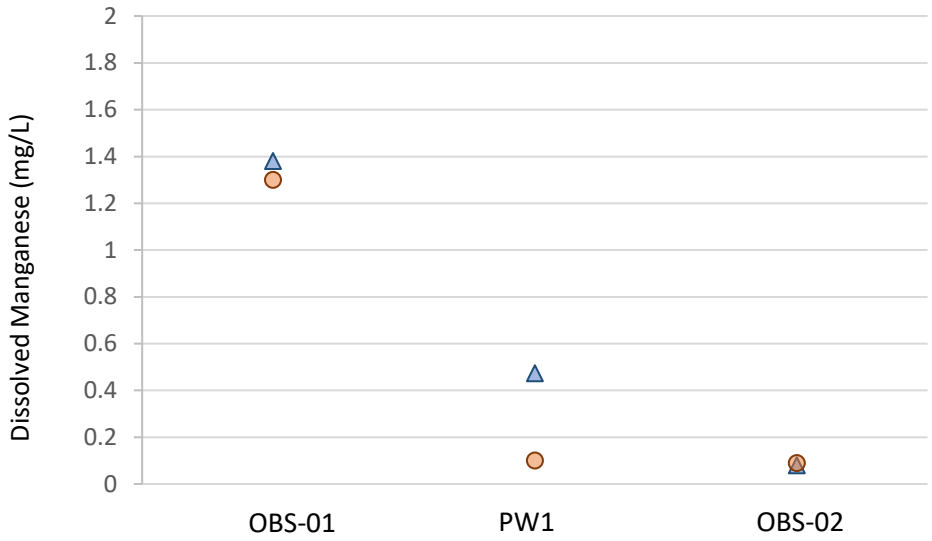


**Figure C1-19: Dissolved manganese at groundwater quality monitoring locations during February 2026 pumping test**

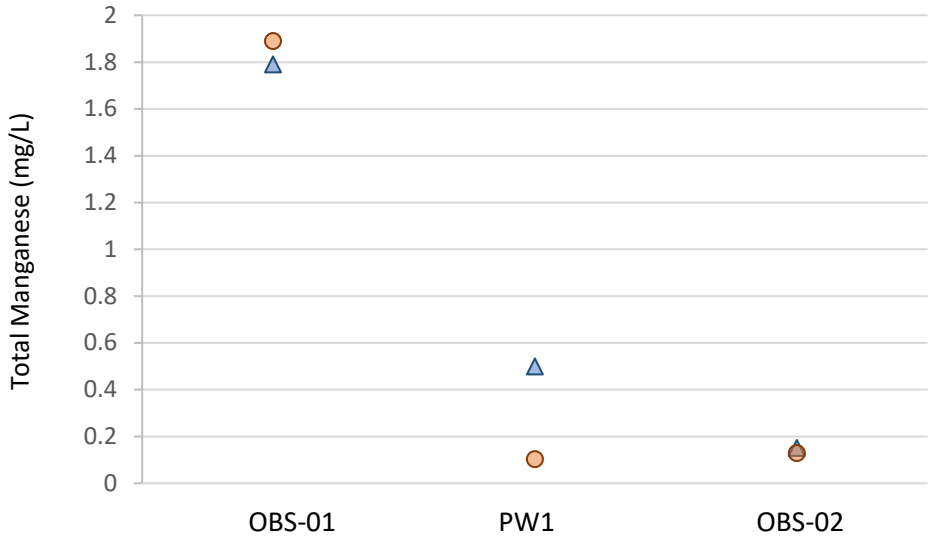


**Figure C1-20: Total manganese at groundwater quality monitoring locations during February 2026 pumping test**

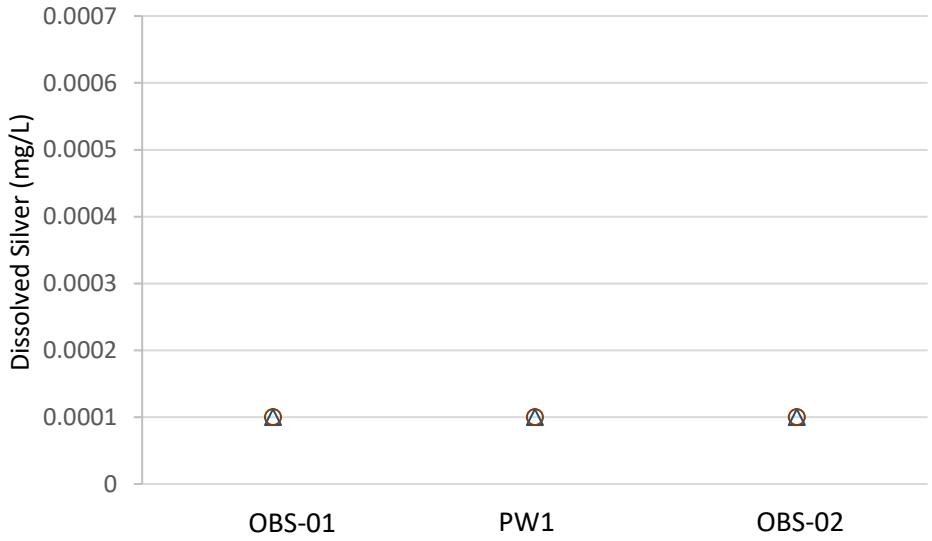


**Figure C1-21: Dissolved silver at groundwater quality monitoring locations during February 2026 pumping test**

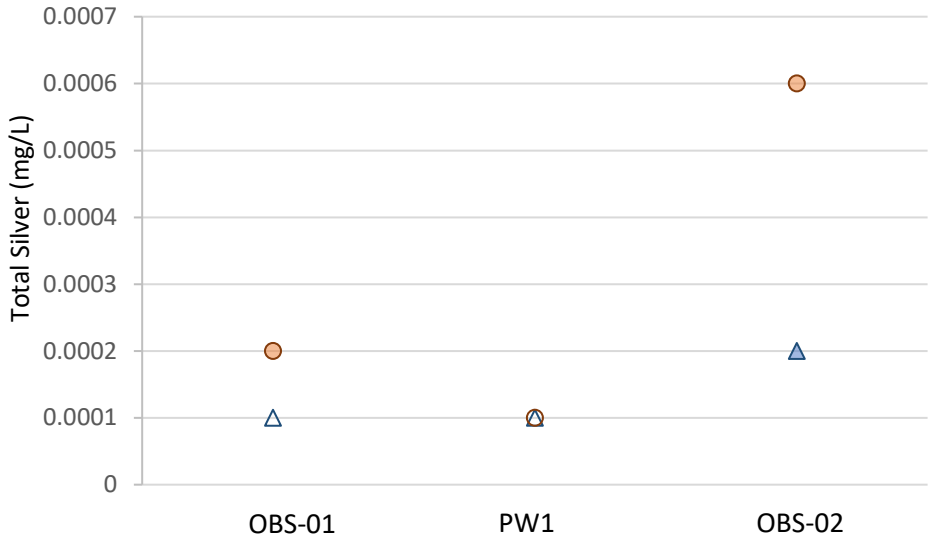


**Figure C1-22: Total silver at groundwater quality monitoring locations during February 2026 pumping test**

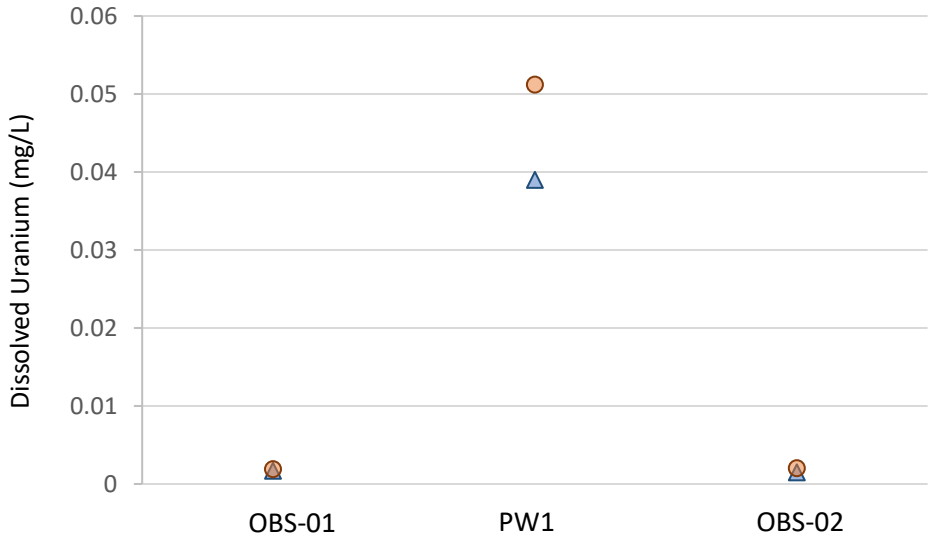


**Figure C1-23: Dissolved uranium at groundwater quality monitoring locations during February 2026 pumping test**

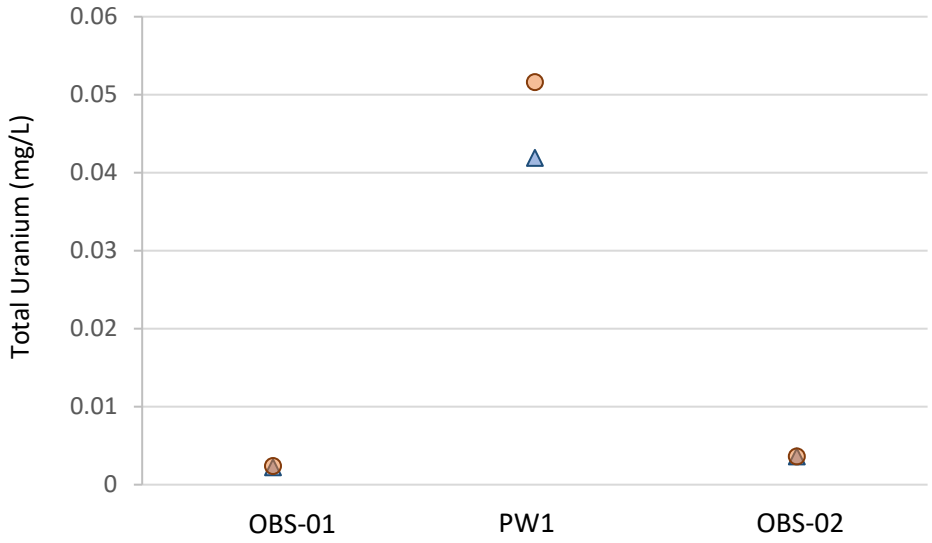


**Figure C1-24: Total uranium at groundwater quality monitoring locations during February 2026 pumping test**

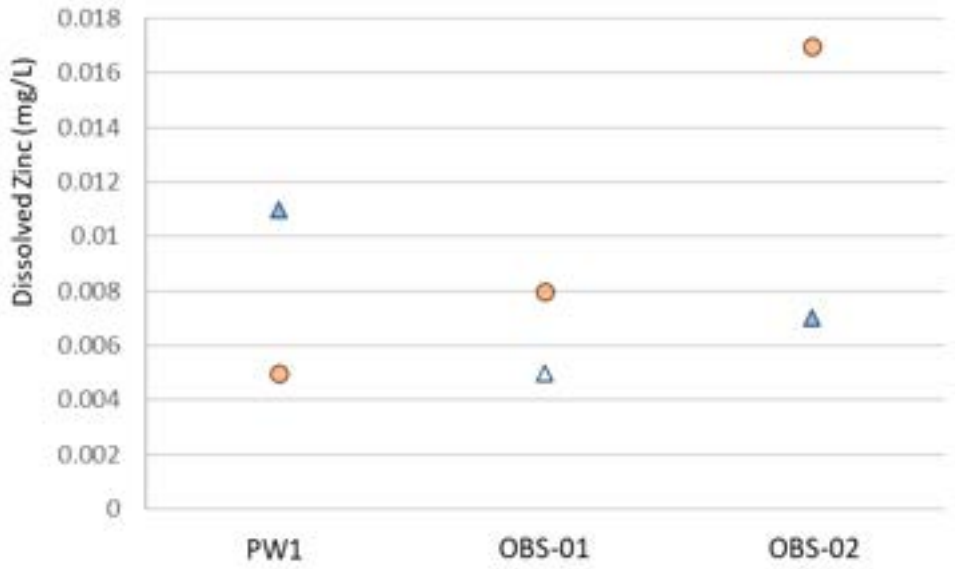


**Figure C1-25: Dissolved zinc at groundwater quality monitoring locations during February 2026 pumping test**

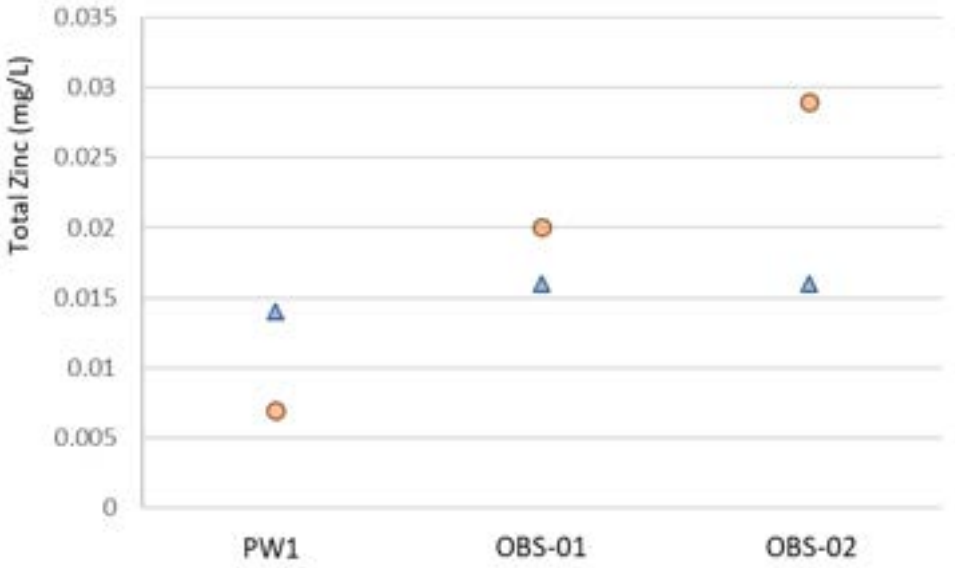


**Figure C1-26: Total zinc at groundwater quality monitoring locations during February 2026 pumping test**

# Appendix 6.5-1: Surface Water Hydrology Baseline and Effects Assessment Report – South Ridge Project

# SURFACE WATER HYDROLOGY BASELINE AND EFFECTS ASSESSMENT REPORT – SOUTH RIDGE PROJECT

## PREPARED FOR:
## CANADA FLUORSPAR INC.

CFI-25-01-02

14 April 2026

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## Appendices

Appendix A. Water Balance Climate Inputs and Calculations

# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| **AET** | Actual Evapotranspiration |
| **ASTER** | Advanced Spaceborne Thermal Emission and Reflection Radiometer |
| **CFI** | Canada Fluorspar Inc. |
| **DEM** | Digital Elevation Model |
| **EA** | Environmental Assessment |
| **ECCC** | Environment and Climate Change Canada |
| **ET** | Evapotranspiration |
| **GDEM** | Global Digital Elevation Model |
| **HEC-SSP** | Hydrologic Engineering Center – Statistical Software Package |
| **LP3** | Log-Pearson Type III distribution |
| **LSA** | Local Study Area |
| **MOE** | Ministry of the Environment |
| **PET** | Potential Evapotranspiration |
| **$Q_2$** | 2-year return period flow |
| **$Q_t$** | Peak flow associated with return period *t* |
| **RSA** | Regional Study Area |
| **SRTM** | Shuttle Radar Topography Mission |
| **SWE** | Snow Water Equivalent |
| **WHC** | Water Holding Capacity |
| **WSC** | Water Survey of Canada |

# 1 INTRODUCTION

## 1.1 OVERVIEW

Falkirk Environmental Consultants Ltd. (Falkirk) was retained by Canada Fluorspar Inc. (CFI) to complete a surface water hydrology baseline and effects assessment for the proposed South Ridge Project (the Project) on the Burin Peninsula of the Island of Newfoundland. This report has been prepared in support of the Project's Environmental Assessment (EA) Registration and provides the technical basis for evaluating potential project-related changes to surface water quantity.

The objectives of this report are to:

- Characterize existing surface water hydrology conditions within the Local Study Area (LSA), with consideration of the Regional Study Area (RSA);
- Assess potential changes to surface water flows resulting from Project operation, closure, and post-closure; and
- Provide flow projections and quantitative inputs to support interdisciplinary EA components, including surface water quality, fish and fish habitat, and wetlands and vegetation effects assessments.

The hydrology baseline characterizes existing conditions using a combination of publicly available topographic, climatic, and hydrometric datasets, supplemented by available site-specific information where applicable. Baseline flow metrics for ungauged catchments were estimated using regional regression relationships derived from Water Survey of Canada (WSC) hydrometric stations on the Burin Peninsula. These metrics include mean annual and monthly flows, representative low-flow statistics, and peak flow estimates relevant to the assessment of potential effects.

Potential project-related effects on surface water quantity were evaluated through the development of a site-wide water balance, which represents existing conditions as well as operations, closure and post-closure conditions, accounting for climatic inputs, watershed characteristics, proposed mine infrastructure, and water management features. Water balance results were used to compare baseline and Project conditions and to identify watercourses where measurable or hydrologically relevant changes in surface water flows may occur.

## 1.2 SCOPE

Given the limited availability of long-term local hydrometric data, the baseline characterization and water balance results presented in this report are considered preliminary and are intended to support the identification of potential hydrologic effects. Water balance calculations should be refined as additional site-specific climate and flow data become available through ongoing and proposed monitoring programs, recognizing the more detailed hydrologic or hydraulic modelling might be required.

This report is intended to be read alongside companion reports addressing surface water quality and groundwater quantity and quality. Collectively, these documents provide an integrated assessment of water-related existing conditions and potential effects associated with the Project.

# 2 BACKGROUND

The South Ridge Project is a brownfield development, representing an expansion of an existing active mining operation at AGS Mine, located approximately 4 km southwest of the Town of St. Lawrence on the southern tip of the Burin Peninsula.

## 2.1 PROJECT LOCATION

The Project is located within the municipal boundaries of the Town of St. Lawrence and is situated between the existing AGS Mine and the Blue Beach Marine Terminal (Figure 2.1-1). The Project site (the Site) is accessible via existing mining roads connected to Provincial Highway 220 through the Town of St. Lawrence.

The Project benefits from proximity to an ice-free, deep-water harbour at Blue Beach, which provides direct access to major North Atlantic shipping routes and supports marine transport of mined materials. The St. Lawrence area is a long-established fluorspar mining district, hosting more than 40 known fluorite-bearing veins. The proposed South Ridge Project focuses on the North/South Ridge vein, which contains significant mineral resources and represents a continuation of existing mining activities in the area.

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# SOUTH RIDGE MINE
## FIGURE 2.1-1- PROJECT LOCATION

★ Project Location

Existing AGS Mine Infrastructure

Proposed Project Infrastructure

Shared AGS Mine Infrastructure

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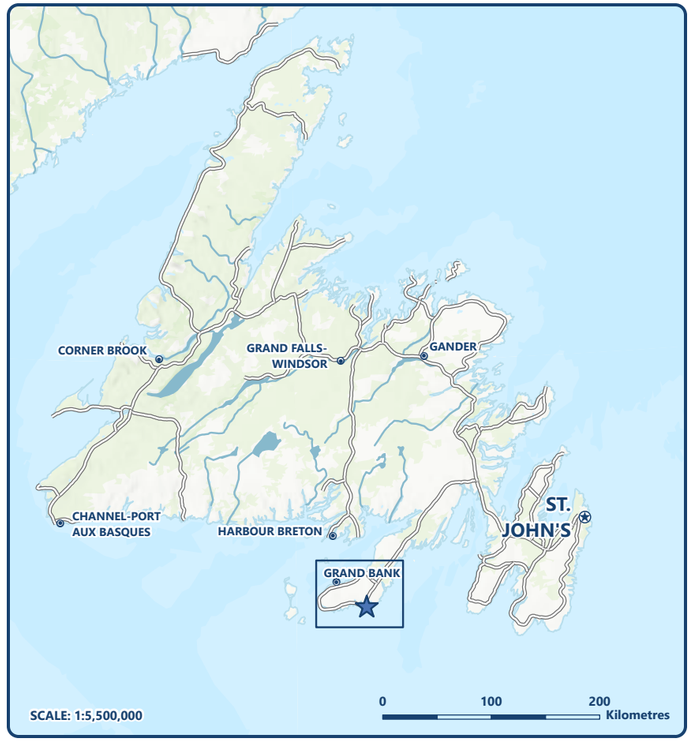


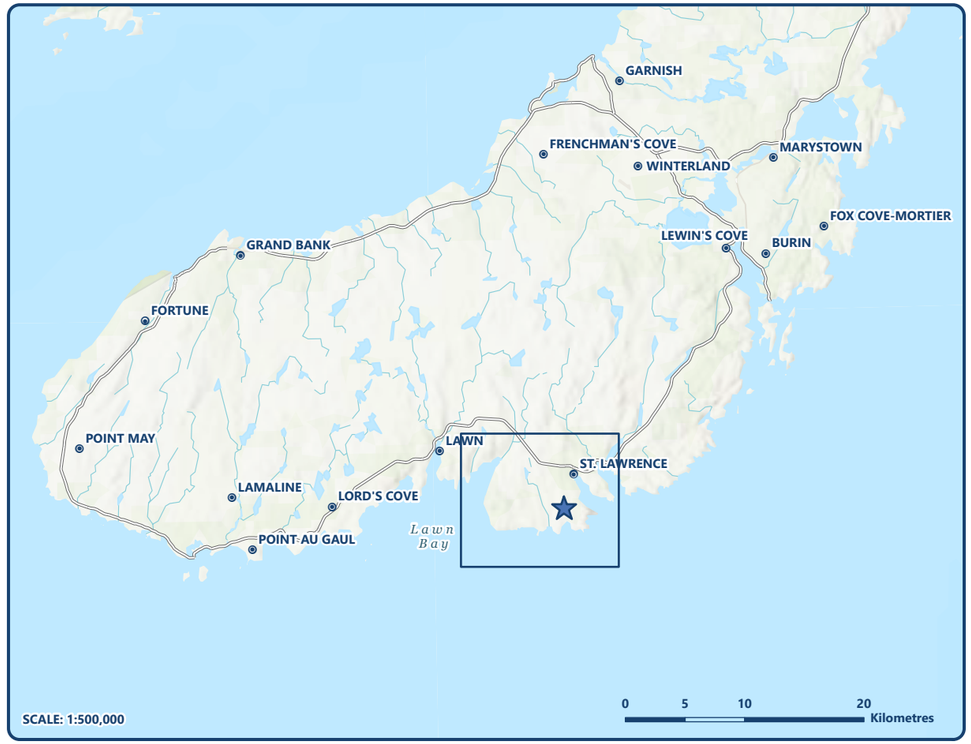


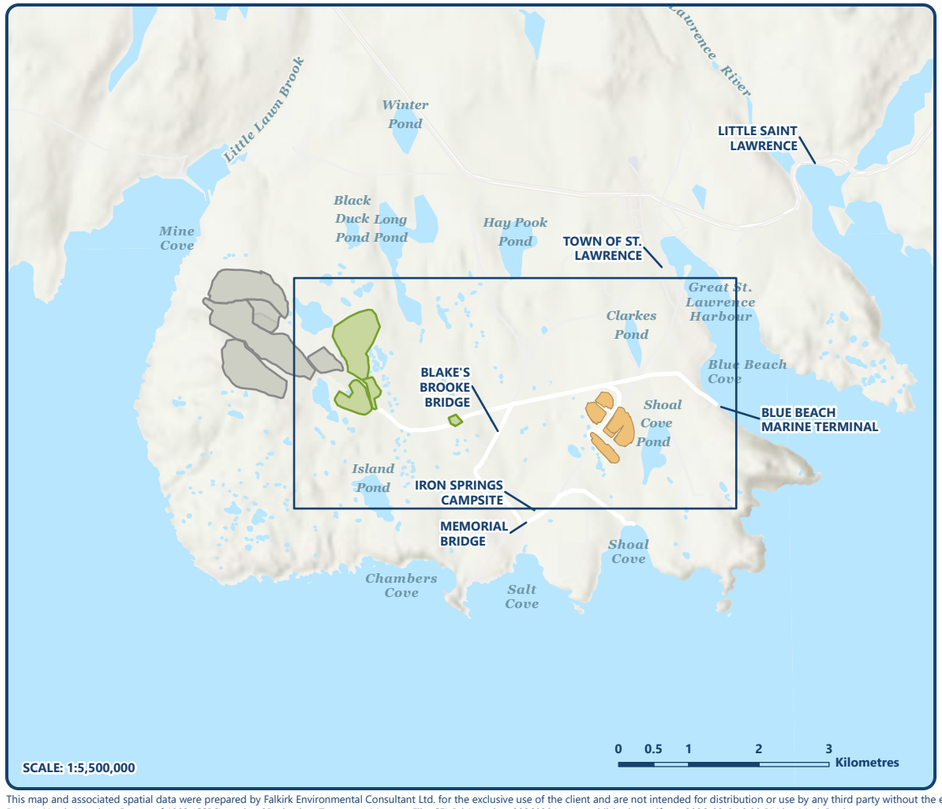


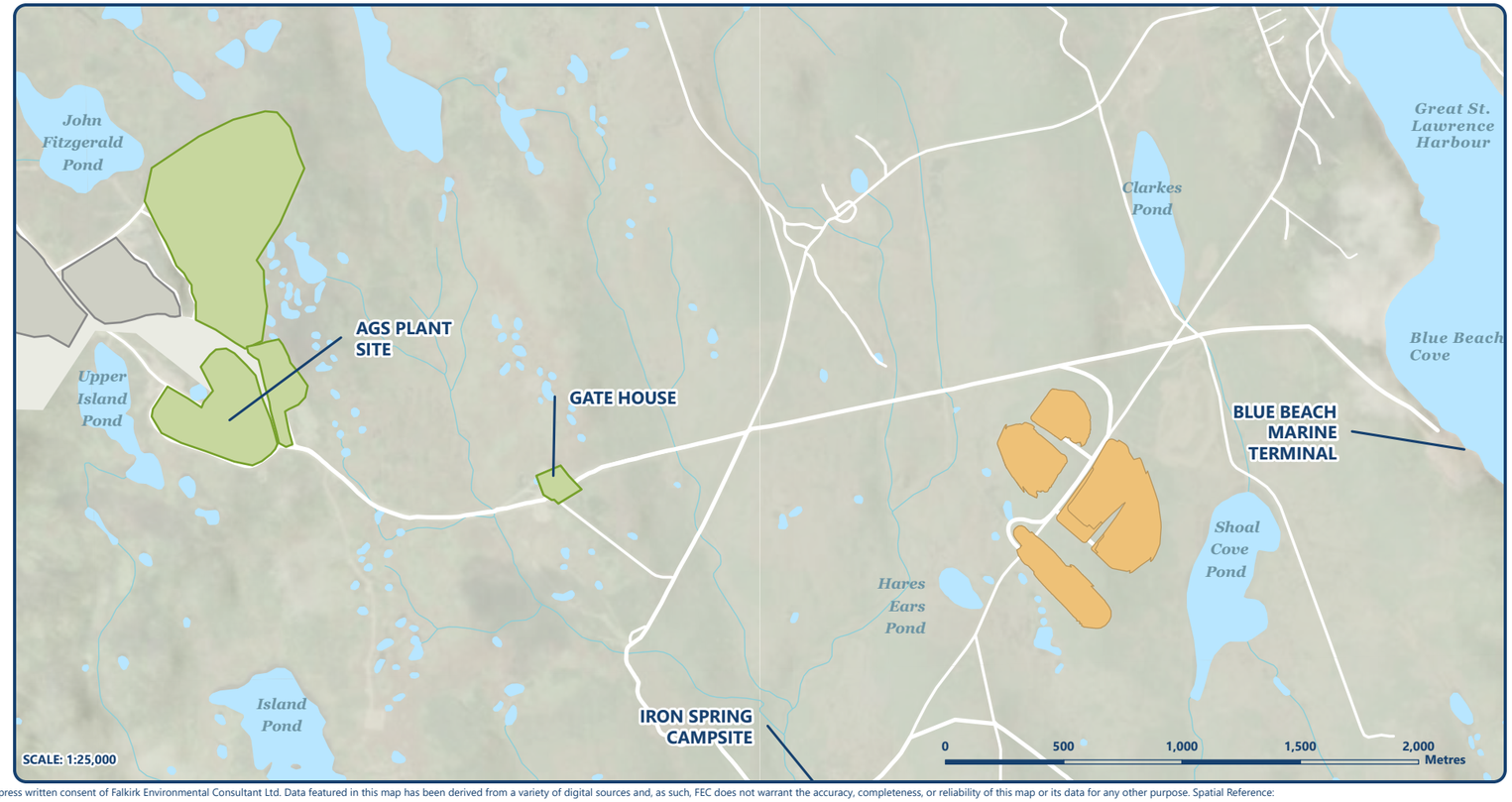


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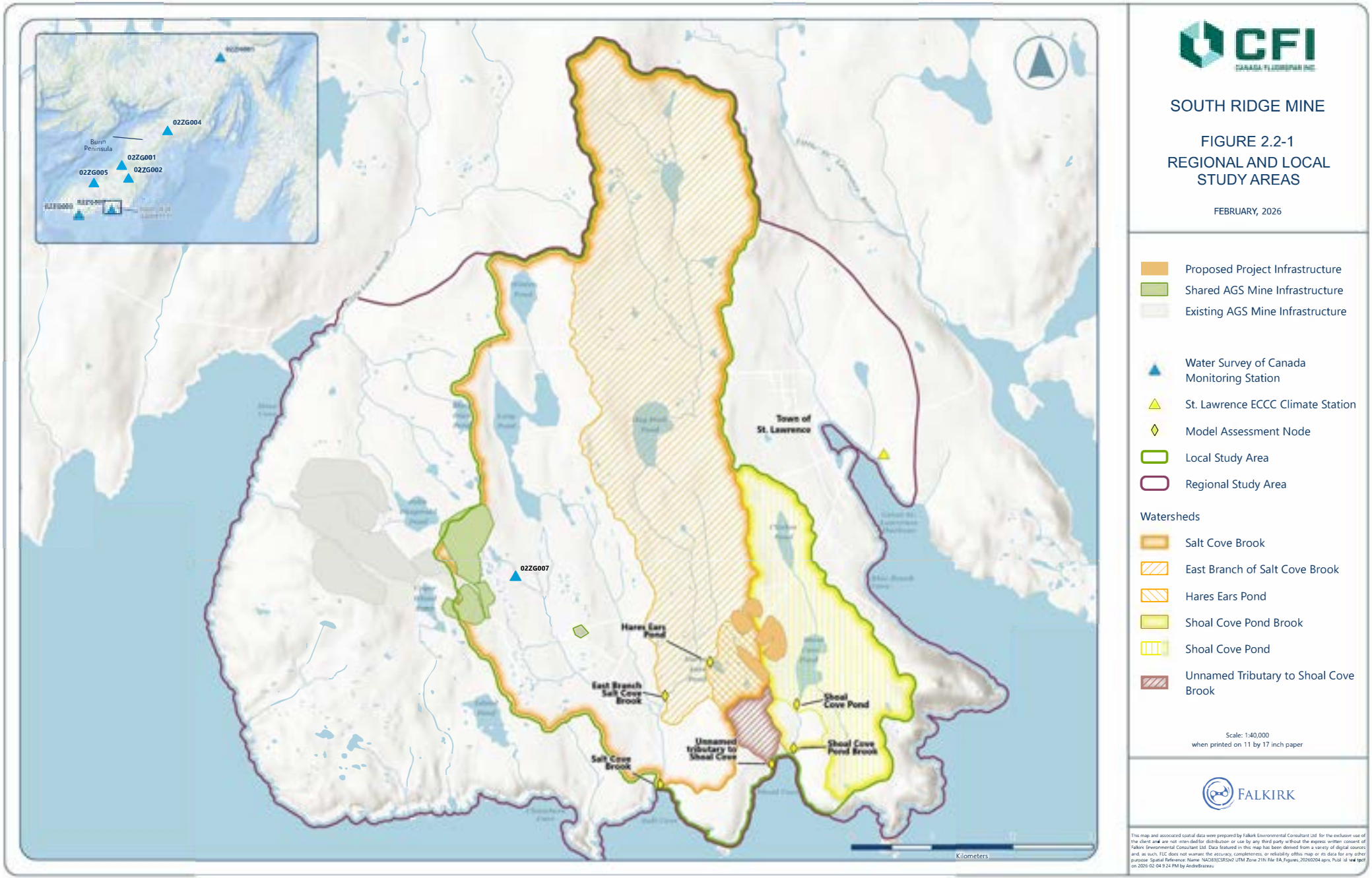
## 2.2 STUDY AREA

The Site consists of an approximately 62.2 ha area, including forested, meadow and sparsely vegetated areas, wetland areas, as well as existing roads. The Site straddles the Shoal Cove Brook and Salt Cove Brook watersheds and lies immediately upstream of Shoal Cove Pond and Hares Ears Pond. The proposed Blue Beach Haul Road extends through the Blue Beach Cove watershed east to the Blue Beach Marine Terminal.

The spatial boundaries of the assessment are defined below and shown in Figure 2.2-1.

- LSA: The LSA encompasses the Salt Cove, Shoal Cove, and Blue Beach Cove watersheds, which may be directly affected by the Project.
- RSA: The RSA encompasses the LSA and adjacent watersheds associated with the Town of St. Lawrence and the existing AGS Mine, including the Grebes Nest, Mine Cove, Northwest Pond, and Upper Island Pond watersheds. The RSA also includes the Environment and Climate Change Canada (ECCC) St. Lawrence climate station, which provides long-term climate data.

Although ore processing and tailings disposal will occur at the AGS Mine, potential hydrologic effects associated with those activities are assumed to be assessed and permitted separately. Accordingly, AGS-related watersheds are included in the RSA for regional context but excluded from the LSA, which focuses on areas of direct Project interaction.

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# SOUTH RIDGE MINE

## FIGURE 2.2-1
## REGIONAL AND LOCAL STUDY AREAS

FEBRUARY, 2026

- Proposed Project Infrastructure
- Shared AGS Mine Infrastructure
- Existing AGS Mine Infrastructure
- Water Survey of Canada Monitoring Station
- St. Lawrence ECCC Climate Station
- Model Assessment Node
- Local Study Area
- Regional Study Area

Watersheds

- Salt Cove Brook
- East Branch of Salt Cove Brook
- Hares Ears Pond
- Shoal Cove Pond Brook
- Shoal Cove Pond
- Unnamed Tributary to Shoal Cove Brook

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## 2.3 TOPOGRAPHY AND DRAINAGE

The Project is situated on the southeastern end of the Burin Peninsula within a low-relief coastal landscape characteristic of the St. Lawrence Lowlands. Ground elevations generally range from approximately 0 to 200 m above sea level. The terrain is defined by gently undulating ridges, shallow bedrock highs, and intervening low-lying areas occupied by wetlands and ponds. As shown on Figure 2.1-1, topographic divides are subdued, and surface drainage is organized through short, low-gradient brooks that flow toward the Atlantic Ocean.

Soils within the Project area generally consist of glacial till of variable thickness, ranging from approximately 1.5 m to 15 m, and are composed primarily of silty sand and gravel with varying proportions of cobbles and boulders (CFI 2015). The landscape has been shaped by glaciation into broad, elongate upland valley troughs that slope generally southward and are separated by rounded ridges forming the principal watershed divides.

The largest pond in the area is Long Pond, located west of the Project Site, which, together with Hay Pook Pond and Hares Ears Pond, report to the Salt Cove Brook catchment. Clarke Pond and Shoal Cove Pond are located within the Shoal Cove Brook catchment. Historical mining activities have resulted in localized modification of the surface-water system, including the historical use of Shoal Cove Pond for tailings deposition. Clarke Pond, located upgradient, is believed to be hydraulically connected to the groundwater system and was historically used as a mine water supply. In addition, a canal constructed prior to 1967 diverted water from the Director Mine by intercepting flows from the upper reaches of Salt Cove Brook and discharging them at a downstream location within the same watershed. The numerous ponds together with associated wetland areas, providing localized flow attenuation and storage, influencing runoff timing and baseflow conditions.

Surface drainage within the Project area is controlled by an interconnected network of small streams, ponds, and wetland complexes. The Project spans portions of the Salt Cove Brook and Shoal Cove Brook watersheds, both of which discharge directly to the coast, while adjacent areas drain east toward Blue Beach Cove.

## 2.4 PREVIOUS INVESTIGATIONS

Previous hydrogeological and surface water investigations have been completed in the LSA and RSA in support of historical and proposed mining activities. While these investigations were not conducted within the LSA, they provide regional context regarding surface water features and groundwater-surface water interactions.

- Burin Minerals Limited. 2009. *St Lawrence Fluorspar Project Pre-Feasibility Study*.
- Wilson, Scott, October 2009. *St Lawrence Fluorspar Project, Newfoundland Pre-Feasibility Study – Hydrological Aspects*. Prepared for Burin Minerals Ltd Limited. Document reference: D118703.
- Canada Fluorspar [NL] Inc. 2015. AGS Fluorspar Mine, *Environmental Assessment Registration Pursuant to the Newfoundland and Labrador Environmental Protection Act*. Submitted to the Newfoundland and Labrador Department of Environment and Conservation. Document reference: 0032-1407707-3-R-Rev1-CFI EA Registration.

- Golder Associates Ltd. 2015. *Proposed AGS Mine Project – Phase 1 Hydrogeology Study*. Report No. 1407707: Rpt ID-0007 (Rev. 0). Prepared for Canada Fluorspar Inc., St. Lawrence, Newfoundland and Labrador.
- Golder Associates Ltd., July 20, 2015. *AGS Mine, St. Lawrence, NL – Water Management Strategy*. Prepared for Canada Fluorspar Inc. Document reference: 1407707 (Doc#0053 – Rev 0).
- Knight Piésold Consulting, February 1, 2017. *St. Lawrence Fluorspar Project – Site Water Management Plan (Updated)*. Prepared for Canada Fluorspar (NL) Inc. Document reference: NB101-00642/15-A.01.
- Canada Fluorspar Inc., August 8, 2025. *South Ridge Project Environmental Assessment Self-Referral Request*. Submitted to the Newfoundland and Labrador Department of Environment and Climate Change Environmental Assessment Division.
- Mining One Pty Ltd., November 2025. *Hydrogeology Review, Gap Analysis, and Preliminary Assessment for Pit Dewatering for South Ridge Pre-Feasibility Study*. Prepared for Canada Fluorspar Inc. Document reference: 44058_M.


# 3 EXISTING CONDITIONS

## 3.1 CLIMATE

Existing climate conditions within the Project area were characterized using an analysis of long-term historical meteorological data from ECCC monitoring station St Lawrence (ECCC IDs: 8403619 and 8403616) within the RSA, approximately 4 km northeast of the AGS Mine. A desktop climate analysis was completed to estimate monthly and annual precipitation and air temperature statistics at a scale appropriate for hydrologic baseline characterization and preliminary effects assessment.

The St. Lawrence station was selected as it is the closest ECCC climate station to the Project area, located approximately 31 km from the site, and provides an extended continuous period of record (1994–2024) considered representative of climate conditions within the RSA and the Site, recognizing that the Site and climate station elevations are nearly identical at 49 masl. Climate data from 1994 to 2024 were used for this analysis, representing a 30-year period of record commonly used to define climate normals and characterize long-term climate variability.

Monthly climate statistics were obtained directly from ECCC standardized climate summaries for the St. Lawrence climate station from 1994 to 2024. These statistics are derived by ECCC from quality-controlled daily observations. Monthly total precipitation represents the summed daily precipitation for each month, while monthly air temperature values represent monthly mean temperatures calculated from daily observations. These monthly values were used directly to characterize long-term average climate conditions and support hydrologic baseline assessment. These compiled climate statistics form the basis for the surface water hydrology baseline and subsequent water balance assessment.

### 3.1.1 Precipitation

Mean monthly precipitation in the RSA is relatively consistent throughout the year, with a wet season in fall and no distinct dry season. Based on ECCC data from the St. Lawrence climate station (Figure 3.1-1, Table 3.1-1), mean monthly precipitation ranges from approximately 107 mm in July to 161 mm in

November. Precipitation generally decreases through late spring and summer, reaching a minimum in July, before increasing through the fall months. Elevated precipitation totals are observed from September through December.

The mean annual total precipitation reported by ECCC for the RSA is 1,555 mm of which an average of 1,364 mm (88%) falls as rainfall, while an average of 191 mm (12%) is recorded as snowfall. Rainfall dominates precipitation inputs through most of the year, during which monthly rainfall totals closely approximate total monthly precipitation. However, snowfall represents a meaningful component of winter precipitation, particularly in January to March.

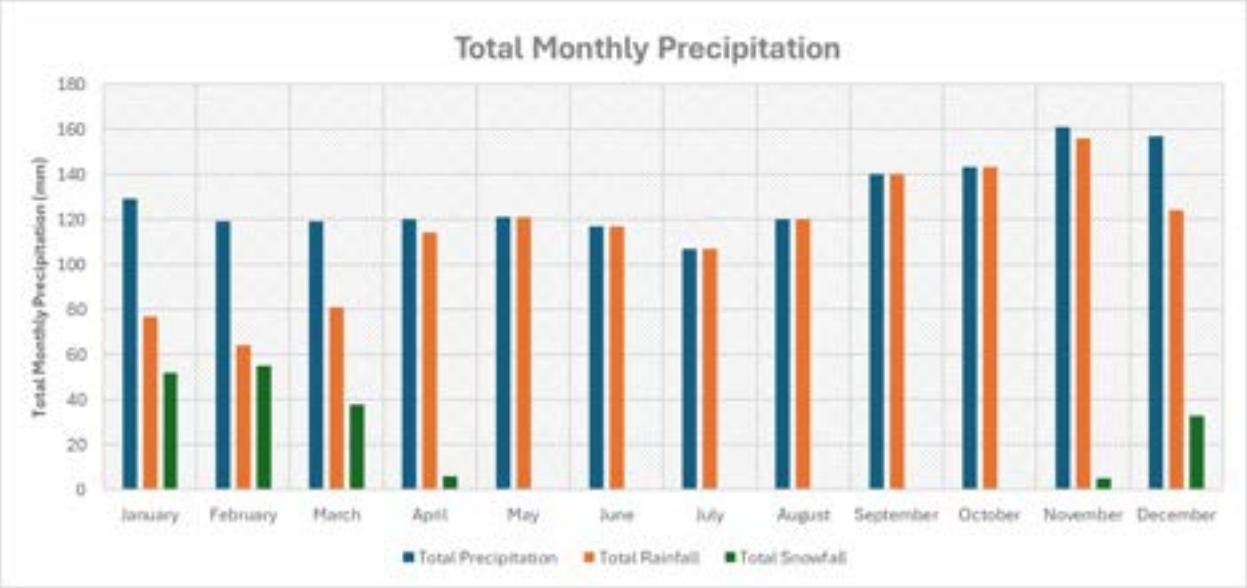



**Figure 3.1-1: Mean Monthly Total Precipitation, Rainfall, and Snowfall in mm at the RSA**

**Table 3.1-1: Mean Monthly and Annual Precipitation Statistics at the RSA**

| Monthly Mean | Precipitation (mm) | Rainfall (mm) | Snow Water Equivalent (mm) |
|---|---|---|---|
| January | 129 | 77 | 52 |
| February | 119 | 64 | 55 |
| March | 119 | 81 | 38 |
| April | 120 | 114 | 6 |
| May | 121 | 121 | 0 |
| June | 117 | 117 | 0 |
| July | 107 | 107 | 0 |
| August | 120 | 120 | 0 |
| September | 140 | 140 | 0 |
| October | 143 | 143 | 0 |

| Monthly Mean | Precipitation (mm) | Rainfall (mm) | Snow Water Equivalent (mm) |
|---|---|---|---|
| November | 161 | 156 | 5 |
| December | 157 | 124 | 33 |
| **Annual Mean** | **1,555** | **1,364** | **191** |

*Note: Snow water equivalent values were calculated as the difference between total precipitation and rainfall.*

Although summer months exhibit comparatively lower precipitation totals, monthly values generally exceed 100 mm and continue to support sustained surface runoff. Winter precipitation remains substantial; however, under the low-elevation maritime climate of the Burin Peninsula, a large proportion of winter precipitation falls as rain or is subject to frequent melt events. As a result, winter precipitation commonly contributes directly to runoff rather than accumulating as a persistent seasonal snowpack, consistent with regional climatic and hydrologic conditions documented for southern Newfoundland (NL DECC 1992; ECCC 2023).

### 3.1.2 Air Temperature

Mean monthly air temperatures exhibit seasonal variability as shown in Figure 3.1-2. Mean temperatures are below freezing during winter months, with the coldest mean monthly temperature occurring in February (-3.5°C). Temperatures increase steadily through the spring, becoming positive in April, and reach a peak mean monthly temperature of 16.9°C in August before declining through the fall. The mean annual air temperature over the 1994 to 2024 period was approximately 6.2°C (Table 3.1-2).

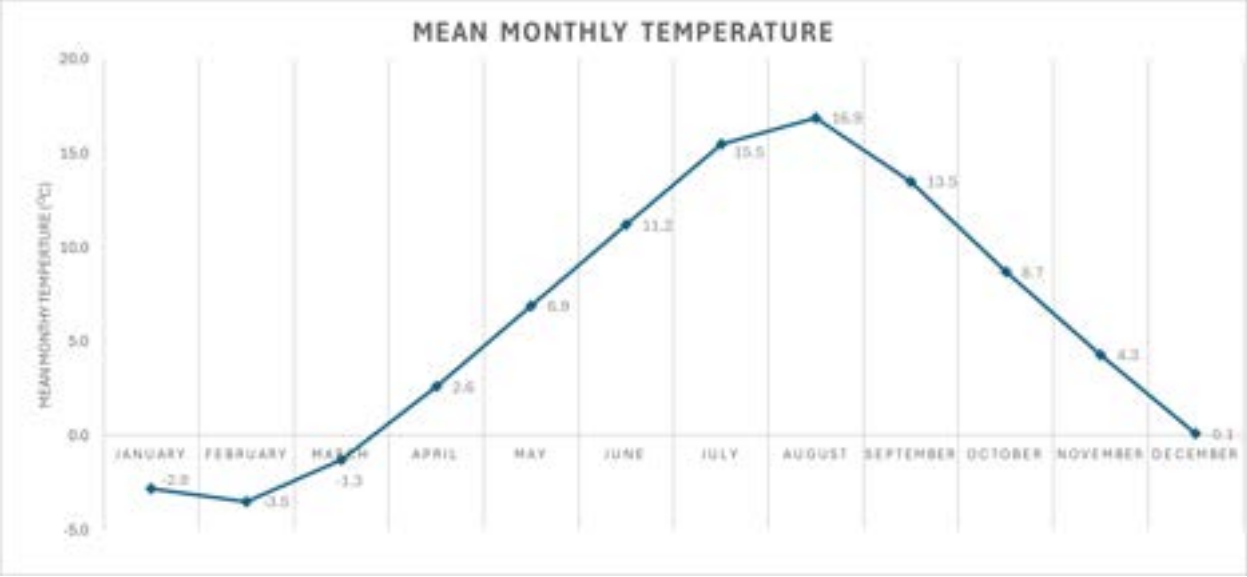



**Figure 3.1-2 : Mean Monthly Temperatures at the RSA**

**Table 3.1-2: Summary of Mean Monthly Temperatures at the RSA**

| Month | Monthly Mean Temperature (°C) |
|---|---|
| January | -2.8 |
| February | -3.5 |
| March | -1.3 |
| April | 2.6 |
| May | 6.9 |
| June | 11.2 |
| July | 15.5 |
| August | 16.9 |
| September | 13.5 |
| October | 8.7 |
| November | 4.3 |
| December | 0.1 |
| **Annual Mean** | **6.2** |

Seasonal temperature patterns influence hydrologic processes within the study watersheds. Climate normals indicate sub-zero winter temperatures with frequent freeze-thaw conditions that limit persistent snowpack development, while rising spring temperatures drive snowmelt-related increases to runoff. These patterns are consistent with regional hydrologic behaviour documented for southern Newfoundland under humid maritime conditions (ECCC 2023; NL DECC 1992).

### 3.1.3 Evapotranspiration

Potential evapotranspiration (PET) reflects atmospheric demand for moisture under prevailing climatic conditions if there is sufficient moisture in the soil at all times. PET was estimated for the LSA according to the Thornthwaite method, using the recorded daily mean temperature at the ECCC St. Lawrence meteorological station (Johnstone 1983). The monthly accumulation of PET was calculated for the period of 1994 to 2024 and averaged as shown in Figure 3.1-3.

Evapotranspiration is minimal during winter months (December to March), as shown in Figure 3.1-3, reflecting low air temperatures and limited solar radiation. PET increase steadily through spring, peak in July and August at 109 mm/month, coincident with the warmest temperatures (Table 3.1-2), and recede during the fall. The average annual PET for the LSA is 528 mm, the majority of which is accumulated during summer.

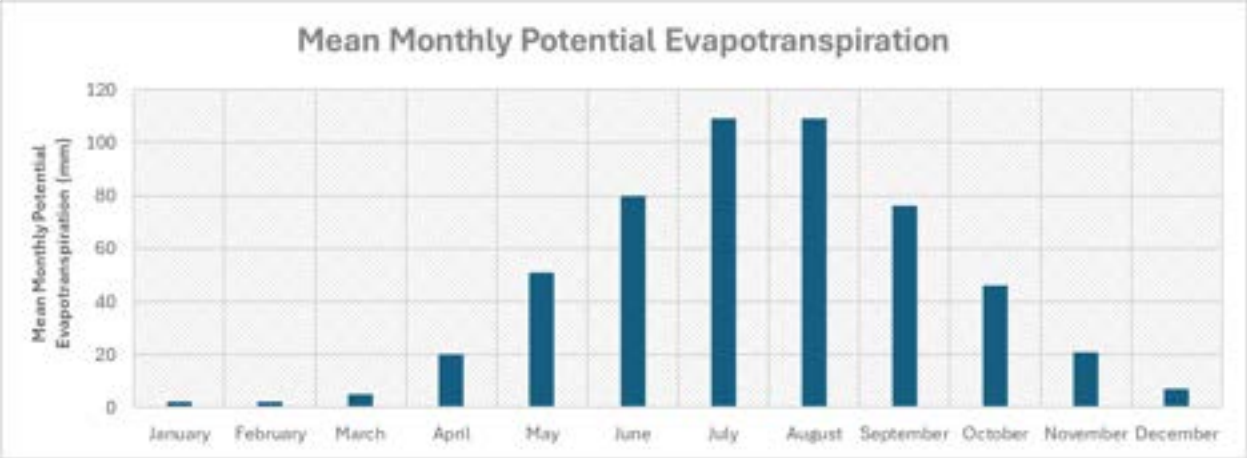



**Figure 3.1-3: Estimated Monthly Potential Evapotranspiration**

**Table 3.1-3: Estimated Monthly Potential Evapotranspiration**

| Month | PET (mm) |
|---|---|
| January | 2 |
| February | 2 |
| March | 5 |
| April | 20 |
| May | 51 |
| June | 80 |
| July | 109 |
| August | 109 |
| September | 76 |
| October | 46 |
| November | 21 |
| December | 7 |
| Annual Total | 528 |

The estimated potential evapotranspiration is consistent with regional evapotranspiration patterns described for coastal Newfoundland, where mean annual potential evapotranspiration typically ranges between approximately 350 and 550 mm depending on latitude and elevation (NL DECC 1992).

## 3.2 SURFACE WATER HYDROLOGY

### 3.2.1 Approach

A regional hydrologic assessment was undertaken to characterize surface water flows within the LSA. In the absence of long-term continuous flow monitoring within the LSA, baseline flow conditions at assessment nodes were characterized using regional historical hydrometric data from WSC stations located in the Burin Peninsula (Figure 2.1-1).

Representative regression relationships between discharge and drainage area were developed and applied to delineated catchments within the LSA. Drainage area was used as the primary scaling parameter, recognizing that additional factors such as watershed storage and extent of wetlands may influence local flow response. The resulting regression relationships were intended to provide screening-level estimates of baseline flow conditions for ungauged Project catchments.

### 3.2.2 Watershed Characteristics

Watersheds within the LSA were delineated using a digital elevation model (NASA DEM; 1-arc-second resolution SRTM/ASTER/GDEM) as shown in Figure 2.1-1. The LSA comprises two broad watersheds divided into six discrete surface-water catchments draining generally south and southeast toward the Atlantic Ocean at either Shoal Cove or Salt Cove. Catchment areas range from less than 1 km² to approximately 24 km².

Topographic relief across the LSA is low, and watershed divides are subdued. Many catchments include natural surface-water storage features that influence flow timing and magnitude.

#### 3.2.2.1 Shoal Cove Watershed

- The Shoal Cove Pond watershed, with a drainage area of 3.9 km², drains a small coastal basin located east of Salt Cove Brook. Surface runoff from upland areas drains into Shoal Cove Pond prior to discharge downstream, with the pond representing a prominent surface-water feature within the watershed.
- Shoal Cove Pond Brook, with a drainage area of 0.3 km$^2$ of the total watershed drainage area of 4.2 km$^2$, drains the outlet of Shoal Cove Pond and conveys flows southward to Shoal Cove. The watershed is characterized by short flow paths and direct marine discharge.

#### 3.2.2.2 Unnamed Tributary to Shoal Cove

This small tributary drains an area of approximately 0.4 km² and contributes directly to the Shoal Cove system south of Hares Ears Pond, with no major upstream storage features.

#### 3.2.2.3 Salt Cove Watershed

- The Hares Ears Pond watershed drains an area of approximately 0.6 km² and includes Hares Ears Pond, a prominent surface-water feature within the Salt Cove Brook drainage system.
- The East Branch of Salt Cove Brook drains an inland catchment of approximately 12.6 km². The watershed includes a network of small tributaries and multiple ponded features, with flows converging downstream before entering the main Salt Cove Brook channel.

- Salt Cove Brook has a drainage area of 10.9 km² of the total watershed drainage area of 24.1 km² and integrates flows from multiple upstream tributaries including the East Branch and contributions from Hares Ears Pond. Due to its size and contributing area, Salt Cove Brook represents the dominant surface-water system within the LSA.

### 3.2.3 Hydrometric Data and Station Selection

A review of available WSC hydrometric stations (Table 3.2-1) on the Burin Peninsula and surrounding region was completed. Selected stations span a range of basin sizes and include both riverine and pond outflow systems, providing a basis for evaluating regional hydrologic scaling relationships. These data were used to characterize typical flow magnitudes and seasonal flow patterns applicable to ungauged catchments within the LSA.

A summary of the WSC hydrometric stations used in the analysis, including station identifiers, locations, watershed areas, and periods of record, is provided in Table 3.2-1.

**Table 3.2-1: WSC Stations Used in Regional Analysis**

| Station No [(a)] | Station Name | Latitude / Longitude | Gross Drainage Area (km²) | Watershed | Period of Flow Record | Years of Full Years of Record [(b)] |
|---|---|---|---|---|---|---|
| 02ZG001 | Garnish River near Garnish | 47°12’59” N / 55°19’48” W | 205 | Garnish River watershed | 1958–2023 | 65 |
| 02ZG002 | Tides Brook below Freshwater Pond | 47°07’38” N / 55°15’54” W | 166 | Tides Brook watershed | 1977–1997 | 19 |
| 02ZG003 | Salmonier River near Lamaline | 46°52’40” N / 55°46’34” W | 115 | Salmonier River watershed | 1980–2024 | 45 |
| 02ZG004 | Rattle Brook near Boat Harbour | 47°27’00” N / 54°51’10” W | 42.7 | Rattle Brook watershed | 1981–2023 | 43 |
| 02ZG005 | Little Barasway Brook near Molliers | 47°06’00” N / 55°37’15” W | 28.2 | Little Barasway watershed | 1987–1996 | 9 |
| 02ZG007 | Outflow of Unnamed Pond south of Long Pond | 46°54'14"N / 55°26'37"W | 0.87 | Minor pond outflow | 2017–2023 | 6 |
| 02ZH001 | Pipers Hole River at Mothers Brook | 47°56’48” N / 54°17’03” W | 764 | Pipers Hole River watershed | 1952–2024 | 72 |

*Note: (a) A water-level only station (02ZG008 – John Fitzpatrick Pond near outlet) was not used for analysis even though it was in the LSA.*
*(b): “Period of Flow Record” refers to the full span of available hydrometric data at each station, while “Full Years of Record” represents the number of complete calendar years used in statistical analyses.*

## 3.2.4 Average Flow Conditions

### 3.2.4.1 Methods

Flow duration curves were developed for each selected WSC station using drainage-area-normalized discharge to assess the consistency of streamflow regime behaviour across the regional dataset. The shape of each flow duration curve reflects the combined influence of physiography and climate on streamflow response. Variability at the upper and lower ends of the curves provides insight into differences in high-flow and low-flow behaviour among watersheds.

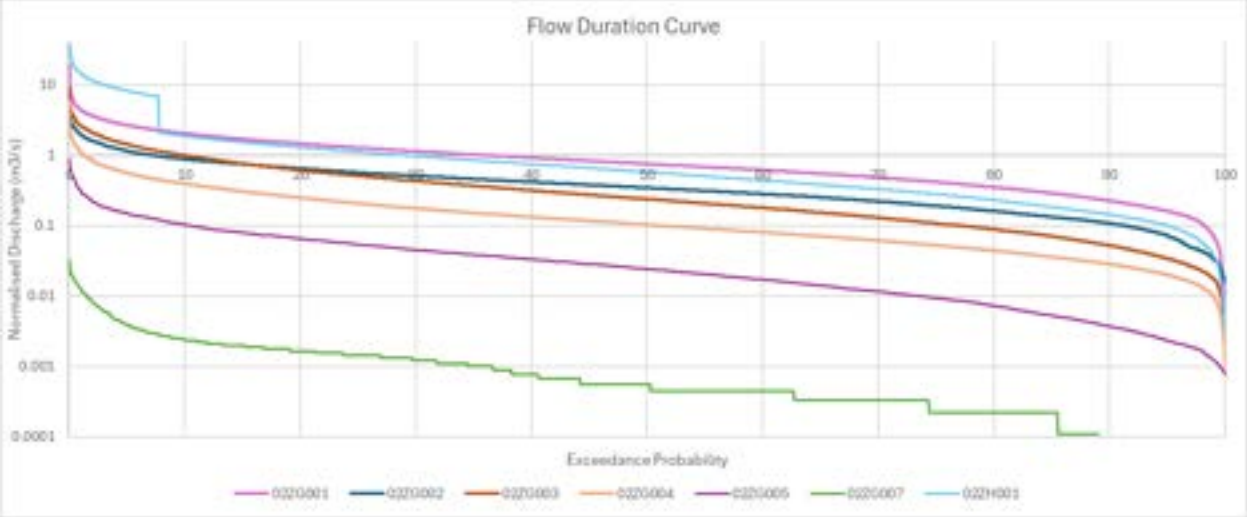



**Figure 3.2-1: Normalized Flow Duration Curves for Selected WSC Stations**

The normalized flow duration curves (Figure 3.2-1) for the stations exhibit broadly similar shapes, particularly across the mid-range of exceedance probabilities (approximately 10–80%), indicating comparable runoff response and catchment storage behaviour at the regional scale.

Differences among stations are most evident at the high-flow and low-flow extremes, reflecting variability in storm response and surface runoff. Overall, the general similarity in curve shape across most stations supports the application of regional regression relationships to ungauged Project watersheds, while the observed divergence at flow extremes highlights increased uncertainty in inferring peak-flow and low-flow characteristics across various watercourses in the Burin Peninsula.

Mean annual discharge was calculated for each selected WSC station using available daily flow records. A regression relationship between mean annual discharge and gross drainage area was then developed using the regional dataset (Figure 3.2-2).

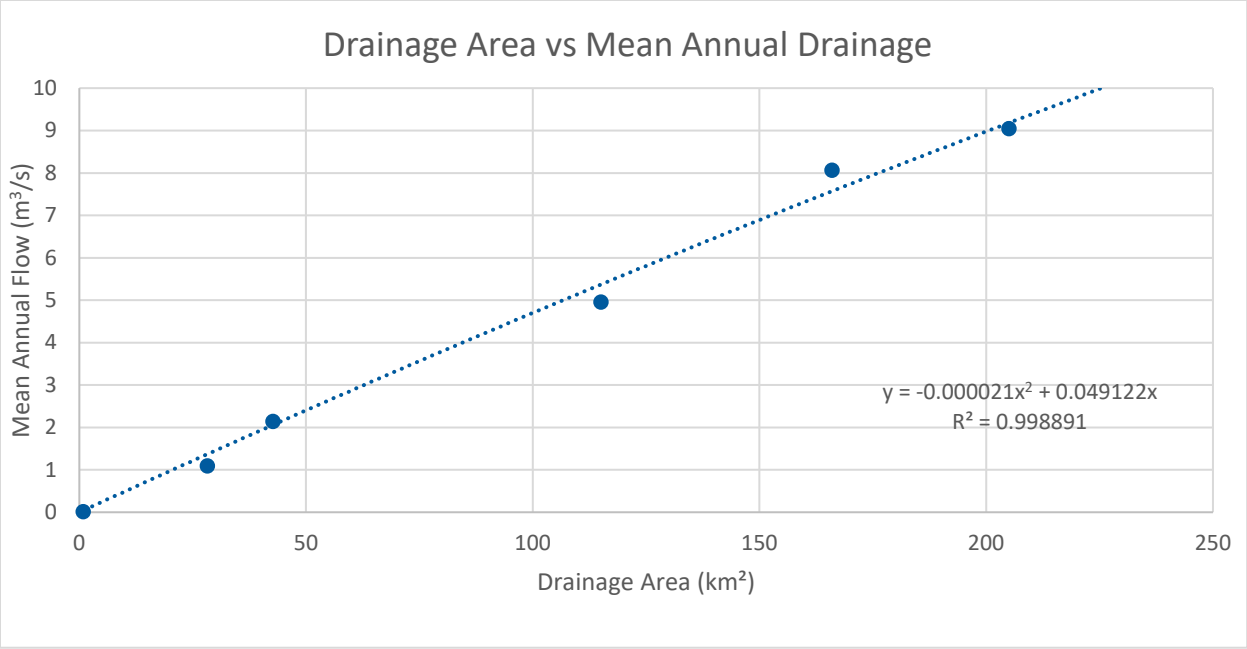
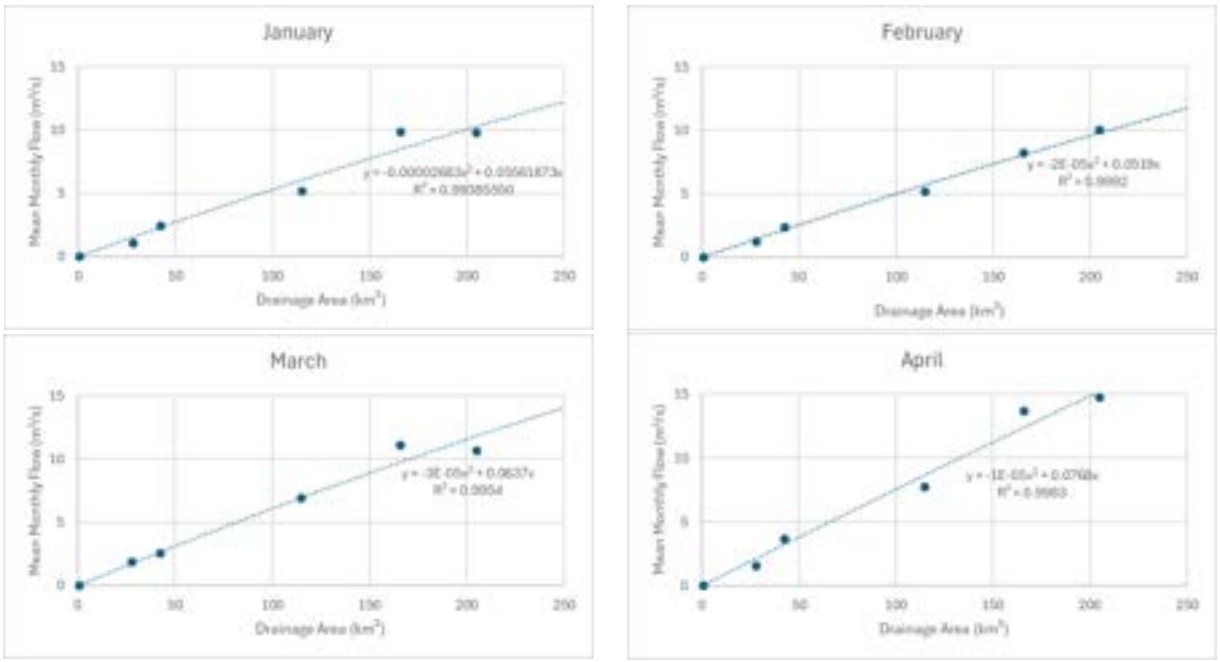



**Figure 3.2-2: Relationship between Drainage Area and Mean Annual Discharge**

To capture seasonal variability in runoff response, separate regression relationships (Figure 3.2-3) were developed between mean monthly discharge and drainage area for each calendar month. Mean monthly flows were calculated at each WSC station from daily records, and month-specific regressions were applied to the delineated Project catchment areas. This approach accounts for seasonal differences in climatic processes and variability in hydrologic response throughout the year.



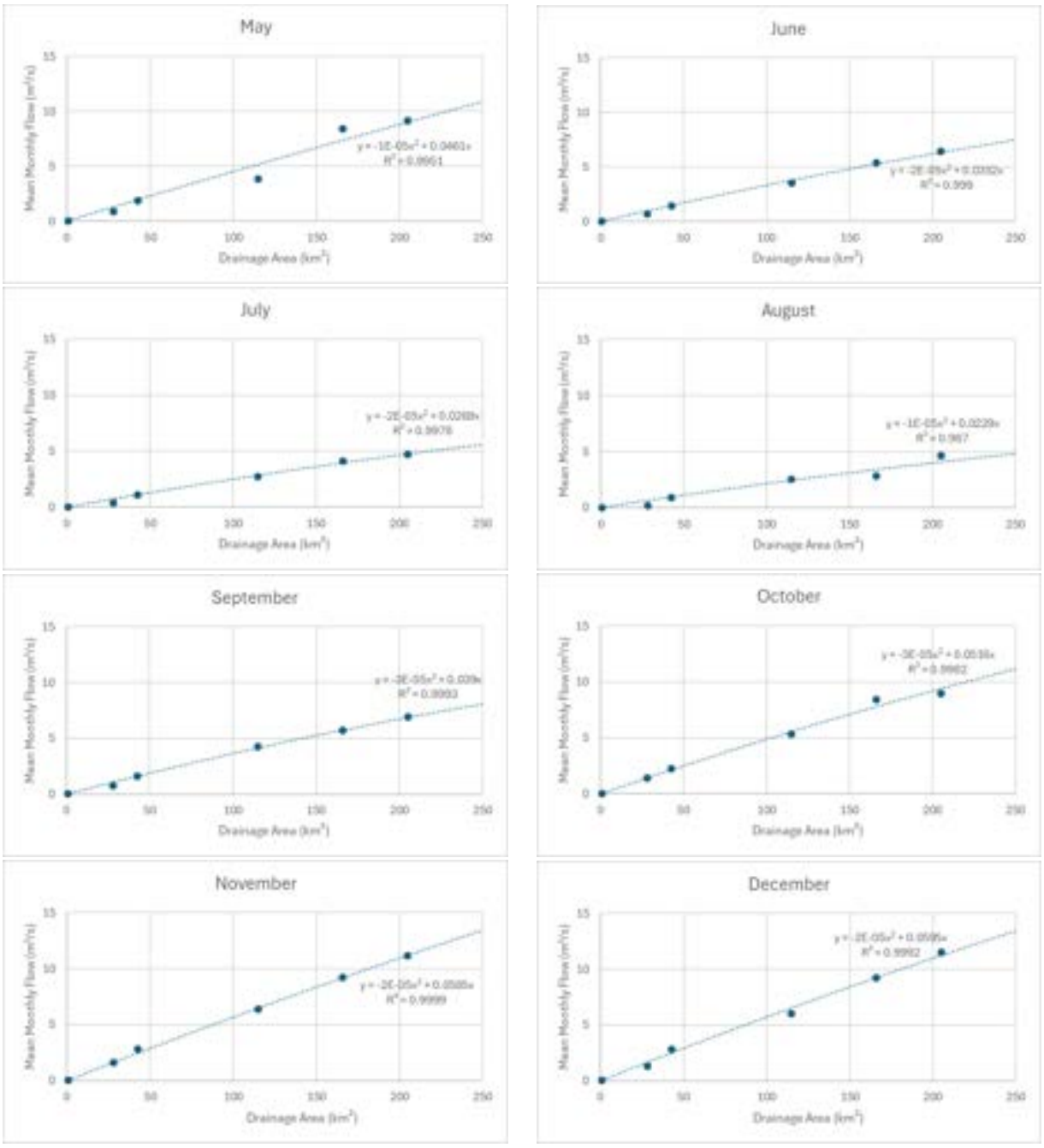



**Figure 3.2-3: Regression relationships between Drainage Areas and Mean Monthly Discharges**

The resulting regression equations were applied to estimate mean monthly flows for Salt Cove Brook, Shoal Cove Pond Brook, and associated sub-catchments within the LSA.

### 3.2.4.2 Results

Estimated mean annual flows for the assessment nodes range from approximately 0.02 m³/s for the smallest contributing tributaries to approximately 1.16 m³/s at the outlet of Salt Cove Brook (Table 3.2-2).

When normalized by drainage area, estimated mean annual unit-area discharges are highly consistent across all Project catchments, ranging from approximately 1,523 to 1,539 mm/year. This consistency is representative of the anticipated similar runoff response characteristics across the LSA that is inherent in the regional regression method and should be confirmed with hydrometric monitoring within the LSA.

The estimated unit-area discharges are similar in magnitude to the long-term mean annual precipitation for the region (1,555 mm/year; Section 3.1.1). This is considered reasonable for a humid maritime setting characterized by high precipitation and limited soil storage capacity, and the presence of wetlands and ponded features that promote efficient runoff generation. Similar hydrologic behaviour has been documented for the Burin Peninsula and coastal Newfoundland, where a large proportion of annual precipitation contributes directly to surface runoff (NL DECC 1992).

The similarity between estimated runoff depths and regional precipitation totals is therefore interpreted as a screening-level check on the plausibility of the estimated mean annual flows.

**Table 3.2-2: Catchment Areas and Estimated Mean Annual Flows for Project Catchments**

| Assessment Node | Catchment Area ($km^2$) | Mean Annual Flow ($m^3/s$) | Mean Annual/Discharge (mm/year) |
|---|---|---|---|
| Shoal Cove Pond | 3.9 | 0.19 | 1,536 |
| Shoal Cove Pond Brook | 4.2 | 0.21 | 1,536 |
| Unnamed Tributary to Shoal Cove | 0.4 | 0.02 | 1,539 |
| Hares Ears Pond | 0.6 | 0.03 | 1,539 |
| East Branch of Salt Cove Brook | 13.2 | 0.64 | 1,531 |
| Salt Cove Brook | 24.1 | 1.16 | 1,523 |

Estimated mean monthly flows for assessment nodes are summarized in Table 3.2-3 and illustrated on Figure 3.2-4. Results indicate a seasonal pattern characterized by higher mean flows in winter and early spring, associated with snowmelt, with peak monthly values occurring in April, and lower mean flows during the late summer months, particularly July and August.

For Salt Cove Brook, mean monthly flows increase from approximately 1.24 to 1.52 $m^3/s$ during the winter months (January-March) to a peak of approximately 1.84 $m^3/s$ in April. Flows then decline through the summer, reaching a minimum of approximately 0.55 $m^3/s$ in August. Flows subsequently increase during the fall, reaching approximately 0.92 to 1.42 $m^3/s$ between September and December.

A similar seasonal pattern is observed for Shoal Cove Pond Brook, where mean monthly flows range from approximately 0.22 to 0.27 $m^3/s$ in winter, peak at approximately 0.33 $m^3/s$ in April and decline to approximately 0.10 $m^3/s$ during August, followed by a gradual increase through the fall.

**Table 3.2-3: Estimated Mean Monthly Flows for Assessment Nodes**

| | | Monthly Mean Flows ($m^3/s$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catchment | Catchment Area ($km^2$) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Shoal Cove Pond | 3.9 | 0.22 | 0.20 | 0.25 | 0.30 | 0.18 | 0.14 | 0.11 | 0.09 | 0.15 | 0.20 | 0.23 | 0.23 |
| Shoal Cove Pond Brook | 4.2 | 0.24 | 0.22 | 0.27 | 0.33 | 0.20 | 0.15 | 0.11 | 0.10 | 0.16 | 0.22 | 0.25 | 0.25 |
| Unnamed Tributary to Shoal Cove | 0.4 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 |
| Hares Ears Pond | 0.6 | 0.03 | 0.03 | 0.04 | 0.05 | 0.03 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 | 0.04 |
| East Branch of Salt Cove Brook | 13.2 | 0.73 | 0.68 | 0.84 | 1.01 | 0.61 | 0.46 | 0.35 | 0.30 | 0.51 | 0.68 | 0.77 | 0.78 |
| Salt Cove Brook | 24.1 | 1.32 | 1.24 | 1.52 | 1.84 | 1.10 | 0.84 | 0.64 | 0.55 | 0.92 | 1.23 | 1.40 | 1.42 |

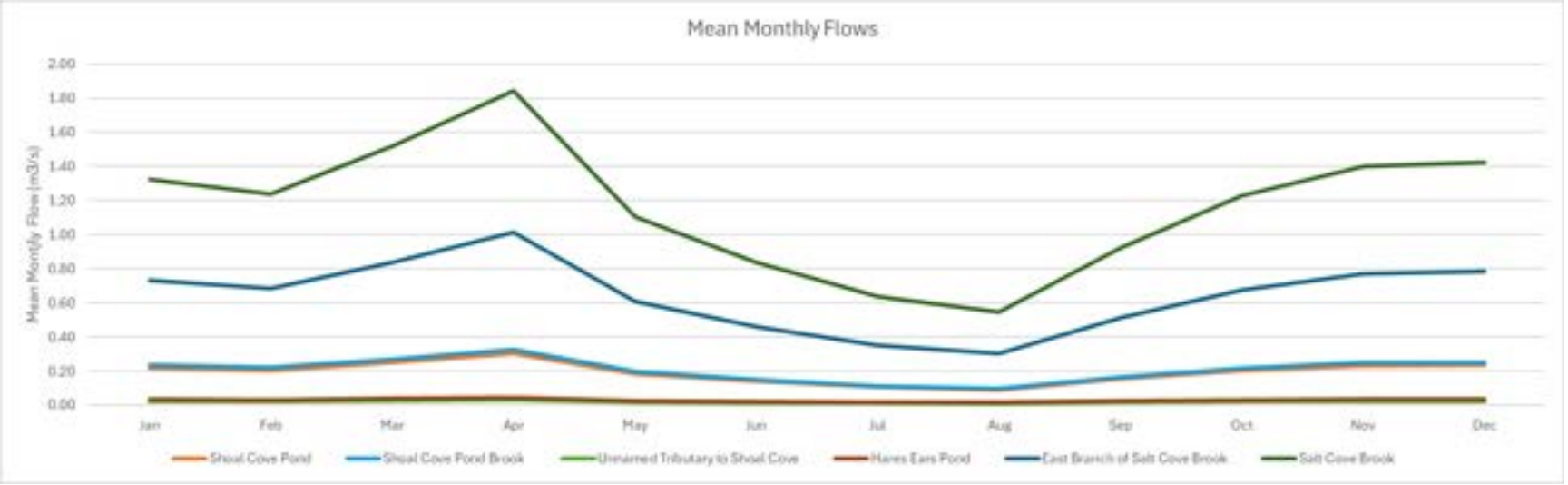



**Figure 3.2-4: Estimated Mean Monthly Flows for Assessment Nodes**

### 3.2.5 Peak Flow Conditions

#### 3.2.5.1 Flood Frequency Analysis

Peak flow conditions within the Project area were characterized using regional flood frequency methods, as no long-term continuous flow monitoring is available within the LSA. The analysis relied on WSC hydrometric stations located within the Burin Peninsula that have sufficient record length and quality to support flood frequency analysis.

Annual maximum series peak flow statistics for WSC hydrometric stations were obtained from existing flood frequency analyses completed using HEC-SSP in accordance with the Bulletin 17B framework and the Log-Pearson Type III (LP3) distribution. Flood quantile estimates were available for standard annual exceedance probabilities, including 50%, 20%, 10%, 5%, 2%, 1%, and 0.5%.

#### 3.2.5.2 Regional Index-Flood Approach

Flood quantiles at each gauged station were normalized by the station-specific 2-year return period flood ($Q_2$) to derive dimensionless flood growth ratios ($Q_t/Q_2$), which describe the relative increase in peak flow with return period independent of watershed size. Mean regional growth ratios were calculated across stations for each return period to define a representative regional flood growth curve. The consistency of flood growth behaviour across stations was evaluated using a flood index homogeneity test (Figure 3.2-5); station 02ZG003 was excluded due to a substantially higher normalized 10-year flood value relative to the remaining stations.

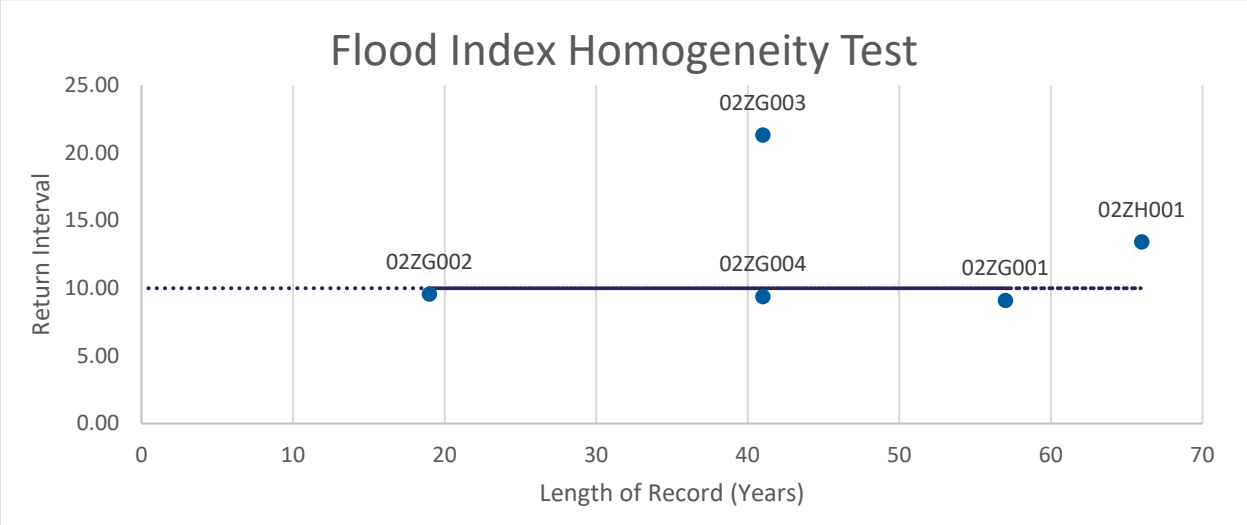



**Figure 3.2-5: Index Flood Homogeneity Test**

For ungauged Project catchments, the index flood ($Q_2$) was estimated using a regional regression relationship with gross drainage area (Figure 3.2-6). Peak flows for higher return periods were then estimated by scaling the regression-derived $Q_2$ values using the corresponding regional mean flood growth ratios (Table 3.2-4), following the index-flood formulation:

$$Q_t = Q_2 \times (Q_t/Q_2)_{\text{regional}}$$

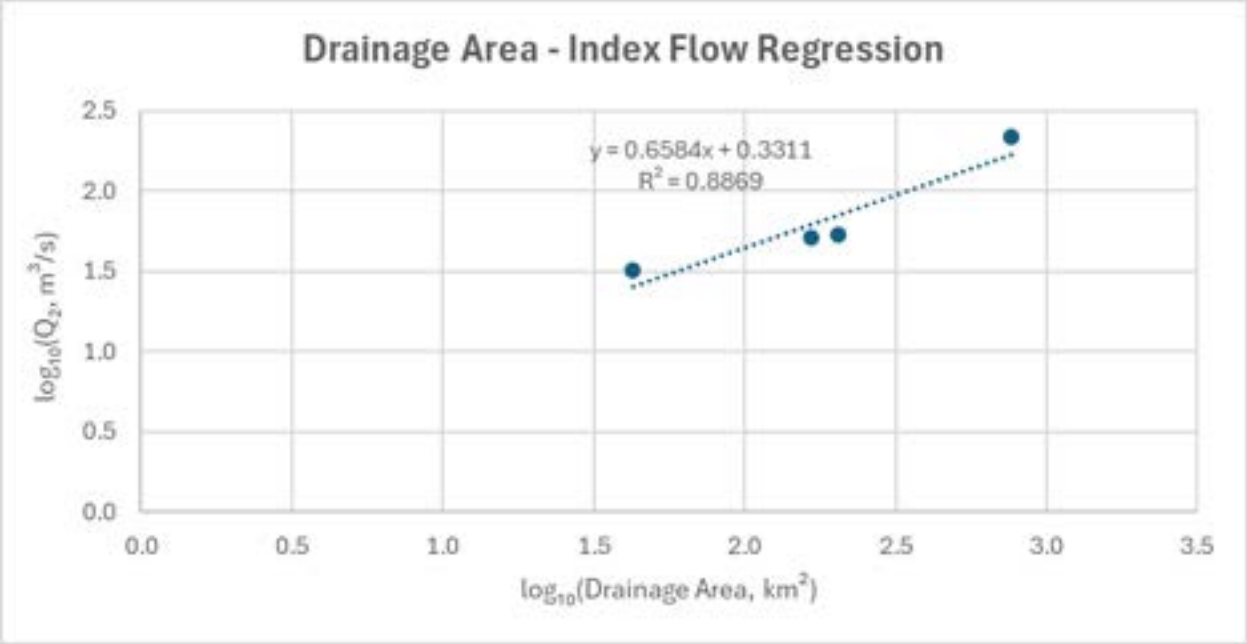



**Figure 3.2-6: Relationship Between Drainage Area and Index Flood ($Q_2$)**

**Table 3.2-4: Regional Mean Flood Growth Ratios ($Q_t$ / $Q_2$) by Return Period**

| Return Period (years) | Regional Mean Flood Growth Ratio ($Q_t$ / $Q_2$) |
|---|---|
| 5 | 1.5 |
| 10 | 1.9 |
| 20 | 2.3 |
| 50 | 3.0 |
| 100 | 3.6 |
| 200 | 4.3 |

This approach ensures that estimated peak flows reflect both watershed scale and regional flood growth behaviour observed at gauged watersheds.

### 3.2.5.3 Estimated Peak-Flow Conditions in the LSA

Estimated peak flows for Salt Cove Brook and Shoal Cove Pond Brook were derived using the regional index-flood approach as shown in Table 3.2-5. Peak flows are presented for return periods ranging from 2 to 200 years and reflect the combined application of the drainage-area-based $Q_2$ regression and regional flood growth ratios.

As a supplementary check, peak flows were also estimated using the Newfoundland Regional Flood Frequency Analysis (NL RFFA) equations for the South-East Region of Newfoundland. Results of this

comparison are also summarized in Table 3.2-5 and provide a validation of the index-flood approach for these watersheds.

**Table 3.2-5: Estimated Peak Flows for Project Catchments**

| Return Period (years) | Shoal Cove Peak Flow ($m^3/s$) | | Salt Cove Peak Flow ($m^3/s$) | |
|---|---|---|---|---|
| | Index Flood | NL RFFA | Index Flood | NL RFFA |
| 2 | 5.5 | 4.9 | 17.4 | 22.0 |
| 5 | 8.2 | 6.6 | 25.8 | 30.1 |
| 10 | 10.4 | 7.7 | 32.7 | 35.6 |
| 20 | 12.9 | 8.8 | 40.4 | 40.8 |
| 50 | 16.7 | 10.2 | 52.3 | 47.6 |
| 100 | 20.1 | 11.3 | 62.9 | 52.7 |
| 200 | 24.0 | 12.4 | 75.2 | 57.9 |

## 3.2.6 Low Flow Conditions

### 3.2.6.1 Methods

Low-flow conditions were estimated using direct relationships between drainage area and sustained low-flow metrics, developed from regional WSC hydrometric stations with sufficient record length for low-flow frequency analysis. Station specific 7-day, 10-year (7Q10) and 7-day, 20-year (7Q20) flows, were obtained from existing analyses derived from annual minimum 7-day mean discharge series.

Regression relationships were developed by relating observed 7Q10 and 7Q20 flows to contributing drainage area for the selected regional stations as shown in Figure 3.2-7.

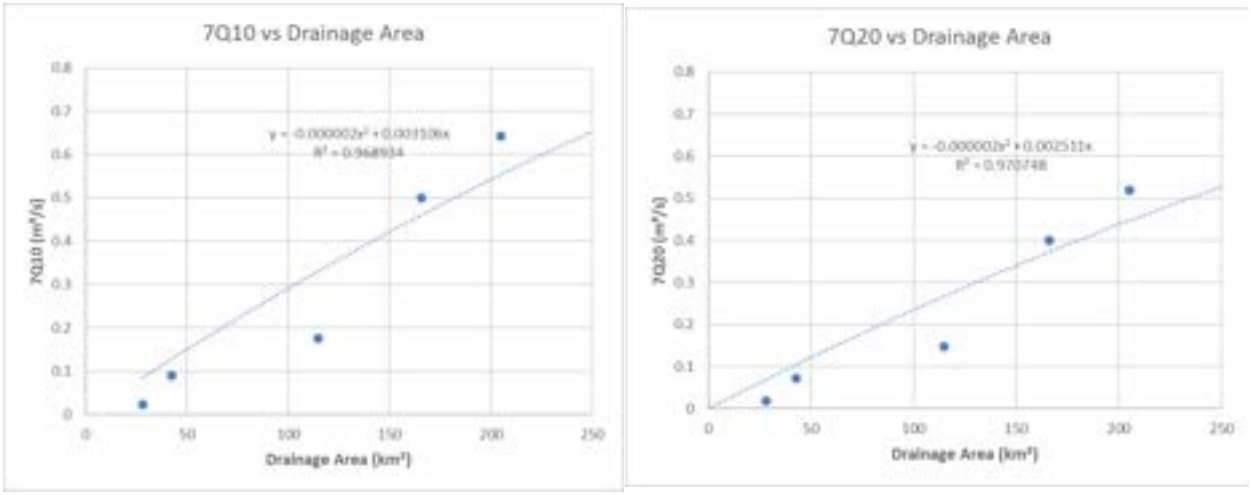



**Figure 3.2-7: Drainage-area Regression Relationships used to Estimate Sustained Low-flow Metrics (7Q10 and 7Q20)**

#### 3.2.6.2 Results

Estimated low-flow statistics for the Project watersheds are summarized in Table 3.2-6. Low-flow estimates derived using the drainage-area regression relationships from regional WSC stations were compared with values obtained from provincial low-flow regression equations developed for Newfoundland and Labrador (NL 2017) as a qualitative check on reasonableness.

**Table 3.2-6: Estimated Low-Flow Statistics for Project Watersheds**

| Basin | Method | Drainage Area (km²) | 7Q10 (m³/s) | 7Q20 (m³/s) |
|---|---|---|---|---|
| Salt Cove Brook | Drainage area regression | 24.1 | 0.07 | 0.06 |
| | NL 2017 | | 0.09 | 0.08 |
| Shoal Cove Pond Brook | Drainage area regression | 4.2 | 0.013 | 0.011 |
| | NL 2017 | | 0.014 | 0.013 |

# 4 HYDROLOGY EFFECTS ASSESSMENT

The potential hydrology effects of the Project were assessed using a water balance analysis. An average annual water balance was prepared to estimate pre-development and post-development water balance conditions throughout the life of mine on a site-wide basis, and the results were assessed in the context of the estimated baseline flows at receiving watercourses and ponds. In this way, the hydrology assessment considers potential impacts to hydrology throughout the LSA.

## 4.1 WATER BALANCE METHODS

The water balance assessment was completed using historic meteorological records (1994 to 2024) obtained from ECCC for the St. Lawrence climate station (ID: 8403619 and 8403616; Section 3.1), along with provided information on current and proposed land uses, and existing soil types as identified through previous reporting. The St. Lawrence meteorological station is the nearest station to the Site (Figure 2.2-1) with expected similar climatic conditions and where significant historical records exist from which to evaluate climatic normals of the input parameters used in a water balance assessment.

The water balance estimate is based on the following equation:

$$P = S + ET + R + I$$

Where:
P = precipitation;
S = change in soil water storage;
ET = evapotranspiration;
R = surface runoff; and
I = infiltration (groundwater recharge).

Precipitation data collected at the St. Lawrence meteorological station indicate a mean annual precipitation (P) of 1,555 mm/yr. Short-term or seasonal changes in soil water storage (S) are anticipated

to occur on an annual basis, but long-term changes (e.g., year to year) in soil water storage are considered to be negligible.

Evapotranspiration (ET) refers to water lost to the atmosphere from vegetated surfaces. The term combines evaporation (i.e., water lost from soil or water surfaces) and transpiration (i.e., water lost from plants and trees) because of the difficulties in measuring these two processes separately. Potential ET refers to the loss of water from a vegetated surface to the atmosphere under conditions of an unlimited water supply. The actual rate of ET is typically less than the potential rate under dry conditions. The mean annual potential ET for the Study Area is approximately 528 mm/yr based on data provided by ECCC.

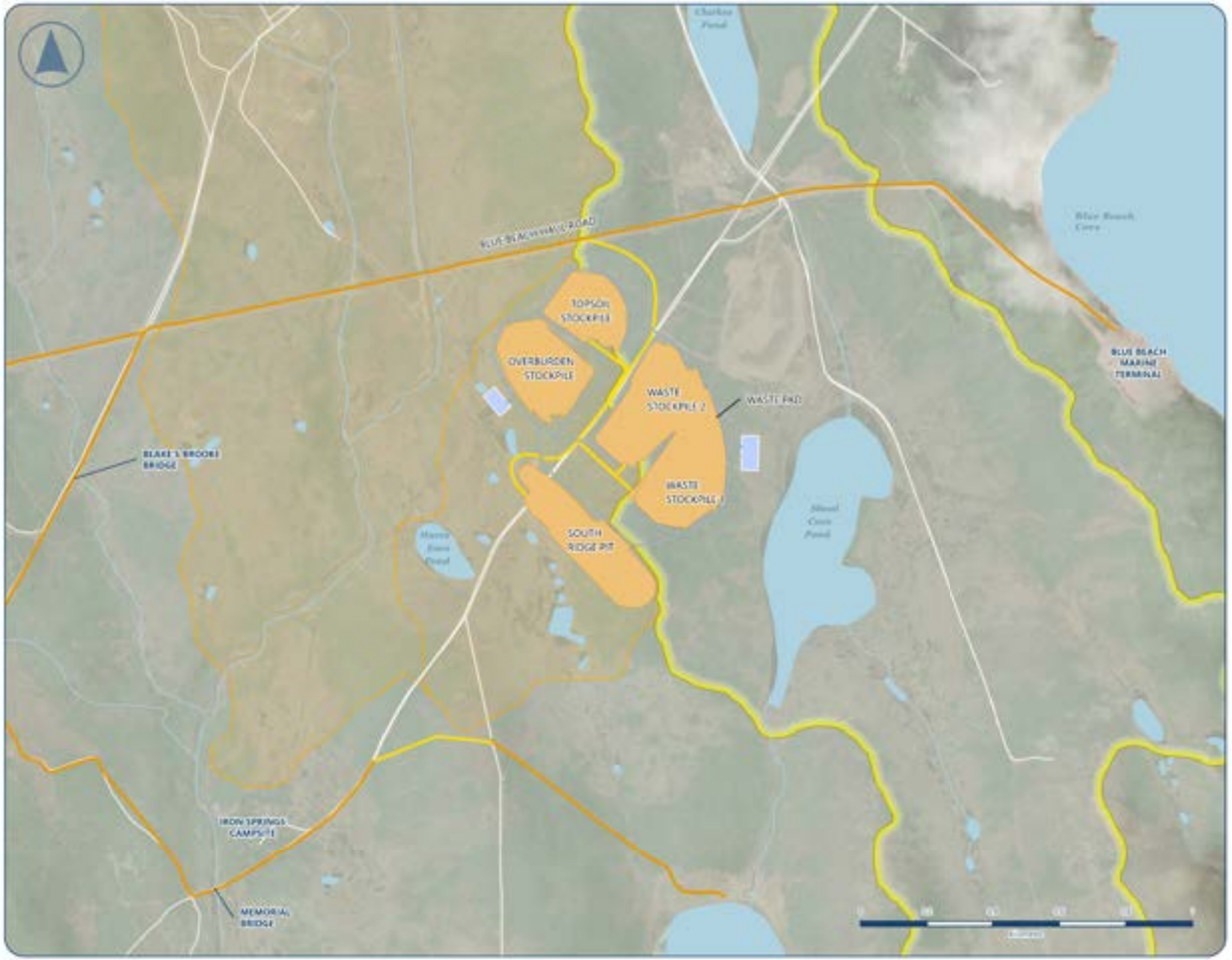
Annual water surplus is the difference between P and the actual ET. The water surplus represents the total amount of water available for either surface runoff (R) or groundwater infiltration (I) on an annual basis. On a monthly basis, surplus water remains after actual evapotranspiration has been removed from the sum of rainfall and snow melt, and maximum soil or snowpack storage is exceeded (Johnstone 1983). Maximum soil storage is quantified using a water holding capacity (WHC) specific to the soil type and land use. The climatic data for relevant WHCs obtained from ECCC are presented in Table A-1, Appendix A.

Infiltration rates as percentages of total surplus were estimated using three primary factors: topography, soil type, and ground cover. The sum of the fractions representing the three factors establishes the approximate annual average percentage of surplus which can be infiltrated in an area with a sufficient downward groundwater gradient (MOE 2003).

## 4.2 Water Balance Parameters

Based on Department of Natural Resources surficial geology mapping, soils in the area generally consist of a relatively thin (1.5 m) to thick (15 m) glacial till consisting of silty sand and gravel with varying percentages of cobbles and boulders (Golder 2015b). Recent test pit logging (CFI 2025b) at the South Ridge site similarly identified predominantly till-derived surficial materials, typically including sand to with pebbles, cobbles, and clay nodules. For the purpose of this assessment, the surficial soils were generalized using representative hydrologic parameters consistent with a sandy loam soil. Water holding capacities were then assigned according to the soil type and vegetative cover type. The soil was classified as hydrologic soil group “B” (MOE 2003).

Land use for the pre-development Site condition was estimated from the ESA Worldcover 2020 Map and available aerial imagery, and consists of forested, meadow and sparsely vegetated areas, wetland areas, and roads. Forested areas were assigned a WHC of 300 mm, meadow areas were assigned a WHC of 150 mm, sparsely vegetated areas were assigned a WHC of 75 mm and roads were assigned a WHC of 5 mm.

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# SOUTH RIDGE MINE

## FIGURE 4.2-1
## PROPOSED PROJECT SITE DEVELOPMENT

FEBRUARY, 2026

- Proposed New Road
- Existing Road Upgrades
- Proposed Surface Drainage Ditch
- Proposed Sedimentation Pond
- Proposed Project Infrastructure

**Post-Development Watersheds**

- East Branch of Salt Cove Brook
- Hares Ears Pond
- Shoal Cove Pond

Scale: 1:11,000
when printed on 11 by 17 inch paper

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Land use for the post-development Site conditions was estimated based on design information provided by Mining One on January 20, 2026, which is aligned with the expected footprint, as opposed to the worst-case footprint (CFI 2025a). The proposed development includes a pit, stockpiles, and associated haul roads (Figure 4.2-1). Water management consists of proposed diversion channels, which divert non-contact water around the Site, while contact water is proposed to be collected and settled at two sedimentation ponds prior to discharge to the east (to Shoal Cove Pond) and to the west (to Hares Ears Pond). At Closure, stockpiles and water management infrastructure were assumed to remain in place, while the pit was assumed to be allowed to fill. At the Post-Closure condition, reclaimed stockpiles were assumed to be capped with overburden and seeded, with hydrologic parameters assumed to be consistent with grass covered slopes.

The post-development surficial soil types across the Site were considered to be consistent with pre-development (i.e., sandy loam). As such, the post-development water holding capacities will be unchanged from those mentioned above. In addition, the open pit was assigned a WHC of 5 mm and material stockpiles were assigned a WHC of 10 mm.

The surplus data obtained from ECCC for each of the above water holding capacities was split into infiltration and runoff components by applying an infiltration factor (MOE 2003). The infiltration factors were based on a sum of Site-specific topography, surficial soil type, and vegetative cover factors, as presented in Table A-2, Appendix A, and described below:

- Both the pre-development and post-development grades were assigned a topography factor of 0.1 (i.e., hilly) based on typical grades observed in the topography.
- The sandy loam soil type was assigned a soil factor of 0.4 (i.e., open sandy loam) based on its characterization (Golder 2015b).
- The forested areas were considered to be “woodland” and assigned a factor of 0.2. The meadow areas were considered to be “cultivated land” and assigned a factor of 0.1.
- Roads were assigned an infiltration factor of 0.1.
- Waterbodies and open pit were assigned an infiltration factor of 0 (i.e., the surplus would be entirely runoff).

Summing the topography, soils and cover factors, the infiltration factors shown in Table A-2 were applied to the surplus to estimate infiltration rates for each water holding capacity.

The water balance calculations also accounted for pumped discharge associated with pit dewatering during Operations. Pit inflow assumptions were adopted from the hydrogeologic assessment by Mining One (Mining One 2026a). The median groundwater inflow to the South Ridge Pit was estimated to be approximately 1,061 $m^3$/day when fully developed and dewatered using a horizontal drain dewatering system, reducing to 40 to 50 $m^3$/day when full of water. For the purposes of the surface water balance assessment, dewatering discharge during Operations was assumed to be split evenly between the east sedimentation pond, which reports to Shoal Cove Pond, and the west sedimentation pond, which reports to Hares Ears Pond, with half of the median dewatering flow directed to each pond.

The hydrology assessment also included expected changes to groundwater baseflow at neighbouring catchments, as described in hydrogeologic assessment (Mining One 2026a). The net changes to groundwater recharge and discharge were adopted for receiving catchments during the Operations, Closure, and Post-Closure conditions.

## 4.3 WATER BALANCE RESULTS

The catchment areas for the Site were delineated according to the receiving watercourse (i.e., Shoal Cove Pond, Hares Ears Pond or directly to East Branch Salt Cove Brook). The following summarizes the water balance results for the approximately 62.2 ha Site.

### 4.3.1 Existing Condition

Based on the parameters described in Section 4.2, the average annual Existing Condition water balance was estimated for the 62.2 ha Site, and split between receiving watercourses, as summarized in Table 4.3-1 below, and as detailed on an annual and monthly basis in Table A-3, Appendix A.

**Table 4.3-1: Average Annual Existing Condition Water Balance ($m^3$/yr)**

| Catchment | Precipitation (P) | Evapotranspiration (ET) | Infiltration (I) | Runoff (R) |
|---|---|---|---|---|
| Shoal Cove Pond | 498,000 | 171,000 | 208,000 | 119,000 |
| Hares Ears Pond | 381,000 | 130,000 | 148,000 | 102,000 |
| East Branch Salt Cove Brook | 89,000 | 31,000 | 34,000 | 24,000 |
| Total Site | 967,000 | 331,000 | 390,000 | 245,000 |

### 4.3.2 Operational Condition

The Operational Condition was assumed to occur during operational dewatering, when mining and stockpiling footprints are at their maximum.

Based on the parameters described in Section 4.2, the average annual Operational Condition water balance was estimated for the 62.2 ha Site, and split between receiving watercourses, including influence from dewatering discharge. Results are summarized in Table 4.3-2, below, and as detailed on an annual and monthly basis in Table A-4, Appendix A.

**Table 4.3-2: Average Annual Operational Condition Water Balance ($m^3$/yr)**

| Catchment | Precipitation (P) | Evapotranspiration (ET) | Infiltration (I) | Runoff (R) |
|---|---|---|---|---|
| Shoal Cove Pond | 526,000 | 174,000 | 172,000 | 352,000 |
| Hares Ears Pond | 442,000 | 146,000 | 137,000 | 296,000 |
| East Branch Salt Cove Brook | 0 | 0 | 0 | 0 |
| Total Site | 967,000 | 318,000 | 309,000 | 725,000 |

From the water balance summaries for the Site (Table 4.3-1 and Table 4.3-2), the proposed development is estimated to result in an average annual increase in runoff of approximately 196% (from 245,000 $m^3$/yr to 725,000 $m^3$/yr) and an average annual decrease in infiltration of approximately 21% (from 390,000 $m^3$/yr to 309,000 $m^3$/yr) during the Operational Condition. The increase in runoff during

operations reflects the assumed median pit inflow during dewatering using a horizontal drain dewatering system, estimated to be approximately 1,061 $m^3$/day (Mining One 2026a). Under the Operations Case, dewatering discharge was assumed to be distributed evenly between the east sedimentation pond and the west sedimentation pond in accordance with the operational water management assumptions described in Section 4.2.

### 4.3.3 Closure Condition

The Closure Condition was assumed to occur after operational dewatering, mining, and stockpiling are complete, and the South Ridge Pit is filling with water.

Based on the parameters described in Section 4.2, the average annual Closure Condition water balance was estimated for the 62.2 ha Site, and split between receiving watercourses, for the duration of pit filling when reclamation is ongoing. Results are summarized in Table 4.3-3, below, and as detailed on an annual and monthly basis in Table A-5, Appendix A.

**Table 4.3-3: Average Annual Closure Condition Water Balance ($m^3$/yr)**

| Catchment | Precipitation (P) | Evapotranspiration (ET) | Infiltration (I) | Runoff (R) |
|---|---|---|---|---|
| Shoal Cove Pond | 462,000 | 152,000 | 167,000 | 143,000 |
| Hares Ears Pond | 379,000 | 126,000 | 137,000 | 116,000 |
| East Branch Salt Cove Brook | 0 | 0 | 0 | 0 |
| Total Site | 841,000 | 278,000 | 304,000 | 259,000 |

From the water balance summaries for the Site (Table 4.3-1 and Table 4.3-3), the proposed development is estimated to result in an average annual increase in runoff of approximately 5.7% (from 245,000 $m^3$/yr to 259,000 $m^3$/yr) and an average annual decrease in infiltration of approximately 22% (from 390,000 $m^3$/yr to 304,000 $m^3$/yr) during the Closure Condition, recognizing that the pit was excluded from this water balance calculation during filling.

During Closure, stockpiles are conservatively assumed to be uncovered until the reclamation process is complete and the South Ridge Pit is assumed to be filling, with pit lake formation expected approximately 6.5 years after mining cessation, at a water elevation of approximately 30 masl and an estimated volume of about 1.3 gigalitres (Mining One 2026a).

### 4.3.4 Post-Closure Condition

The Post-Closure Condition was assumed to occur after reclamation is complete and the South Ridge Pit is full and is spilling, with pit lake formation expected approximately 6.5 years after mining cessation (Mining One 2026b). The assessment reflects groundwater inflow assumptions from the Mining One hydrogeologic assessment (Mining One 2026a), including an estimated post-closure groundwater inflow of 40 to 50 $m^3$/day. For the Post-Closure condition, the mine rock stockpiles were assumed to remain in place and to be capped with overburden and seeded, consistent with the conservative closure scenario adopted for the assessment. For water balance purposes, these capped stockpiles were represented as a

separate post-closure land-use category, with infiltration assumed to be consistent with sparse vegetation.

Based on the parameters described in Section 4.2, the average annual Post-Closure Condition water balance was estimated for the 62.2 ha Site, and split between receiving watercourses, after the pit is spilling and reclamation is complete. Results are summarized in Table 4.3-4, below, and as detailed on an annual and monthly basis in Table A-6, Appendix A.

**Table 4.3-4: Average Annual Post-Closure Condition Water Balance ($m^3$/yr)**

| Catchment | Precipitation (P) | Evapotranspiration (ET) | Infiltration (I) | Runoff (R) |
|---|---|---|---|---|
| Shoal Cove Pond | 462,000 | 157,000 | 171,000 | 134,000 |
| Hares Ears Pond | 504,000 | 171,000 | 139,000 | 210,000 |
| East Branch Salt Cove Brook | 0 | 0 | 0 | 0 |
| Total Site | 967,000 | 329,000 | 310,000 | 344,000 |

From the water balance summaries for the Site (Table 4.3-1 and Table 4.3-4), the proposed development is estimated to result in an average annual increase in runoff of approximately 40% (from 245,000 $m^3$/yr to 344,000 $m^3$/yr) and an average annual decrease in infiltration of approximately 21% (from 390,000 $m^3$/yr to 310,000 $m^3$/yr) during the Post-Closure Condition, recognizing that the pit was assumed to be spilling towards Hares Ears Pond via a lined channel. For Post-Closure condition, the assessment also incorporates the post-closure groundwater inflow, represented by an additional groundwater inflow component of 40 to 50 $m^3$/day to Hares Ears Pond (Mining One 2026a).

# 5 DISCUSSION

## 5.1 EXISTING CONDITIONS

Baseline surface water hydrology for the LSA reflects a wet, maritime climate typical of the Burin Peninsula (NL DECC 1993), with precipitation distributed relatively evenly throughout the year and no distinct dry season. Long-term ECCC data from the St. Lawrence climate station indicate a mean annual precipitation of 1,555 mm, with monthly means generally exceeding 100 mm. Precipitation decreases through late spring and summer, reaching a minimum of 107 mm in July and increases through the fall, with the highest monthly totals occurring during fall, with 161 mm in November.

Rainfall dominates annual precipitation inputs, accounting for approximately 88% (1,364 mm) of total annual precipitation, while snowfall contributes 12% (191 mm), primarily in the winter months. Mean annual air temperature over the 1994 to 2024 period is approximately 6.2°C, with mean monthly temperatures falling below freezing during winter and a peak monthly temperature of approximately 16.9°C in August. The average annual PET for the LSA is 528 mm, the majority of which is accumulated during summer.

Regional hydrological analysis results suggest annual runoff depths at LSA catchments on the order of 1,523 to 1,539 mm/yr, which are aligned with regional total annual precipitation estimates. Peak flow

estimates for Shoal Cove Brook range from 5.5 $m^3/s$ (2-year return period) to 24.0 $m^3/s$ (200-year return period) and for Salt Cove Brook range from 17.5 $m^3/s$ (2-year return period) to 75.2 $m^3/s$ (200-year return period. Estimated 7Q10 flows were 0.013 $m^3/s$ for Shoal Cove Brook and 0.07 $m^3/s$ for Salt Cove Brook and estimated 7Q20 were 0.011 $m^3/s$ and 0.06 $m^3/s$, respectively.

These conditions establish the baseline surface water regime against which potential Project-related effects in flow quantity are evaluated, recognizing that existing hydrological conditions are based only on regional data, and have not been verified with local flow or water level monitoring.

## 5.2 Effects Assessment

Project-related changes in surface water quantity were evaluated using a site-wide average annual water balance under Existing, Operational, Closure, and Post-Closure conditions (Section 4). During Operations, runoff increases to 725,000 $m^3/yr$ (Table 4.3-2), driven primarily by pit inflows and dewatering discharge (Mining One 2026a). During Closure (pit filling), runoff is similar to Existing Conditions (259,000 $m^3/yr$; Table 4.3-3), while infiltration remains reduced relative to Existing Conditions. In the Post-Closure condition, runoff is elevated, primarily due to reduced infiltration at the Site (344,000 $m^3/yr$; Table 4.3-4).

Using the average annual and monthly existing conditions flows estimated in Section 3, and the average annual and monthly site-wide water balance, changes to surface flows were estimated at assessment nodes within the LSA, with consideration of expected changes to groundwater baseflows at watercourses resulting from pit development, as detailed in the hydrogeological numerical groundwater modelling (Mining One, 2026a). Flow changes in receiving watercourses are generally expected to remain within 5% of existing conditions, with the exception of Hares Ears Pond, where more pronounced increases are predicted, particularly during Operations.

Expected changes to flows at assessment nodes for the Operations, Closure, and Post-Closure conditions are shown for average annual flows in Table 5.2-1 and for average monthly flows in Table A-7, Appendix A.

**Table 5.2-1: Expected Changes to Average Annual Flows at Assessment Nodes ($m^3/day$)**

| Assessment Node | Existing Condition Flow $m^3/day$ | Change in Operations Case $m^3/day$ (%) | Change in Closure Case $m^3/day$ (%) | Change in Post-Closure Case $m^3/day$ (%) |
|---|---|---|---|---|
| Shoal Cove Pond | 16,600 | +701 (+4.2%) | +69 (+0.4%) | +49 (+0.3%) |
| Shoal Cove Brook | 17,800 | +695 (+3.9%) | +63 (+0.4%) | +43 (+0.2%) |
| Unnamed Tributary of Shoal Cove | 1,600 | +8 (+0.5%) | +8 (+0.5%) | +10 (+0.7%) |
| Hares Ears Pond | 2,600 | +685 (+26%) | +37 (+1.4%) | +295 (+11%) |
| East Branch Salt Cove Brook | 55,400 | +519 (+0.9%) | -129 (-0.2%) | +135 (+0.2%) |
| Salt Cove Brook | 100,600 | +373 (+0.4%) | -274 (-0.3%) | 0 (0.0%) |

In addition to surface runoff and dewatering discharge routing, the assessment incorporates groundwater baseflow adjustment values from the water budget analysis provided in the hydrogeologic assessment for

the Operations and Post-Closure conditions (Mining One 2026a). For the purpose of the hydrologic assessment, changes to groundwater baseflows in the Closure condition were assumed to be consistent with the Operations condition, recognizing that the pit would still be filling and the groundwater system would not have yet had time to stabilize. These adjustments were applied to the relevant assessment nodes and therefore form part of the reported changes in flow at the receiving environments.

The most significant expected changes to flows in the receiving watercourses are limited to the Operations Case, while pit dewatering is ongoing. The results of the hydrology effects assessment are summarized for each assessment node, below:

- Shoal Cove Pond: A negligible increase to average annual flows (i.e., +4.2%) is expected during the Operations period. This increase is substantially reduced during Closure (i.e., +0.4%) and remains negligible during Post-Closure (i.e., +0.3%). Flow increases during operations are primarily resulting from pit inflow dewatering. These increases are expected to remain relatively consistent seasonally, with the largest relative increase during Operations occurring in August (i.e., +7.6%). During Closure, the largest relative increase occurs in September (i.e., +0.6%), and during Post-Closure, the largest relative increase occurs in November (i.e., + 0.4%).
- Shoal Cove Brook: A negligible increase to average annual flows (i.e., +3.9%) is expected during the Operations period. This increase is substantially reduced during Closure (i.e., +0.4%) and remains negligible during Post-Closure (i.e., +0.2%). Flow increases during operations are primarily resulting from pit inflow dewatering. These increases are expected to remain relatively constant seasonally.
- Unnamed Tributary of Shoal Cove: A negligible increase to average annual flows (i.e., +0.7%) is expected during the Post-Closure period. Flow increases are limited to changes to groundwater baseflows as a result of pit development, recognizing that there will be limited surface disturbance in this catchment.
- Hares Ears Pond: A moderate increase to average annual flows (i.e., 26%) is expected during the Operations period. This increase is reduced during Closure (i.e., 1.4%) but remains elevated during Post-Closure (i.e., 11%). Flow increases during operations are primarily resulting from pit inflow dewatering. In the Post-Closure condition, flow increases are primarily resulting from increased catchment area associated with proposed water management and are expected to be less significant during summer when evapotranspiration is higher. During Operations, the maximum increase occurs in August (i.e., +48%). During Post-Closure, the maximum increase occurs in December (i.e., +15%). A bathymetric survey of the pond is recommended in order to better understand the potential effects of increased flows, storage, flooding, and potential sedimentation.
- East Branch Salt Cove Brook: A negligible increase to average annual flows (i.e., 0.9%) is expected during the Operations period, followed by a negligible decrease during Closure (i.e., -0.2%) and a negligible increase during Post-Closure (i.e., 0.2%). During Operations, the largest relative increase occurs in August (i.e., 1.8%). During Closure, the largest relative decrease also occurs in August (i.e., -0.4%).
- Salt Cove Brook: A negligible increase to average annual flows (i.e., 0.4%) is expected during the Operations period, followed by a negligible decrease during Closure (i.e., -0.3%) and no change during Post-Closure (i.e., 0.0%). During Operations, the largest relative increase occurs in August (i.e., 0.7%). During Closure, the largest relative decrease also occurs in August (i.e., -0.5%).

It is noted that the above conclusions rely on the expected waste rock spoil footprint, rather than the worst-case waste rock spoil footprint (CFI 2025). However, the change in flows due to land use is small

relative to the change in flows due to dewatering, so the results of the flow assessment are not expected to be sensitive to the waste rock spoil footprint.

## 5.3 RECOMMENDATIONS

Limited hydrologic and bathymetric data are available within the LSA. As such, the baseline characterization and effects assessment rely on several assumptions which should be refined, including the following general recommendations and further details in Table 5.3-1:

- Hydrometric monitoring is recommended for receiving environment brooks within the LSA, in order to better define flow conditions and confirm assessment results.
- Water level monitoring is recommended for receiving environment ponds downstream of the Site and a bathymetric survey is recommended for Hares Ears Pond to better define storage within the water balance and refine assessment results for potential flooding concerns.

**Table 5.3-1: Data Gaps and Recommendations for Surface Water Hydrology Studies**

| Information Need | Description | Data Gap | Recommendation |
|---|---|---|---|
| Streamflow Data | Hydrometric data from receiving environment locations are required to characterize existing hydrological conditions. | Existing hydrometric data is available in the LSA for Outflow of Unnamed Pond south of Long Pond (ECCC 02ZG007), for 2016 to 2023.<br>There is a gap for hydrometric data within the LSA. | Commence hydrometric monitoring at the following locations within the LSA:<br>• Shoal Cove Brook (WS-5)<br>• Unnamed Tributary to Shoal Cove<br>• Hares Ears Pond<br>• Salt Cove Brook (WS-10)<br>Hydrometric monitoring should include continuous monitoring, paired with monthly spot flows. |
| Water Level Data | Water level data for mine-related reservoirs and neighbouring ponds are required to support understanding of the existing water balance. | Existing water level data is available in the LSA for the Tailings Management Facility (2024 to 2025).<br>Existing water level data is available in the RSA for the following stations:<br>• AGS Grebes Pit (2024 to 2025)<br>• AGS Center Pit (2025)<br>• John Fitzpatrick Pond near Outlet (ECCC 02ZG008), for 2022 to 2023.<br>There is a gap for water level data within the LSA. | Commence water level monitoring at the following locations with the LSA:<br>• Shoal Cove Pond<br>• Hares Ears Pond<br>Water level monitoring should consist of a water level logger, paired with a geodetic survey point to serve as a benchmark for relative water levels. |

| Information Need | Description | Data Gap | Recommendation |
|---|---|---|---|
| Bathymetric Data | Bathymetric data will be required in order to characterize the storage capacity of water bodies that could be impacted by the project. | Bathymetric data is available for Shoal Cove Pond.<br>There remains a bathymetric data gap for Hares Ears Pond. | Obtain bathymetric survey of Hares Ears Pond |

# 6 STUDY LIMITATIONS

It is important to acknowledge certain limitations inherent in the process of preparing technical documents. This section aims to outline some limitations and provide transparency into the potential impact on the findings and conclusions presented herein. It is recommended that readers of this report consider these limitations while interpreting and applying the information presented. Future investigations or additional studies may be necessary to further explore and validate the findings and overcome these limitations.

**Scope and Generalizability**: Every effort has been made by Falkirk Environmental Consultants Ltd. (Falkirk) to conduct a thorough and accurate study. No warranty, express or implied, is made. Results presented in this document may not be applicable in all circumstances or settings and should be limited to the spatial and temporal scope presented alone. Variations in conditions, resources, and contextual factors could influence outcomes and conclusions.

**Data Limitations**: The findings and recommendations presented in this document are based on data provided to Falkirk, which may extend outside any data collected and analyzed within the defined scope of work. The accuracy and reliability of the study rely on the quality and availability of data. While efforts are made to verify data integrity, certain limitations such as data accessibility, accuracy, or completeness may influence the analysis and subsequent findings.

**Assumptions, Estimations, and Methods**: In situations where specific data points or information are unavailable, certain assumptions and estimations are made. These assumptions are based on available knowledge and expertise at the time of analysis, recognizing that variations in these assumptions could potentially affect the accuracy of the results. The study was conducted using recognized standard practices, engineering, and scientific methods. However, limitations inherent to these methods, such as sample size, bias, or measurement errors, could impact the reliability and validity of the findings.

**Duty of Care and Professional Standards**: This study has been conducted in adherence to the code of practice outlined by professional engineering and scientific associations, by exercising a level of care and skill consistent with the members of the science and engineering professions practising under similar conditions in the jurisdiction where the services are provided. However, it is important to recognize that even with the application of standard practices, unforeseen circumstances or human error may introduce limitations to the findings and conclusions presented.

**Document Control**: This document has been prepared for the sole benefit of the client to whom it is addressed. Third parties using this document do so at their own risk. Furthermore, Falkirk is not responsible for any unauthorized use or modification of this document. Electronic media is susceptible to unauthorized modification, and no party can rely solely on such versions of this document.

**Contractual Agreements**: It is important to note that nothing in the Study Limitations section will supersede clauses in existing contractual agreements, including but not limited to Master Service Agreements, Work Authorizations, and Purchase Orders that govern the scope of work outlined in this report. Any conflicting terms and conditions defined in these agreements take precedence.

# 7 CLOSURE

We trust this Report meets your present requirements. Please do not hesitate to contact the undersigned should you have any questions.

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14 April 2026

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Province of Newfoundland & Labrador Permit to Practice Engineering: N1543

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Permit # N1543 Year Valid 2026
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# APPENDIX A. WATER BALANCE CLIMATE INPUTS AND CALCULATIONS

This appendix presents the climate inputs and derived water surplus calculations used to support the Project water balance assessment. Monthly temperature, precipitation (P), and potential evapotranspiration (PET) were derived from long-term ECCC records for the St. Lawrence climate station (ECCC IDs: 8403619 and 8403616).

Actual evapotranspiration and surplus were calculated using soil water holding capacities (WHC) of 5, 10, 75, 150, and 300 mm to represent a range of plausible soil storage conditions and to support evaluation of infiltration and runoff. Relevant monthly climate inputs, actual evapotranspiration (AET) and resulting climatic and WHC-based water surplus calculations are summarized in Table A-1b.

Table A-2 summarized the land-use-based infiltration factors and corresponding annual water balance components used in the analysis.

Site-specific infiltration factors were developed based on a combination of topography, surficial soil type, and vegetative cover, as summarized in Table A-3. These infiltration factors were applied to WHC-based surplus values to estimate infiltration and runoff.

Detailed annual and monthly water balance results for Existing, Operations, Closure, and Post-Closure conditions are provided in Tables A-4 through A-6. Table A-7 provides expected changes in average monthly flow at assessment nodes under Project conditions.

**Table A-1a: Monthly Climate Inputs Used in the Water Balance Analysis**

| Month | Mean Temperature (°C) | P (mm) | PET (mm) | Actual Evapotranspiration (mm) by WHC | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 5 mm | 10 mm | 75 mm | 150 mm | 300 mm |
| January | -2.8 | 129 | 2 | 2 | 2 | 2 | 2 | 2 |
| February | -3.5 | 119 | 2 | 2 | 2 | 2 | 2 | 2 |
| March | -1.3 | 119 | 5 | 5 | 5 | 5 | 5 | 5 |
| April | 2.6 | 120 | 20 | 20 | 20 | 20 | 20 | 20 |
| May | 6.9 | 121 | 51 | 51 | 51 | 51 | 51 | 51 |
| June | 11.2 | 117 | 80 | 77 | 79 | 80 | 80 | 80 |
| July | 15.5 | 107 | 109 | 91 | 94 | 108 | 109 | 109 |
| August | 16.9 | 120 | 109 | 94 | 95 | 103 | 107 | 109 |
| September | 13.5 | 140 | 76 | 73 | 73 | 76 | 76 | 76 |
| October | 8.7 | 143 | 46 | 46 | 46 | 46 | 46 | 46 |
| November | 4.3 | 161 | 21 | 21 | 21 | 21 | 21 | 21 |
| December | 0.1 | 157 | 7 | 7 | 7 | 7 | 7 | 7 |
| Total | 6.2 | 1,555 | 528 | 489 | 495 | 521 | 526 | 528 |

**Table A-1b: Estimated Monthly Water Surplus Estimates**

| Month | P (mm) | PET (mm) | Climatic Water Surplus (P – PET) (mm) | Water Surplus (mm) by WHC | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 5 mm | 10 mm | 75 mm | 150 mm | 300 mm |
| January | 129 | 2 | 127 | 104 | 104 | 103 | 102 | 100 |
| February | 119 | 2 | 117 | 92 | 92 | 92 | 92 | 92 |
| March | 119 | 5 | 114 | 124 | 124 | 124 | 124 | 124 |
| April | 120 | 20 | 100 | 151 | 151 | 151 | 151 | 151 |
| May | 121 | 51 | 70 | 72 | 72 | 72 | 72 | 72 |
| June | 117 | 80 | 37 | 40 | 40 | 40 | 40 | 40 |
| July | 107 | 109 | -2 | 17 | 17 | 16 | 16 | 16 |
| August | 120 | 109 | 11 | 26 | 24 | 20 | 20 | 20 |
| September | 140 | 76 | 64 | 66 | 65 | 52 | 49 | 49 |
| October | 143 | 46 | 97 | 96 | 95 | 85 | 83 | 82 |
| November | 161 | 21 | 140 | 139 | 139 | 139 | 139 | 138 |
| December | 157 | 7 | 150 | 136 | 136 | 136 | 136 | 136 |
| Total | 1,555 | 528 | 1,027 | 1,063 | 1,059 | 1,030 | 1,024 | 1,020 |

**Table A-2: Land-Use-Based Infiltration Factors and Derived Annual Water Balance Parameters**

| Land Use | Infiltration Factor | | | | Depth of Water (mm) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Topo | Soils | Cover | Total | Precipitation | WHC | Surplus | Infiltration | Runoff |
| Grassland | 0.1 | 0.4 | 0.1 | 0.6 | 1,555 | 150 mm | 1,024 | 614 | 410 |
| Tree Cover | 0.1 | 0.4 | 0.2 | 0.7 | 1,555 | 300 mm | 1,020 | 714 | 306 |
| Waterbody | 0.0 | 0.0 | 0.0 | 0.0 | 1,555 | P-PET | 1,025 | 0 | 1,027 |
| Sediment Pond | 0.0 | 0.0 | 0.0 | 0.0 | 1,555 | P-PET | 1,025 | 0 | 1,027 |
| Wetland | 0.0 | 0.0 | 0.0 | 0.0 | 1,555 | P-PET | 1,025 | 0 | 1,027 |
| Bare/Sparse Vegetation | 0.1 | 0.4 | 0.0 | 0.5 | 1,555 | 75 mm | 1,030 | 515 | 515 |
| Public Road | 0.0 | 0.0 | 0.0 | 0.1 | 1,555 | 10 mm | 1,063 | 106 | 957 |
| Haul Road | 0.0 | 0.0 | 0.0 | 0.1 | 1,555 | 10 mm | 1,063 | 106 | 957 |
| Open Pit | 0.0 | 0.0 | 0.0 | 0.0 | 1,555 | 5 mm | 1,063 | 0 | 1,063 |
| Stockpile | 0.0 | 0.0 | 0.0 | 0.0 | 1,555 | 10 mm | 1,059 | 0 | 1,059 |

*Note: Annual surplus values shown in Table A-2 are derived from Table A-1 and reflect either WHC-limited surplus or P − AET, depending on land-use type.*

**Shoal Cove Pond**

| | | | Grassland | | | Tree Cover | | | Waterbody | | | Sediment Pond | | | Wetland | | | Bare / Sparse Vegetation | | | Public Road | | | Haul Road | | | Open Pit | | | Stockpile | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | WHC | 150 mm | | WHC | 300 mm | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | 75 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 10 mm | | Total Area ($m^2$) | 319,835 |
| | | | Total Area ($m^2$) | 52,200 | | Total Area ($m^2$) | 210,010 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 3,305 | | Total Area ($m^2$) | 49,010 | | Total Area ($m^2$) | 5,310 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | | |
| | | | Infiltration Factor | 0.6 | | Infiltration Factor | 0.7 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Total Infiltr. | Well Discharge | Total Runoff |
| | | (°C) | (mm) | (mm) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) |
| January | 31 | -2.8 | 129 | 2 | 2 | 102 | 5,324 | 2 | 100 | 21,001 | 2 | 127 | 0 | 2 | 127 | 0 | 2 | 127 | 420 | 2 | 103 | 5,048 | 2 | 104 | 552 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | **32,345** | 20,475 | | 11,871 |
| February | 28 | -3.5 | 119 | 2 | 2 | 92 | 4,802 | 2 | 92 | 19,321 | 2 | 117 | 0 | 2 | 117 | 0 | 2 | 117 | 387 | 2 | 92 | 4,509 | 2 | 92 | 489 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | **29,507** | 18,709 | | 10,798 |
| March | 31 | -1.3 | 119 | 5 | 5 | 124 | 6,473 | 5 | 124 | 26,041 | 5 | 114 | 0 | 5 | 114 | 0 | 5 | 114 | 377 | 5 | 124 | 6,077 | 5 | 124 | 658 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | **39,626** | 25,217 | | 14,409 |
| April | 30 | 2.6 | 120 | 20 | 20 | 151 | 7,882 | 20 | 151 | 31,712 | 20 | 100 | 0 | 20 | 100 | 0 | 20 | 100 | 331 | 20 | 151 | 7,401 | 20 | 151 | 802 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | **48,127** | 30,708 | | 17,419 |
| May | 31 | 6.9 | 121 | 51 | 51 | 72 | 3,758 | 51 | 72 | 15,121 | 51 | 70 | 0 | 51 | 70 | 0 | 51 | 70 | 231 | 51 | 72 | 3,529 | 51 | 72 | 382 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | **23,022** | 14,642 | | 8,379 |
| June | 30 | 11.2 | 117 | 80 | 80 | 40 | 2,088 | 80 | 40 | 8,400 | 80 | 37 | 0 | 80 | 37 | 0 | 80 | 37 | 122 | 80 | 40 | 1,960 | 77 | 40 | 212 | 77 | 40 | 0 | 77 | 40 | 0 | 79 | 40 | 0 | **12,783** | 8,135 | | 4,649 |
| July | 31 | 15.5 | 107 | 109 | 109 | 16 | 835 | 109 | 16 | 3,360 | 109 | -2 | 0 | 109 | -2 | 0 | 109 | -2 | -7 | 108 | 16 | 784 | 91 | 17 | 90 | 91 | 17 | 0 | 91 | 17 | 0 | 94 | 17 | 0 | **5,063** | 3,254 | | 1,809 |
| August | 31 | 16.9 | 120 | 109 | 107 | 20 | 1,044 | 109 | 20 | 4,200 | 109 | 11 | 0 | 109 | 11 | 0 | 109 | 11 | 36 | 103 | 20 | 980 | 94 | 26 | 138 | 94 | 26 | 0 | 94 | 26 | 0 | 95 | 24 | 0 | **6,399** | 4,070 | | 2,328 |
| September | 30 | 13.5 | 140 | 76 | 76 | 49 | 2,558 | 76 | 49 | 10,290 | 76 | 64 | 0 | 76 | 64 | 0 | 76 | 64 | 212 | 76 | 52 | 2,549 | 73 | 66 | 350 | 73 | 66 | 0 | 73 | 66 | 0 | 73 | 65 | 0 | **15,959** | 10,047 | | 5,911 |
| October | 31 | 8.7 | 143 | 46 | 46 | 83 | 4,333 | 46 | 82 | 17,221 | 46 | 97 | 0 | 46 | 97 | 0 | 46 | 97 | 321 | 46 | 85 | 4,166 | 46 | 96 | 510 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 95 | 0 | **26,550** | 16,788 | | 9,762 |
| November | 30 | 4.3 | 161 | 21 | 21 | 139 | 7,256 | 21 | 138 | 28,981 | 21 | 140 | 0 | 21 | 140 | 0 | 21 | 140 | 463 | 21 | 139 | 6,812 | 21 | 139 | 738 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | **44,250** | 28,120 | | 16,130 |
| December | 31 | 0.1 | 157 | 7 | 7 | 136 | 7,099 | 7 | 136 | 28,561 | 7 | 150 | 0 | 7 | 150 | 0 | 7 | 150 | 496 | 7 | 136 | 6,665 | 7 | 136 | 722 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | **43,544** | 27,657 | | 15,886 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00*** | ***53,452.80*** | ***528.00*** | ***1,020.00*** | ***214,210.20*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***3,387.63*** | ***521.00*** | ***1,030.00*** | ***50,480.30*** | ***489.00*** | ***1,063.00*** | ***5,644.53*** | ***489.00*** | ***1,063.00*** | ***-*** | ***489.00*** | ***1,063.00*** | ***-*** | ***495.00*** | ***1,059.00*** | ***-*** | ***327,175.46*** | ***207,823.42*** | ***-*** | ***119,352.03*** |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***QA/QC (should be 0)*** | | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | 0 | | | 0 | | | 0 | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | |
| ***Actual evapotranspiration (mm)*** | | | | | ***526*** | | | ***528*** | | | ***528*** | | | ***528*** | | | | ***521*** | | | ***489*** | | | ***489*** | | | ***489*** | | | ***495*** | | | | |
| ***Infiltration ($m^3$)*** | | | | | ***32,072*** | | | ***149,947*** | | | ***0*** | | | ***0*** | | | | ***25,240*** | | | ***564*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |
| ***Infiltration (mm)*** | | | | | ***614*** | | | ***714*** | | | ***0*** | | | ***0*** | | | | ***515*** | | | ***106*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |

***Note:*** The Surplus values in (mm) are calculated using rainfall, melt and Actual Evapotranspiration

**Hares Ears Pond**

| | | | Grassland | | | Tree Cover | | | Waterbody | | | Sediment Pond | | | Wetland | | | Bare / Sparse Vegetation | | | Public Road | | | Haul Road | | | Open Pit | | | Stockpile | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | WHC | 150 mm | | WHC | 300 mm | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | 75 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 10 mm | | Total Area ($m^2$) | 244,683 |
| | | | Total Area ($m^2$) | 12,000 | | Total Area ($m^2$) | 152,000 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 9,140 | | Total Area ($m^2$) | 63,000 | | Total Area ($m^2$) | 6,620 | | Total Area ($m^2$) | 1,923 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | | |
| | | | Infiltration Factor | 0.6 | | Infiltration Factor | 0.7 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Total Infiltr. | Well Discharge | Total Runoff |
| | | (°C) | (mm) | (mm) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 | 1,224 | 2 | 100 | 15,200 | 2 | 127 | 0 | 2 | 127 | 0 | 2 | 127 | 1,161 | 2 | 103 | 6,489 | 2 | 104 | 688 | 2 | 104 | 200 | 2 | 104 | 0 | 2 | 104 | 0 | **24,962** | 14,619 | | 10,343 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 | 1,104 | 2 | 92 | 13,984 | 2 | 117 | 0 | 2 | 117 | 0 | 2 | 117 | 1,069 | 2 | 92 | 5,796 | 2 | 92 | 609 | 2 | 92 | 177 | 2 | 92 | 0 | 2 | 92 | 0 | **22,739** | 13,349 | | 9,390 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 | 1,488 | 5 | 124 | 18,848 | 5 | 114 | 0 | 5 | 114 | 0 | 5 | 114 | 1,042 | 5 | 124 | 7,812 | 5 | 124 | 821 | 5 | 124 | 238 | 5 | 124 | 0 | 5 | 124 | 0 | **30,249** | 17,992 | | 12,257 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 | 1,812 | 20 | 151 | 22,952 | 20 | 100 | 0 | 20 | 100 | 0 | 20 | 100 | 914 | 20 | 151 | 9,513 | 20 | 151 | 1,000 | 20 | 151 | 290 | 20 | 151 | 0 | 20 | 151 | 0 | **36,481** | 21,910 | | 14,571 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 | 864 | 51 | 72 | 10,944 | 51 | 70 | 0 | 51 | 70 | 0 | 51 | 70 | 640 | 51 | 72 | 4,536 | 51 | 72 | 477 | 51 | 72 | 138 | 51 | 72 | 0 | 51 | 72 | 0 | **17,599** | 10,447 | | 7,152 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 | 480 | 80 | 40 | 6,080 | 80 | 37 | 0 | 80 | 37 | 0 | 80 | 37 | 338 | 80 | 40 | 2,520 | 77 | 40 | 265 | 77 | 40 | 77 | 77 | 40 | 0 | 79 | 40 | 0 | **9,760** | 5,804 | | 3,956 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 | 192 | 109 | 16 | 2,432 | 109 | -2 | 0 | 109 | -2 | 0 | 109 | -2 | -18 | 108 | 16 | 1,008 | 91 | 17 | 113 | 91 | 17 | 33 | 91 | 17 | 0 | 94 | 17 | 0 | **3,759** | 2,322 | | 1,437 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 | 240 | 109 | 20 | 3,040 | 109 | 11 | 0 | 109 | 11 | 0 | 109 | 11 | 101 | 103 | 20 | 1,260 | 94 | 26 | 172 | 94 | 26 | 50 | 94 | 26 | 0 | 95 | 24 | 0 | **4,863** | 2,902 | | 1,961 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 | 588 | 76 | 49 | 7,448 | 76 | 64 | 0 | 76 | 64 | 0 | 76 | 64 | 585 | 76 | 52 | 3,276 | 73 | 66 | 437 | 73 | 66 | 127 | 73 | 66 | 0 | 73 | 65 | 0 | **12,461** | 7,204 | | 5,256 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 | 996 | 46 | 82 | 12,464 | 46 | 97 | 0 | 46 | 97 | 0 | 46 | 97 | 887 | 46 | 85 | 5,355 | 46 | 96 | 636 | 46 | 96 | 185 | 46 | 96 | 0 | 46 | 95 | 0 | **20,522** | 12,000 | | 8,522 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 | 1,668 | 21 | 138 | 20,976 | 21 | 140 | 0 | 21 | 140 | 0 | 21 | 140 | 1,280 | 21 | 139 | 8,757 | 21 | 139 | 920 | 21 | 139 | 267 | 21 | 139 | 0 | 21 | 139 | 0 | **33,868** | 20,063 | | 13,806 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 | 1,632 | 7 | 136 | 20,672 | 7 | 150 | 0 | 7 | 150 | 0 | 7 | 150 | 1,371 | 7 | 136 | 8,568 | 7 | 136 | 900 | 7 | 136 | 262 | 7 | 136 | 0 | 7 | 136 | 0 | **33,405** | 19,734 | | 13,671 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00*** | ***12,288.00*** | ***528.00*** | ***1,020.00*** | ***155,040.00*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***9,368.50*** | ***521.00*** | ***1,030.00*** | ***64,890.00*** | ***489.00*** | ***1,063.00*** | ***7,037.06*** | ***489.00*** | ***1,063.00*** | ***2,044.15*** | ***489.00*** | ***1,063.00*** | ***-*** | ***495.00*** | ***1,059.00*** | ***-*** | ***250,667.71*** | ***148,345.80*** | ***-*** | ***102,321.91*** |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***QA/QC (should be 0)*** | | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | 0 | | | 0 | | | 0 | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | |
| ***Actual evapotranspiration (mm)*** | | | | | ***526*** | | | ***528*** | | | ***528*** | | | ***528*** | | | | ***521*** | | | ***489*** | | | ***489*** | | | ***489*** | | | ***495*** | | | | |
| ***Infiltration ($m^3$)*** | | | | | ***7,373*** | | | ***108,528*** | | | ***0*** | | | ***0*** | | | | ***32,445*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |
| ***Infiltration (mm)*** | | | | | ***614*** | | | ***714*** | | | ***0*** | | | ***0*** | | | | ***515*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |

**East Branch of Salt Cove Brook**

| | | | Grassland | | | Tree Cover | | | Waterbody | | | Sediment Pond | | | Wetland | | | Bare / Sparse Vegetation | | | Public Road | | | Haul Road | | | Open Pit | | | Stockpile | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | WHC | 150 mm | | WHC | 300 mm | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | 75 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 10 mm | | Total Area ($m^2$) | 57,041 |
| | | | Total Area ($m^2$) | 9,790 | | Total Area ($m^2$) | 21,380 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 801 | | Total Area ($m^2$) | 25,070 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | Total Area ($m^2$) | 0 | | | |
| | | | Infiltration Factor | 0.6 | | Infiltration Factor | 0.7 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Total Infiltr. | Well Discharge | Total Runoff |
| | | (°C) | (mm) | (mm) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | (mm) | (mm) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 | 999 | 2 | 100 | 2,138 | 2 | 127 | 0 | 2 | 127 | 0 | 2 | 127 | 102 | 2 | 103 | 2,582 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | **5,821** | 3,387 | | 2,434 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 | 901 | 2 | 92 | 1,967 | 2 | 117 | 0 | 2 | 117 | 0 | 2 | 117 | 94 | 2 | 92 | 2,306 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | **5,268** | 3,071 | | 2,197 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 | 1,214 | 5 | 124 | 2,651 | 5 | 114 | 0 | 5 | 114 | 0 | 5 | 114 | 91 | 5 | 124 | 3,109 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | **7,065** | 4,139 | | 2,927 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 | 1,478 | 20 | 151 | 3,228 | 20 | 100 | 0 | 20 | 100 | 0 | 20 | 100 | 80 | 20 | 151 | 3,786 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | **8,572** | 5,040 | | 3,533 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 | 705 | 51 | 72 | 1,539 | 51 | 70 | 0 | 51 | 70 | 0 | 51 | 70 | 56 | 51 | 72 | 1,805 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | **4,105** | 2,403 | | 1,702 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 | 392 | 80 | 40 | 855 | 80 | 37 | 0 | 80 | 37 | 0 | 80 | 37 | 30 | 80 | 40 | 1,003 | 77 | 40 | 0 | 77 | 40 | 0 | 77 | 40 | 0 | 79 | 40 | 0 | **2,279** | 1,335 | | 944 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 | 157 | 109 | 16 | 342 | 109 | -2 | 0 | 109 | -2 | 0 | 109 | -2 | -2 | 108 | 16 | 401 | 91 | 17 | 0 | 91 | 17 | 0 | 91 | 17 | 0 | 94 | 17 | 0 | **898** | 534 | | 364 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 | 196 | 109 | 20 | 428 | 109 | 11 | 0 | 109 | 11 | 0 | 109 | 11 | 9 | 103 | 20 | 501 | 94 | 26 | 0 | 94 | 26 | 0 | 94 | 26 | 0 | 95 | 24 | 0 | **1,134** | 668 | | 466 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 | 480 | 76 | 49 | 1,048 | 76 | 64 | 0 | 76 | 64 | 0 | 76 | 64 | 51 | 76 | 52 | 1,304 | 73 | 66 | 0 | 73 | 66 | 0 | 73 | 66 | 0 | 73 | 65 | 0 | **2,882** | 1,673 | | 1,209 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 | 813 | 46 | 82 | 1,753 | 46 | 97 | 0 | 46 | 97 | 0 | 46 | 97 | 78 | 46 | 85 | 2,131 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 95 | 0 | **4,774** | 2,780 | | 1,994 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 | 1,361 | 21 | 138 | 2,950 | 21 | 140 | 0 | 21 | 140 | 0 | 21 | 140 | 112 | 21 | 139 | 3,485 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | **7,908** | 4,624 | | 3,284 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 | 1,331 | 7 | 136 | 2,908 | 7 | 150 | 0 | 7 | 150 | 0 | 7 | 150 | 120 | 7 | 136 | 3,410 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | **7,769** | 4,539 | | 3,230 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00*** | ***10,024.96*** | ***528.00*** | ***1,020.00*** | ***21,807.60*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***821.03*** | ***521.00*** | ***1,030.00*** | ***25,822.10*** | ***489.00*** | ***1,063.00*** | ***-*** | ***489.00*** | ***1,063.00*** | ***-*** | ***489.00*** | ***1,063.00*** | ***-*** | ***495.00*** | ***1,059.00*** | ***-*** | ***58,475.69*** | ***34,191.35*** | ***-*** | ***24,284.34*** |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***QA/QC (should be 0)*** | | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | 0 | | | 0 | | | 0 | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | |
| ***Actual evapotranspiration (mm)*** | | | | | ***526*** | | | ***528*** | | | ***528*** | | | ***528*** | | | | ***521*** | | | ***489*** | | | ***489*** | | | ***489*** | | | ***495*** | | | | |
| ***Infiltration ($m^3$)*** | | | | | ***6,015*** | | | ***15,265*** | | | ***0*** | | | ***0*** | | | | ***12,911*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |
| ***Infiltration (mm)*** | | | | | ***614*** | | | ***714*** | | | ***0*** | | | ***0*** | | | | ***515*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |

**Table A-4: Detailed Annual and Monthly Operations Condition Water Balance by Catchment (m³)**

**Shoal Cove Pond**

| | Grassland | Tree Cover | Waterbody | Sediment Pond | Wetland | Bare / Sparse Vegetation | Public Road | Haul Road | Open Pit | Stockpile | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| WHC | 150 mm | 300 mm | Precip - PET | Precip - PET | Precip - PET | 75 mm | 5 mm | 5 mm | 5 mm | 10 mm | |
| Total Area (m²) | 17,530 | 98,700 | 0 | 5,500 | 2,088 | 21,430 | 2,591 | 11,440 | 40,250 | 138,000 | 337,529 |
| Infiltration Factor | 0.6 | 0.7 | 0.0 | 0.0 | 0.0 | 0.5 | 0.1 | 0.1 | 0.0 | 0.5 | |

| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Pit Inflow | Total Infiltr. | Total Runoff | Change in GW Contribution | Surface Water Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (°C) | (mm) | (mm) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) |
| January | 31 | -2.8 | 129 | 2 | 2 | 102 | 1,788 | 2 | 100 | 9,870 | 2 | 127 | 0 | 2 | 127 | 699 | 2 | 127 | 265 | 2 | 103 | 2,207 | 2 | 104 | 269 | 2 | 104 | 1,190 | 2 | 104 | 4,186 | 2 | 104 | 14,352 | **34,826** | 16,446 | 17,106 | 34,166 | 162 | 34,328 |
| February | 28 | -3.5 | 119 | 2 | 2 | 92 | 1,613 | 2 | 92 | 9,080 | 2 | 117 | 0 | 2 | 117 | 644 | 2 | 117 | 244 | 2 | 92 | 1,972 | 2 | 92 | 238 | 2 | 92 | 1,052 | 2 | 92 | 3,703 | 2 | 92 | 12,696 | **31,242** | 14,854 | 15,430 | 30,666 | 146 | 30,813 |
| March | 31 | -1.3 | 119 | 5 | 5 | 124 | 2,174 | 5 | 124 | 12,239 | 5 | 114 | 0 | 5 | 114 | 627 | 5 | 114 | 238 | 5 | 124 | 2,657 | 5 | 124 | 321 | 5 | 124 | 1,419 | 5 | 124 | 4,991 | 5 | 124 | 17,112 | **41,778** | 16,446 | 20,557 | 37,666 | 162 | 37,828 |
| April | 30 | 2.6 | 120 | 20 | 20 | 151 | 2,647 | 20 | 151 | 14,904 | 20 | 100 | 0 | 20 | 100 | 550 | 20 | 100 | 209 | 20 | 151 | 3,236 | 20 | 151 | 391 | 20 | 151 | 1,727 | 20 | 151 | 6,078 | 20 | 151 | 20,838 | **50,580** | 15,915 | 24,820 | 41,675 | 157 | 41,832 |
| May | 31 | 6.9 | 121 | 51 | 51 | 72 | 1,262 | 51 | 72 | 7,106 | 51 | 70 | 0 | 51 | 70 | 385 | 51 | 70 | 146 | 51 | 72 | 1,543 | 51 | 72 | 187 | 51 | 72 | 824 | 51 | 72 | 2,898 | 51 | 72 | 9,936 | **24,287** | 16,446 | 11,957 | 28,775 | 162 | 28,937 |
| June | 30 | 11.2 | 117 | 80 | 80 | 40 | 701 | 80 | 40 | 3,948 | 80 | 37 | 0 | 80 | 37 | 204 | 80 | 37 | 77 | 80 | 40 | 857 | 77 | 40 | 104 | 77 | 40 | 458 | 77 | 40 | 1,610 | 79 | 40 | 5,520 | **13,478** | 15,915 | 6,633 | 22,761 | 157 | 22,918 |
| July | 31 | 15.5 | 107 | 109 | 109 | 16 | 280 | 109 | 16 | 1,579 | 109 | -2 | 0 | 109 | -2 | -11 | 109 | -2 | -4 | 108 | 16 | 343 | 91 | 17 | 44 | 91 | 17 | 194 | 91 | 17 | 684 | 94 | 17 | 2,346 | **5,456** | 16,446 | 2,631 | 19,271 | 162 | 19,433 |
| August | 31 | 16.9 | 120 | 109 | 107 | 20 | 351 | 109 | 20 | 1,974 | 109 | 11 | 0 | 109 | 11 | 61 | 109 | 11 | 23 | 103 | 20 | 429 | 94 | 26 | 67 | 94 | 26 | 297 | 94 | 26 | 1,047 | 95 | 24 | 3,312 | **7,560** | 16,446 | 3,559 | 20,446 | 162 | 20,608 |
| September | 30 | 13.5 | 140 | 76 | 76 | 49 | 859 | 76 | 49 | 4,836 | 76 | 64 | 0 | 76 | 64 | 352 | 76 | 64 | 134 | 76 | 52 | 1,114 | 73 | 66 | 171 | 73 | 66 | 755 | 73 | 66 | 2,657 | 73 | 65 | 8,970 | **19,848** | 15,915 | 9,388 | 26,375 | 157 | 26,532 |
| October | 31 | 8.7 | 143 | 46 | 46 | 83 | 1,455 | 46 | 82 | 8,093 | 46 | 97 | 0 | 46 | 97 | 534 | 46 | 97 | 203 | 46 | 85 | 1,822 | 46 | 96 | 249 | 46 | 96 | 1,098 | 46 | 96 | 3,864 | 46 | 95 | 13,110 | **30,427** | 16,446 | 14,672 | 32,200 | 162 | 32,362 |
| November | 30 | 4.3 | 161 | 21 | 21 | 139 | 2,437 | 21 | 138 | 13,621 | 21 | 140 | 0 | 21 | 140 | 770 | 21 | 140 | 292 | 21 | 139 | 2,979 | 21 | 139 | 360 | 21 | 139 | 1,590 | 21 | 139 | 5,595 | 21 | 139 | 19,182 | **46,825** | 15,915 | 23,042 | 39,699 | 157 | 39,855 |
| December | 31 | 0.1 | 157 | 7 | 7 | 136 | 2,384 | 7 | 136 | 13,423 | 7 | 150 | 0 | 7 | 150 | 825 | 7 | 150 | 313 | 7 | 136 | 2,914 | 7 | 136 | 352 | 7 | 136 | 1,556 | 7 | 136 | 5,474 | 7 | 136 | 18,768 | **46,010** | 16,446 | 22,684 | 39,772 | 162 | 39,934 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00*** | ***17,950.72*** | ***528.00*** | ***1,020.00*** | ***100,674.00*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***5,637.50*** | ***528.00*** | ***1,025.00*** | ***2,140.20*** | ***521.00*** | ***1,030.00*** | ***22,072.90*** | ***489.00*** | ***1,063.00*** | ***2,754.23*** | ***489.00*** | ***1,063.00*** | ***12,160.72*** | ***489.00*** | ***1,063.00*** | ***42,785.75*** | ***495.00*** | ***1,059.00*** | ***146,142.00*** | ***352,318.02*** | ***193,632.50*** | ***172,478.68*** | ***373,471.85*** | ***1,908.95*** | ***375,380.80*** |
| ***QA/QC (should be 0)*** | | | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | 0 | ***0 mm*** | | 0 | ***0 mm*** | | 0 | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | | | | | | |
| ***Actual evapotranspiration (mm)*** | | | | | ***526*** | | | ***528*** | | | | ***528*** | | | ***528*** | | | ***528*** | | | ***521*** | | | ***489*** | | | ***489*** | | | ***489*** | | | | | | | |
| ***Infiltration (m³)*** | | | | | ***10,770*** | | | ***70,472*** | | | | ***0*** | | | ***0*** | | | ***0*** | | | ***11,036*** | | | ***275*** | | | ***1,216*** | | | ***0*** | | | ***73,071*** | | | | |
| ***Infiltration (mm)*** | | | | | ***614*** | | | ***714*** | | | | ***0*** | | | ***0*** | | | ***0*** | | | ***515*** | | | ***106*** | | | ***106*** | | | ***0*** | | | ***530*** | | | | |

***Note:*** alculated using rainfall, melt and Actual Evapotranspiration

**Hares Ears Pond**

| | Grassland | Tree Cover | Waterbody | Sediment Pond | Wetland | Bare / Sparse Vegetation | Public Road | Haul Road | Open Pit | Stockpile | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| WHC | 150 mm | 300 mm | Precip - PET | Precip - PET | Precip - PET | 75 mm | 5 mm | 5 mm | 5 mm | 10 mm | |
| Total Area (m²) | 10,530 | 87,700 | 0 | 3,600 | 4,798 | 36,160 | 1,172 | 8,520 | 40,250 | 91,300 | 284,030 |
| Infiltration Factor | 0.6 | 0.7 | 0.0 | 0.0 | 0.0 | 0.5 | 0.1 | 0.1 | 0.0 | 0.5 | |

| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Well/Sump Discharge | Total Infiltr. | Total Runoff | Change in GW Contribution | Surface Water Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (°C) | (mm) | (mm) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 | 1,074 | 2 | 100 | 8,770 | 2 | 127 | 0 | 2 | 127 | 457 | 2 | 127 | 609 | 2 | 103 | 3,724 | 2 | 104 | 122 | 2 | 104 | 886 | 2 | 104 | 4,186 | 2 | 104 | 9,495 | **29,324** | 16,446 | 13,494 | 32,276 | 0 | 32,276 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 | 969 | 2 | 92 | 8,068 | 2 | 117 | 0 | 2 | 117 | 421 | 2 | 117 | 561 | 2 | 92 | 3,327 | 2 | 92 | 108 | 2 | 92 | 784 | 2 | 92 | 3,703 | 2 | 92 | 8,400 | **26,341** | 14,854 | 12,181 | 29,013 | 0 | 29,013 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 | 1,306 | 5 | 124 | 10,875 | 5 | 114 | 0 | 5 | 114 | 410 | 5 | 114 | 547 | 5 | 124 | 4,484 | 5 | 124 | 145 | 5 | 124 | 1,056 | 5 | 124 | 4,991 | 5 | 124 | 11,321 | **35,136** | 16,446 | 16,418 | 35,163 | 0 | 35,163 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 | 1,590 | 20 | 151 | 13,243 | 20 | 100 | 0 | 20 | 100 | 360 | 20 | 100 | 480 | 20 | 151 | 5,460 | 20 | 151 | 177 | 20 | 151 | 1,287 | 20 | 151 | 6,078 | 20 | 151 | 13,786 | **42,460** | 15,915 | 19,993 | 38,382 | 0 | 38,382 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 | 758 | 51 | 72 | 6,314 | 51 | 70 | 0 | 51 | 70 | 252 | 51 | 70 | 336 | 51 | 72 | 2,604 | 51 | 72 | 84 | 51 | 72 | 613 | 51 | 72 | 2,898 | 51 | 72 | 6,574 | **20,433** | 16,446 | 9,533 | 27,346 | 0 | 27,346 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 | 421 | 80 | 40 | 3,508 | 80 | 37 | 0 | 80 | 37 | 133 | 80 | 37 | 178 | 80 | 40 | 1,446 | 77 | 40 | 47 | 77 | 40 | 341 | 77 | 40 | 1,610 | 79 | 40 | 3,652 | **11,336** | 15,915 | 5,296 | 21,955 | 0 | 21,955 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 | 168 | 109 | 16 | 1,403 | 109 | -2 | 0 | 109 | -2 | -7 | 109 | -2 | -10 | 108 | 16 | 579 | 91 | 17 | 20 | 91 | 17 | 145 | 91 | 17 | 684 | 94 | 17 | 1,552 | **4,535** | 16,446 | 2,165 | 18,815 | 0 | 18,815 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 | 211 | 109 | 20 | 1,754 | 109 | 11 | 0 | 109 | 11 | 40 | 109 | 11 | 53 | 103 | 20 | 723 | 94 | 26 | 30 | 94 | 26 | 222 | 94 | 26 | 1,047 | 95 | 24 | 2,191 | **6,270** | 16,446 | 2,837 | 19,879 | 0 | 19,879 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 | 516 | 76 | 49 | 4,297 | 76 | 64 | 0 | 76 | 64 | 230 | 76 | 64 | 307 | 76 | 52 | 1,880 | 73 | 66 | 77 | 73 | 66 | 562 | 73 | 66 | 2,657 | 73 | 65 | 5,935 | **16,462** | 15,915 | 7,289 | 25,088 | 0 | 25,088 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 | 874 | 46 | 82 | 7,191 | 46 | 97 | 0 | 46 | 97 | 349 | 46 | 97 | 465 | 46 | 85 | 3,074 | 46 | 96 | 113 | 46 | 96 | 818 | 46 | 96 | 3,864 | 46 | 95 | 8,674 | **25,422** | 16,446 | 11,525 | 30,342 | 0 | 30,342 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 | 1,464 | 21 | 138 | 12,103 | 21 | 140 | 0 | 21 | 140 | 504 | 21 | 140 | 672 | 21 | 139 | 5,026 | 21 | 139 | 163 | 21 | 139 | 1,184 | 21 | 139 | 5,595 | 21 | 139 | 12,691 | **39,401** | 15,915 | 18,343 | 36,973 | 0 | 36,973 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 | 1,432 | 7 | 136 | 11,927 | 7 | 150 | 0 | 7 | 150 | 540 | 7 | 150 | 720 | 7 | 136 | 4,918 | 7 | 136 | 159 | 7 | 136 | 1,159 | 7 | 136 | 5,474 | 7 | 136 | 12,417 | **38,746** | 16,446 | 18,007 | 37,184 | 0 | 37,184 |
| ***Total*** | | | ***1,555*** | ***528*** | ***526*** | ***1024*** | ***10,783*** | ***528*** | ***1020*** | ***89,454*** | ***528*** | ***1025*** | ***0*** | ***528*** | ***1025*** | ***3,690*** | ***528*** | ***1025*** | ***4,918*** | ***521*** | ***1030*** | ***37,245*** | ***489*** | ***1063*** | ***1,246*** | ***489*** | ***1063*** | ***9,057*** | ***489*** | ***1063*** | ***42,786*** | ***495*** | ***1059*** | ***96,687*** | ***295,865*** | ***193,633*** | ***137,083*** | ***352,414*** | ***0*** | ***352,414*** |
| ***QA/QC (should be 0)*** | | | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | 0 | ***0 mm*** | | 0 | ***0 mm*** | | 0 | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | | | | | | |
| ***Actual evapotranspiration (mm)*** | | | | | ***526*** | | | ***528*** | | | | ***528*** | | | ***528*** | | | ***528*** | | | ***521*** | | | ***489*** | | | ***489*** | | | ***489*** | | | | | | | |
| ***Infiltration (m³)*** | | | | | ***6,470*** | | | ***62,618*** | | | | ***0*** | | | ***0*** | | | ***0*** | | | ***18,622*** | | | ***125*** | | | ***906*** | | | ***0*** | | | ***48,343*** | | | | |
| ***Infiltration (mm)*** | | | | | ***614*** | | | ***714*** | | | | ***0*** | | | ***0*** | | | ***0*** | | | ***515*** | | | ***106*** | | | ***106*** | | | ***0*** | | | ***530*** | | | | |

**East Branch of Salt Cove Brook**

| | Grassland | Tree Cover | Waterbody | Sediment Pond | Wetland | Bare / Sparse Vegetation | Public Road | Haul Road | Open Pit | Stockpile | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| WHC | 150 mm | 300 mm | Precip - PET | Precip - PET | Precip - PET | 75 mm | 5 mm | 5 mm | 5 mm | 10 mm | |
| Total Area (m²) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration Factor | 0.6 | 0.7 | 0.0 | 0.0 | 0.0 | 0.5 | 0.1 | 0.1 | 0.0 | 0.5 | |

| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Well Discharge | Total Infiltr. | Total Runoff | Change in GW Contribution | Surface Water Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (°C) | (mm) | (mm) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 | 0 | 2 | 100 | 0 | 2 | 127 | 0 | 2 | 127 | 0 | 2 | 127 | 0 | 2 | 103 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | **0** | | 0 | 0 | -3,085 | -3,085 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 117 | 0 | 2 | 117 | 0 | 2 | 117 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | **0** | | 0 | 0 | -2,786 | -2,786 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 114 | 0 | 5 | 114 | 0 | 5 | 114 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | **0** | | 0 | 0 | -3,085 | -3,085 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 100 | 0 | 20 | 100 | 0 | 20 | 100 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | **0** | | 0 | 0 | -2,985 | -2,985 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 70 | 0 | 51 | 70 | 0 | 51 | 70 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | **0** | | 0 | 0 | -3,085 | -3,085 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 | 0 | 80 | 40 | 0 | 80 | 37 | 0 | 80 | 37 | 0 | 80 | 37 | 0 | 80 | 40 | 0 | 77 | 40 | 0 | 77 | 40 | 0 | 77 | 40 | 0 | 79 | 40 | 0 | **0** | | 0 | 0 | -2,985 | -2,985 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 | 0 | 109 | 16 | 0 | 109 | -2 | 0 | 109 | -2 | 0 | 109 | -2 | 0 | 108 | 16 | 0 | 91 | 17 | 0 | 91 | 17 | 0 | 91 | 17 | 0 | 94 | 17 | 0 | **0** | | 0 | 0 | -3,085 | -3,085 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 | 0 | 109 | 20 | 0 | 109 | 11 | 0 | 109 | 11 | 0 | 109 | 11 | 0 | 103 | 20 | 0 | 94 | 26 | 0 | 94 | 26 | 0 | 94 | 26 | 0 | 95 | 24 | 0 | **0** | | 0 | 0 | -3,085 | -3,085 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 | 0 | 76 | 49 | 0 | 76 | 64 | 0 | 76 | 64 | 0 | 76 | 64 | 0 | 76 | 52 | 0 | 73 | 66 | 0 | 73 | 66 | 0 | 73 | 66 | 0 | 73 | 65 | 0 | **0** | | 0 | 0 | -2,985 | -2,985 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 | 0 | 46 | 82 | 0 | 46 | 97 | 0 | 46 | 97 | 0 | 46 | 97 | 0 | 46 | 85 | 0 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 95 | 0 | **0** | | 0 | 0 | -3,085 | -3,085 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 | 0 | 21 | 138 | 0 | 21 | 140 | 0 | 21 | 140 | 0 | 21 | 140 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | **0** | | 0 | 0 | -2,985 | -2,985 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 150 | 0 | 7 | 150 | 0 | 7 | 150 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | **0** | | 0 | 0 | -3,085 | -3,085 |
| ***Total*** | | | ***1,555*** | ***528*** | ***526*** | ***1024*** | ***0*** | ***528*** | ***1020*** | ***0*** | ***528*** | ***1025*** | ***0*** | ***528*** | ***1025*** | ***0*** | ***528*** | ***1025*** | ***0*** | ***521*** | ***1030*** | ***0*** | ***489*** | ***1063*** | ***0*** | ***489*** | ***1063*** | ***0*** | ***489*** | ***1063*** | ***0*** | ***495*** | ***1059*** | ***0*** | ***0*** | ***0*** | ***0*** | ***0*** | ***-36,318*** | ***-36,318*** |
| ***QA/QC (should be 0)*** | | | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | 0 | ***0 mm*** | | 0 | ***0 mm*** | | 0 | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | | | | | | |
| ***Actual evapotranspiration (mm)*** | | | | | ***526*** | | | ***528*** | | | | ***528*** | | | ***528*** | | | ***528*** | | | ***521*** | | | ***489*** | | | ***489*** | | | ***489*** | | | | | | | |
| ***Infiltration (m³)*** | | | | | ***0*** | | | ***0*** | | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |
| ***Infiltration (mm)*** | | | | | ***0*** | | | ***0*** | | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | ***0*** | | | | |

**Shoal Cove Pond**

| | | | | | Grassland | | Tree Cover | | Waterbody | | Sediment Pond | | Wetland | | Bare / Sparse Vegetation | | Public Road | | Haul Road | | Open Pit | | Stockpile | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WHC | 150 mm | WHC | 300 mm | WHC | Precip - PET | WHC | Precip - PET | WHC | Precip - PET | WHC | 75 mm | WHC | 5 mm | WHC | 5 mm | WHC | 5 mm | WHC | 10 mm | | | | | | | |
| | | | | | Total Area ($m^2$) | 17,530 | Total Area ($m^2$) | 98,700 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 5,500 | Total Area ($m^2$) | 2,088 | Total Area ($m^2$) | 21,430 | Total Area ($m^2$) | 2,591 | Total Area ($m^2$) | 11,440 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 138,000 | Total Area ($m^2$) | 297,279 | | | | | | |
| | | | | | Infiltration Factor | 0.6 | Infiltration Factor | 0.7 | Infiltration Factor | 0.0 | Infiltration Factor | 0.0 | Infiltration Factor | 0.0 | Infiltration Factor | 0.5 | Infiltration Factor | 0.1 | Infiltration Factor | 0.1 | Infiltration Factor | 0.0 | Infiltration Factor | 0.5 | | | | | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Total Surplus | Total Infiltr. | Well Discharge | Total Runoff | Change in GW Contribution | Surface Water Flow |
| | | (°C) | (mm) | (mm) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) |
| January | 31 | -2.8 | 129 | 2 | 2 | 102 1,788 | 2 | 100 9,870 | 2 | 127 0 | 2 | 127 699 | 2 | 127 265 | 2 | 103 2,207 | 2 | 104 269 | 2 | 104 1,190 | 2 | 104 0 | 2 | 104 14,352 | **30,640** | 16,407 | | 14,233 | 162 | 14,395 |
| February | 28 | -3.5 | 119 | 2 | 2 | 92 1,613 | 2 | 92 9,080 | 2 | 117 0 | 2 | 117 644 | 2 | 117 244 | 2 | 92 1,972 | 2 | 92 238 | 2 | 92 1,052 | 2 | 92 0 | 2 | 92 12,696 | **27,539** | 14,787 | | 12,753 | 146 | 12,899 |
| March | 31 | -1.3 | 119 | 5 | 5 | 124 2,174 | 5 | 124 12,239 | 5 | 114 0 | 5 | 114 627 | 5 | 114 238 | 5 | 124 2,657 | 5 | 124 321 | 5 | 124 1,419 | 5 | 124 0 | 5 | 124 17,112 | **36,787** | 19,930 | | 16,857 | 162 | 17,019 |
| April | 30 | 2.6 | 120 | 20 | 20 | 151 2,647 | 20 | 151 14,904 | 20 | 100 0 | 20 | 100 550 | 20 | 100 209 | 20 | 151 3,236 | 20 | 151 391 | 20 | 151 1,727 | 20 | 151 0 | 20 | 151 20,838 | **44,502** | 24,270 | | 20,232 | 157 | 20,389 |
| May | 31 | 6.9 | 121 | 51 | 51 | 72 1,262 | 51 | 72 7,106 | 51 | 70 0 | 51 | 70 385 | 51 | 70 146 | 51 | 72 1,543 | 51 | 72 187 | 51 | 72 824 | 51 | 72 0 | 51 | 72 9,936 | **21,389** | 11,572 | | 9,817 | 162 | 9,979 |
| June | 30 | 11.2 | 117 | 80 | 80 | 40 701 | 80 | 40 3,948 | 80 | 37 0 | 80 | 37 204 | 80 | 37 77 | 80 | 40 857 | 77 | 40 104 | 77 | 40 458 | 77 | 40 0 | 79 | 40 5,520 | **11,868** | 6,429 | | 5,439 | 157 | 5,596 |
| July | 31 | 15.5 | 107 | 109 | 109 | 16 280 | 109 | 16 1,579 | 109 | -2 0 | 109 | -2 -11 | 109 | -2 -4 | 108 | 16 343 | 91 | 17 44 | 91 | 17 194 | 91 | 17 0 | 94 | 17 2,346 | **4,772** | 2,642 | | 2,130 | 162 | 2,292 |
| August | 31 | 16.9 | 120 | 109 | 107 | 20 351 | 109 | 20 1,974 | 109 | 11 0 | 109 | 11 61 | 109 | 11 23 | 103 | 20 429 | 94 | 26 67 | 94 | 26 297 | 94 | 26 0 | 95 | 24 3,312 | **6,513** | 3,499 | | 3,015 | 162 | 3,177 |
| September | 30 | 13.5 | 140 | 76 | 76 | 49 859 | 76 | 49 4,836 | 76 | 64 0 | 76 | 64 352 | 76 | 64 134 | 76 | 52 1,114 | 73 | 66 171 | 73 | 66 755 | 73 | 66 0 | 73 | 65 8,970 | **17,191** | 9,036 | | 8,156 | 157 | 8,313 |
| October | 31 | 8.7 | 143 | 46 | 46 | 83 1,455 | 46 | 82 8,093 | 46 | 97 0 | 46 | 97 534 | 46 | 97 203 | 46 | 85 1,822 | 46 | 96 249 | 46 | 96 1,098 | 46 | 96 0 | 46 | 95 13,110 | **26,563** | 14,139 | | 12,424 | 162 | 12,586 |
| November | 30 | 4.3 | 161 | 21 | 21 | 139 2,437 | 21 | 138 13,621 | 21 | 140 0 | 21 | 140 770 | 21 | 140 292 | 21 | 139 2,979 | 21 | 139 360 | 21 | 139 1,590 | 21 | 139 0 | 21 | 139 19,182 | **41,231** | 22,272 | | 18,959 | 157 | 19,116 |
| December | 31 | 0.1 | 157 | 7 | 7 | 136 2,384 | 7 | 136 13,423 | 7 | 150 0 | 7 | 150 825 | 7 | 150 313 | 7 | 136 2,914 | 7 | 136 352 | 7 | 136 1,556 | 7 | 136 0 | 7 | 136 18,768 | **40,536** | 21,859 | | 18,677 | 162 | 18,840 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00 17,950.72*** | ***528.00*** | ***1,020.00 100,674.00*** | ***528.00*** | ***1,025.00 -*** | ***528.00*** | ***1,025.00 5,637.50*** | ***528.00*** | ***1,025.00 2,140.20*** | ***521.00*** | ***1,030.00 22,072.90*** | ***489.00*** | ***1,063.00 2,754.23*** | ***489.00*** | ***1,063.00 12,160.72*** | ***489.00*** | ***1,063.00 -*** | ***495.00*** | ***1,059.00 146,142.00*** | ***309,532.27*** | ***166,841.18*** | ***-*** | ***142,691.10*** | ***1,908.95*** | ***144,600.05*** |

| QA/QC (should be 0) | | 0 mm | 0 mm | | 0 mm | 0 mm | | 0 | | 0 | | 0 | | 0 mm | 0 mm | | 0 mm | 0 mm | | 0 mm | 0 mm | | 0 mm | 0 mm | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Actual evapotranspirat* | | *526* | | | *528* | | | *528* | | | *528* | | | *521* | | | *489* | | | *489* | | | *495* | | | | | | |
| *Infiltration ($m^3$)* | | *10,770* | | | *70,472* | | | *0* | | | *0* | | | *11,036* | | | *275* | | | *1,216* | | | *73,071* | | | | | | |
| *Infiltration (mm)* | | *614* | | | *714* | | | *0* | | | *0* | | | *515* | | | *106* | | | *106* | | | *530* | | | | | | |

***Note:*** The Surplus values in (mm) are calculated using rainfall, melt and Actual Evapotranspiration

**Hares Ears Pond**

| | | | | | Grassland | | Tree Cover | | Waterbody | | Sediment Pond | | Wetland | | Bare / Sparse Vegetation | | Public Road | | Haul Road | | Open Pit | | Stockpile | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WHC | 150 mm | WHC | 300 mm | WHC | Precip - PET | WHC | Precip - PET | WHC | Precip - PET | WHC | 75 mm | WHC | 5 mm | WHC | 5 mm | WHC | 5 mm | WHC | 10 mm | | | | | | | |
| | | | | | Total Area ($m^2$) | 10,530 | Total Area ($m^2$) | 87,700 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 3,600 | Total Area ($m^2$) | 4,798 | Total Area ($m^2$) | 36,160 | Total Area ($m^2$) | 1,172 | Total Area ($m^2$) | 8,520 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 91,300 | Total Area ($m^2$) | 243,780 | | | | | | |
| | | | | | Infiltration Factor | 0.6 | Infiltration Factor | 0.7 | Infiltration Factor | 0.0 | Infiltration Factor | 0.0 | Infiltration Factor | 0.0 | Infiltration Factor | 0.5 | Infiltration Factor | 0.1 | Infiltration Factor | 0.1 | Infiltration Factor | 0.0 | Infiltration Factor | 0.5 | | | | | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Total Surplus | Total Infiltr. | Well Discharge | Total Runoff | Change in GW Contribution | Surface Water Flow |
| | | (°C) | (mm) | (mm) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 1,074 | 2 | 100 8,770 | 2 | 127 0 | 2 | 127 457 | 2 | 127 609 | 2 | 103 3,724 | 2 | 104 122 | 2 | 104 886 | 2 | 104 0 | 2 | 104 9,495 | **25,138** | 13,494 | | 11,644 | 0 | 11,644 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 969 | 2 | 92 8,068 | 2 | 117 0 | 2 | 117 421 | 2 | 117 561 | 2 | 92 3,327 | 2 | 92 108 | 2 | 92 784 | 2 | 92 0 | 2 | 92 8,400 | **22,638** | 12,181 | | 10,456 | 0 | 10,456 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 1,306 | 5 | 124 10,875 | 5 | 114 0 | 5 | 114 410 | 5 | 114 547 | 5 | 124 4,484 | 5 | 124 145 | 5 | 124 1,056 | 5 | 124 0 | 5 | 124 11,321 | **30,145** | 16,418 | | 13,726 | 0 | 13,726 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 1,590 | 20 | 151 13,243 | 20 | 100 0 | 20 | 100 360 | 20 | 100 480 | 20 | 151 5,460 | 20 | 151 177 | 20 | 151 1,287 | 20 | 151 0 | 20 | 151 13,786 | **36,382** | 19,993 | | 16,389 | 0 | 16,389 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 758 | 51 | 72 6,314 | 51 | 70 0 | 51 | 70 252 | 51 | 70 336 | 51 | 72 2,604 | 51 | 72 84 | 51 | 72 613 | 51 | 72 0 | 51 | 72 6,574 | **17,535** | 9,533 | | 8,002 | 0 | 8,002 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 421 | 80 | 40 3,508 | 80 | 37 0 | 80 | 37 133 | 80 | 37 178 | 80 | 40 1,446 | 77 | 40 47 | 77 | 40 341 | 77 | 40 0 | 79 | 40 3,652 | **9,726** | 5,296 | | 4,430 | 0 | 4,430 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 168 | 109 | 16 1,403 | 109 | -2 0 | 109 | -2 -7 | 109 | -2 -10 | 108 | 16 579 | 91 | 17 20 | 91 | 17 145 | 91 | 17 0 | 94 | 17 1,552 | **3,850** | 2,165 | | 1,685 | 0 | 1,685 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 211 | 109 | 20 1,754 | 109 | 11 0 | 109 | 11 40 | 109 | 11 53 | 103 | 20 723 | 94 | 26 30 | 94 | 26 222 | 94 | 26 0 | 95 | 24 2,191 | **5,223** | 2,837 | | 2,387 | 0 | 2,387 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 516 | 76 | 49 4,297 | 76 | 64 0 | 76 | 64 230 | 76 | 64 307 | 76 | 52 1,880 | 73 | 66 77 | 73 | 66 562 | 73 | 66 0 | 73 | 65 5,935 | **13,805** | 7,289 | | 6,516 | 0 | 6,516 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 874 | 46 | 82 7,191 | 46 | 97 0 | 46 | 97 349 | 46 | 97 465 | 46 | 85 3,074 | 46 | 96 113 | 46 | 96 818 | 46 | 96 0 | 46 | 95 8,674 | **21,558** | 11,525 | | 10,033 | 0 | 10,033 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 1,464 | 21 | 138 12,103 | 21 | 140 0 | 21 | 140 504 | 21 | 140 672 | 21 | 139 5,026 | 21 | 139 163 | 21 | 139 1,184 | 21 | 139 0 | 21 | 139 12,691 | **33,806** | 18,343 | | 15,463 | 0 | 15,463 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 1,432 | 7 | 136 11,927 | 7 | 150 0 | 7 | 150 540 | 7 | 150 720 | 7 | 136 4,918 | 7 | 136 159 | 7 | 136 1,159 | 7 | 136 0 | 7 | 136 12,417 | **33,272** | 18,007 | | 15,264 | 0 | 15,264 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00 10,782.72*** | ***528.00*** | ***1,020.00 89,454.00*** | ***528.00*** | ***1,025.00 -*** | ***528.00*** | ***1,025.00 3,690.00*** | ***528.00*** | ***1,025.00 4,917.95*** | ***521.00*** | ***1,030.00 37,244.80*** | ***489.00*** | ***1,063.00 1,245.84*** | ***489.00*** | ***1,063.00 9,056.76*** | ***489.00*** | ***1,063.00 -*** | ***495.00*** | ***1,059.00 96,686.70*** | ***253,078.77*** | ***137,083.44*** | ***-*** | ***115,995.32*** | ***-*** | ***115,995.32*** |

| QA/QC (should be 0) | | 0 mm | 0 mm | | 0 mm | 0 mm | | 0 | | 0 | | 0 | | 0 mm | 0 mm | | 0 mm | 0 mm | | 0 mm | 0 mm | | 0 mm | 0 mm | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Actual evapotranspirat* | | *526* | | | *528* | | | *528* | | | *528* | | | *521* | | | *489* | | | *489* | | | *495* | | | | | | |
| *Infiltration ($m^3$)* | | *6,470* | | | *62,618* | | | *0* | | | *0* | | | *18,622* | | | *125* | | | *906* | | | *48,343* | | | | | | |
| *Infiltration (mm)* | | *614* | | | *714* | | | *0* | | | *0* | | | *515* | | | *106* | | | *106* | | | *530* | | | | | | |

**East Branch of Salt Cove Brook**

| | | | | | Grassland | | Tree Cover | | Waterbody | | Sediment Pond | | Wetland | | Bare / Sparse Vegetation | | Public Road | | Haul Road | | Open Pit | | Stockpile | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WHC | 150 mm | WHC | 300 mm | WHC | Precip - PET | WHC | Precip - PET | WHC | Precip - PET | WHC | 75 mm | WHC | 5 mm | WHC | 5 mm | WHC | 5 mm | WHC | 10 mm | | | | | | | |
| | | | | | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | Total Area ($m^2$) | 0 | | | | | | |
| | | | | | Infiltration Factor | 0.6 | Infiltration Factor | 0.7 | Infiltration Factor | 0.0 | Infiltration Factor | 0.0 | Infiltration Factor | 0.0 | Infiltration Factor | 0.5 | Infiltration Factor | 0.1 | Infiltration Factor | 0.1 | Infiltration Factor | 0.0 | Infiltration Factor | 0.5 | | | | | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Actual ET | Surplus | Total Surplus | Total Infiltr. | Well Discharge | Total Runoff | Change in GW Contribution | Surface Water Flow |
| | | (°C) | (mm) | (mm) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | (mm) | (mm) ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) | ($m^3$) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 0 | 2 | 100 0 | 2 | 127 0 | 2 | 127 0 | 2 | 127 0 | 2 | 103 0 | 2 | 104 0 | 2 | 104 0 | 2 | 104 0 | 2 | 104 0 | **0** | 0 | | 0 | -3,085 | -3,085 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 0 | 2 | 92 0 | 2 | 117 0 | 2 | 117 0 | 2 | 117 0 | 2 | 92 0 | 2 | 92 0 | 2 | 92 0 | 2 | 92 0 | 2 | 92 0 | **0** | 0 | | 0 | -2,786 | -2,786 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 0 | 5 | 124 0 | 5 | 114 0 | 5 | 114 0 | 5 | 114 0 | 5 | 124 0 | 5 | 124 0 | 5 | 124 0 | 5 | 124 0 | 5 | 124 0 | **0** | 0 | | 0 | -3,085 | -3,085 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 0 | 20 | 151 0 | 20 | 100 0 | 20 | 100 0 | 20 | 100 0 | 20 | 151 0 | 20 | 151 0 | 20 | 151 0 | 20 | 151 0 | 20 | 151 0 | **0** | 0 | | 0 | -2,985 | -2,985 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 0 | 51 | 72 0 | 51 | 70 0 | 51 | 70 0 | 51 | 70 0 | 51 | 72 0 | 51 | 72 0 | 51 | 72 0 | 51 | 72 0 | 51 | 72 0 | **0** | 0 | | 0 | -3,085 | -3,085 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 0 | 80 | 40 0 | 80 | 37 0 | 80 | 37 0 | 80 | 37 0 | 80 | 40 0 | 77 | 40 0 | 77 | 40 0 | 77 | 40 0 | 79 | 40 0 | **0** | 0 | | 0 | -2,985 | -2,985 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 0 | 109 | 16 0 | 109 | -2 0 | 109 | -2 0 | 109 | -2 0 | 108 | 16 0 | 91 | 17 0 | 91 | 17 0 | 91 | 17 0 | 94 | 17 0 | **0** | 0 | | 0 | -3,085 | -3,085 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 0 | 109 | 20 0 | 109 | 11 0 | 109 | 11 0 | 109 | 11 0 | 103 | 20 0 | 94 | 26 0 | 94 | 26 0 | 94 | 26 0 | 95 | 24 0 | **0** | 0 | | 0 | -3,085 | -3,085 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 0 | 76 | 49 0 | 76 | 64 0 | 76 | 64 0 | 76 | 64 0 | 76 | 52 0 | 73 | 66 0 | 73 | 66 0 | 73 | 66 0 | 73 | 65 0 | **0** | 0 | | 0 | -2,985 | -2,985 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 0 | 46 | 82 0 | 46 | 97 0 | 46 | 97 0 | 46 | 97 0 | 46 | 85 0 | 46 | 96 0 | 46 | 96 0 | 46 | 96 0 | 46 | 95 0 | **0** | 0 | | 0 | -3,085 | -3,085 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 0 | 21 | 138 0 | 21 | 140 0 | 21 | 140 0 | 21 | 140 0 | 21 | 139 0 | 21 | 139 0 | 21 | 139 0 | 21 | 139 0 | 21 | 139 0 | **0** | 0 | | 0 | -2,985 | -2,985 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 0 | 7 | 136 0 | 7 | 150 0 | 7 | 150 0 | 7 | 150 0 | 7 | 136 0 | 7 | 136 0 | 7 | 136 0 | 7 | 136 0 | 7 | 136 0 | **0** | 0 | | 0 | -3,085 | -3,085 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00 -*** | ***528.00*** | ***1,020.00 -*** | ***528.00*** | ***1,025.00 -*** | ***528.00*** | ***1,025.00 -*** | ***528.00*** | ***1,025.00 -*** | ***521.00*** | ***1,030.00 -*** | ***489.00*** | ***1,063.00 -*** | ***489.00*** | ***1,063.00 -*** | ***489.00*** | ***1,063.00 -*** | ***495.00*** | ***1,059.00 -*** | **-** | **-** | **-** | **-** | ***- 36,317.50*** | ***- 36,317.50*** |

| QA/QC (should be 0) | | 0 mm | 0 mm | | 0 mm | 0 mm | | 0 | | 0 | | 0 | | 0 mm | 0 mm | | #N/A | #N/A | | 0 mm | 0 mm | | 0 mm | 0 mm | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Actual evapotranspirat* | | *526* | | | *528* | | | *528* | | | *528* | | | *521* | | | *489* | | | *489* | | | *495* | | | | | | |
| *Infiltration ($m^3$)* | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | | | | |
| *Infiltration (mm)* | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | | | | |

**Table A-6: Detailed Annual and Monthly Post-Closure Condition Water Balance by Catchment (m³)**

**Shoal Cove Pond**

| | | | | | Grassland | | | Tree Cover | | | Waterbody | | | Sediment Pond | | | Wetland | | | Bare / Sparse Vegetation | | | Public Road | | | Haul Road | | | Open Pit | | | Stockpile | | | Total Area (m²) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WHC | 150 mm | | WHC | 300 mm | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | 75 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 75 mm | | | | | | | |
| | | | | | Total Area (m²) | 28,970 | | Total Area (m²) | 98,660 | | Total Area (m²) | 0 | | Total Area (m²) | 5,500 | | Total Area (m²) | 2,088 | | Total Area (m²) | 21,430 | | Total Area (m²) | 2,591 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 138,000 | | | 297,239 | | | | | |
| | | | | | Infiltration Factor | 0.6 | | Infiltration Factor | 0.7 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | | | | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Total Infiltr. | Groundwater Inflow | Total Runoff | Change in GW Contribution | Surface Water Flow |
| | | (°C) | (mm) | (mm) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) |
| January | 31 | -2.8 | 129 | 2 | 2 | 102 | 2,955 | 2 | 100 | 9,866 | 2 | 127 | 0 | 2 | 127 | 699 | 2 | 127 | 265 | 2 | 103 | 2,207 | 2 | 104 | 269 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 103 | 14,214 | **30,475** | 16,917 | 0 | 13,559 | 243 | 13,802 |
| February | 28 | -3.5 | 119 | 2 | 2 | 92 | 2,665 | 2 | 92 | 9,077 | 2 | 117 | 0 | 2 | 117 | 644 | 2 | 117 | 244 | 2 | 92 | 1,972 | 2 | 92 | 238 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 12,696 | **27,536** | 15,310 | 0 | 12,225 | 220 | 12,445 |
| March | 31 | -1.3 | 119 | 5 | 5 | 124 | 3,592 | 5 | 124 | 12,234 | 5 | 114 | 0 | 5 | 114 | 627 | 5 | 114 | 238 | 5 | 124 | 2,657 | 5 | 124 | 321 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 17,112 | **36,782** | 20,636 | 0 | 16,146 | 243 | 16,389 |
| April | 30 | 2.6 | 120 | 20 | 20 | 151 | 4,374 | 20 | 151 | 14,898 | 20 | 100 | 0 | 20 | 100 | 550 | 20 | 100 | 209 | 20 | 151 | 3,236 | 20 | 151 | 391 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 20,838 | **44,496** | 25,129 | 0 | 19,367 | 235 | 19,602 |
| May | 31 | 6.9 | 121 | 51 | 51 | 72 | 2,086 | 51 | 72 | 7,104 | 51 | 70 | 0 | 51 | 70 | 385 | 51 | 70 | 146 | 51 | 72 | 1,543 | 51 | 72 | 187 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 9,936 | **21,386** | 11,982 | 0 | 9,404 | 243 | 9,647 |
| June | 30 | 11.2 | 117 | 80 | 80 | 40 | 1,159 | 80 | 40 | 3,946 | 80 | 37 | 0 | 80 | 37 | 204 | 80 | 37 | 77 | 80 | 40 | 857 | 77 | 40 | 104 | 77 | 40 | 0 | 77 | 40 | 0 | 80 | 40 | 5,520 | **11,867** | 6,657 | 0 | 5,210 | 235 | 5,445 |
| July | 31 | 15.5 | 107 | 109 | 109 | 16 | 464 | 109 | 16 | 1,579 | 109 | -2 | 0 | 109 | -2 | -11 | 109 | -2 | -4 | 108 | 16 | 343 | 91 | 17 | 44 | 91 | 17 | 0 | 91 | 17 | 0 | 108 | 16 | 2,208 | **4,622** | 2,663 | 0 | 1,959 | 243 | 2,202 |
| August | 31 | 16.9 | 120 | 109 | 107 | 20 | 579 | 109 | 20 | 1,973 | 109 | 11 | 0 | 109 | 11 | 61 | 109 | 11 | 23 | 103 | 20 | 429 | 94 | 26 | 67 | 94 | 26 | 0 | 94 | 26 | 0 | 103 | 20 | 2,760 | **5,892** | 3,330 | 0 | 2,562 | 243 | 2,805 |
| September | 30 | 13.5 | 140 | 76 | 76 | 49 | 1,420 | 76 | 49 | 4,834 | 76 | 64 | 0 | 76 | 64 | 352 | 76 | 64 | 134 | 76 | 52 | 1,114 | 73 | 66 | 171 | 73 | 66 | 0 | 73 | 66 | 0 | 76 | 52 | 7,176 | **15,201** | 8,398 | 0 | 6,803 | 235 | 7,038 |
| October | 31 | 8.7 | 143 | 46 | 46 | 83 | 2,405 | 46 | 82 | 8,090 | 46 | 97 | 0 | 46 | 97 | 534 | 46 | 97 | 203 | 46 | 85 | 1,822 | 46 | 96 | 249 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 85 | 11,730 | **25,031** | 13,906 | 0 | 11,125 | 243 | 11,368 |
| November | 30 | 4.3 | 161 | 21 | 21 | 139 | 4,027 | 21 | 138 | 13,615 | 21 | 140 | 0 | 21 | 140 | 770 | 21 | 140 | 292 | 21 | 139 | 2,979 | 21 | 139 | 360 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 19,182 | **41,225** | 23,063 | 0 | 18,162 | 235 | 18,397 |
| December | 31 | 0.1 | 157 | 7 | 7 | 136 | 3,940 | 7 | 136 | 13,418 | 7 | 150 | 0 | 7 | 150 | 825 | 7 | 150 | 313 | 7 | 136 | 2,914 | 7 | 136 | 352 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 18,768 | **40,531** | 22,633 | 0 | 17,898 | 243 | 18,141 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00*** | ***29,665.28*** | ***528.00*** | ***1,020.00*** | ***100,633.20*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***5,637.50*** | ***528.00*** | ***1,025.00*** | ***2,140.20*** | ***521.00*** | ***1,030.00*** | ***22,072.90*** | ***489.00*** | ***1,063.00*** | ***2,754.23*** | ***489.00*** | ***1,063.00*** | ***-*** | ***489.00*** | ***1,063.00*** | ***-*** | ***521.00*** | ***1,030.00*** | ***142,140.00*** | ***305,043.31*** | ***170,624.28*** | ***-*** | ***134,419.03*** | ***2,861.60*** | ***137,280.63*** |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***QA/QC (should be 0)*** | | | | ***0 mm*** | ***0 mm*** | | | ***0 mm*** | ***0 mm*** | | 0 | | | 0 | | | 0 | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | | | | | | |
| ***Actual evapotranspira*** | | | | | 526 | | | 528 | | | 528 | | | 528 | | | 528 | | | 521 | | | 489 | | | 489 | | | 489 | | | 521 | | | | | | | | |
| ***Infiltration (m³)*** | | | | | *17,799* | | | *70,443* | | | *0* | | | *0* | | | *0* | | | *11,036* | | | *275* | | | *0* | | | *0* | | | *71,070* | | | | | | | | |
| ***Infiltration (mm)*** | | | | | *614* | | | *714* | | | *0* | | | *0* | | | *0* | | | *515* | | | *106* | | | *0* | | | *0* | | | *515* | | | | | | | | |

***Note:*** The Surplus values in (mm) are calculated using rainfall, melt and Actual Evapotranspiration

**Hares Ears Pond**

| | | | | | Grassland | | | Tree Cover | | | Waterbody | | | Sediment Pond | | | Wetland | | | Bare / Sparse Vegetation | | | Public Road | | | Haul Road | | | Open Pit | | | Stockpile | | | Total Area (m²) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WHC | 150 mm | | WHC | 300 mm | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | 75 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 75 mm | | | | | | | |
| | | | | | Total Area (m²) | 17,127 | | Total Area (m²) | 87,700 | | Total Area (m²) | 80,500 | | Total Area (m²) | 3,600 | | Total Area (m²) | 4,798 | | Total Area (m²) | 36,160 | | Total Area (m²) | 1,172 | | Total Area (m²) | 1,923 | | Total Area (m²) | 0 | | Total Area (m²) | 91,300 | | | 324,280 | | | | | |
| | | | | | Infiltration Factor | 0.6 | | Infiltration Factor | 0.7 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | | | | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Total Infiltr. | Groundwater Inflow | Total Runoff | Change in GW Contribution | Surface Water Flow |
| | | (°C) | (mm) | (mm) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 | 1,747 | 2 | 100 | 8,770 | 2 | 127 | 10,224 | 2 | 127 | 457 | 2 | 127 | 609 | 2 | 103 | 3,724 | 2 | 104 | 122 | 2 | 104 | 200 | 2 | 104 | 0 | 2 | 103 | 9,404 | **35,257** | 13,784 | 1,395 | 22,869 | 0 | 22,869 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 | 1,576 | 2 | 92 | 8,068 | 2 | 117 | 9,419 | 2 | 117 | 421 | 2 | 117 | 561 | 2 | 92 | 3,327 | 2 | 92 | 108 | 2 | 92 | 177 | 2 | 92 | 0 | 2 | 92 | 8,400 | **32,056** | 12,485 | 1,260 | 20,831 | 0 | 20,831 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 | 2,124 | 5 | 124 | 10,875 | 5 | 114 | 9,177 | 5 | 114 | 410 | 5 | 114 | 547 | 5 | 124 | 4,484 | 5 | 124 | 145 | 5 | 124 | 238 | 5 | 124 | 0 | 5 | 124 | 11,321 | **39,322** | 16,828 | 1,395 | 23,889 | 0 | 23,889 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 | 2,586 | 20 | 151 | 13,243 | 20 | 100 | 8,050 | 20 | 100 | 360 | 20 | 100 | 480 | 20 | 151 | 5,460 | 20 | 151 | 177 | 20 | 151 | 290 | 20 | 151 | 0 | 20 | 151 | 13,786 | **44,432** | 20,492 | 1,350 | 25,291 | 0 | 25,291 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 | 1,233 | 51 | 72 | 6,314 | 51 | 70 | 5,635 | 51 | 70 | 252 | 51 | 70 | 336 | 51 | 72 | 2,604 | 51 | 72 | 84 | 51 | 72 | 138 | 51 | 72 | 0 | 51 | 72 | 6,574 | **23,170** | 9,771 | 1,395 | 14,795 | 0 | 14,795 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 | 685 | 80 | 40 | 3,508 | 80 | 37 | 2,979 | 80 | 37 | 133 | 80 | 37 | 178 | 80 | 40 | 1,446 | 77 | 40 | 47 | 77 | 40 | 77 | 77 | 40 | 0 | 80 | 40 | 3,652 | **12,705** | 5,428 | 1,350 | 8,626 | 0 | 8,626 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 | 274 | 109 | 16 | 1,403 | 109 | -2 | -161 | 109 | -2 | -7 | 109 | -2 | -10 | 108 | 16 | 579 | 91 | 17 | 20 | 91 | 17 | 33 | 91 | 17 | 0 | 108 | 16 | 1,461 | **3,591** | 2,172 | 1,395 | 2,815 | 0 | 2,815 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 | 343 | 109 | 20 | 1,754 | 109 | 11 | 886 | 109 | 11 | 40 | 109 | 11 | 53 | 103 | 20 | 723 | 94 | 26 | 30 | 94 | 26 | 50 | 94 | 26 | 0 | 103 | 20 | 1,826 | **5,704** | 2,716 | 1,395 | 4,383 | 0 | 4,383 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 | 839 | 76 | 49 | 4,297 | 76 | 64 | 5,152 | 76 | 64 | 230 | 76 | 64 | 307 | 76 | 52 | 1,880 | 73 | 66 | 77 | 73 | 66 | 127 | 73 | 66 | 0 | 76 | 52 | 4,748 | **17,658** | 6,846 | 1,350 | 12,162 | 0 | 12,162 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 | 1,422 | 46 | 82 | 7,191 | 46 | 97 | 7,809 | 46 | 97 | 349 | 46 | 97 | 465 | 46 | 85 | 3,074 | 46 | 96 | 113 | 46 | 96 | 185 | 46 | 96 | 0 | 46 | 85 | 7,761 | **28,367** | 11,334 | 1,395 | 18,429 | 0 | 18,429 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 | 2,381 | 21 | 138 | 12,103 | 21 | 140 | 11,270 | 21 | 140 | 504 | 21 | 140 | 672 | 21 | 139 | 5,026 | 21 | 139 | 163 | 21 | 139 | 267 | 21 | 139 | 0 | 21 | 139 | 12,691 | **45,076** | 18,802 | 1,350 | 27,624 | 0 | 27,624 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 | 2,329 | 7 | 136 | 11,927 | 7 | 150 | 12,075 | 7 | 150 | 540 | 7 | 150 | 720 | 7 | 136 | 4,918 | 7 | 136 | 159 | 7 | 136 | 262 | 7 | 136 | 0 | 7 | 136 | 12,417 | **45,347** | 18,456 | 1,395 | 28,286 | 0 | 28,286 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00*** | ***17,538.05*** | ***528.00*** | ***1,020.00*** | ***89,454.00*** | ***528.00*** | ***1,025.00*** | ***82,512.50*** | ***528.00*** | ***1,025.00*** | ***3,690.00*** | ***528.00*** | ***1,025.00*** | ***4,917.95*** | ***521.00*** | ***1,030.00*** | ***37,244.80*** | ***489.00*** | ***1,063.00*** | ***1,245.84*** | ***489.00*** | ***1,063.00*** | ***2,044.15*** | ***489.00*** | ***1,063.00*** | ***-*** | ***521.00*** | ***1,030.00*** | ***94,039.00*** | ***332,686.28*** | ***139,111.53*** | ***16,425.00*** | ***209,999.76*** | ***-*** | ***209,999.76*** |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***QA/QC (should be 0)*** | | | | ***0 mm*** | ***0 mm*** | | | ***0 mm*** | ***0 mm*** | | 0 | | | 0 | | | 0 | | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | | | | | | |
| ***Actual evapotranspira*** | | | | | 526 | | | 528 | | | 528 | | | 528 | | | 528 | | | 521 | | | 489 | | | 489 | | | 489 | | | 521 | | | | | | | | |
| ***Infiltration (m³)*** | | | | | *10,523* | | | *62,618* | | | *0* | | | *0* | | | *0* | | | *18,622* | | | *125* | | | *204* | | | *0* | | | *47,020* | | | | | | | | |
| ***Infiltration (mm)*** | | | | | *614* | | | *714* | | | *0* | | | *0* | | | *0* | | | *515* | | | *106* | | | *106* | | | *0* | | | *515* | | | | | | | | |

**East Branch of Salt Cove Brook**

| | | | | | Grassland | | | Tree Cover | | | Waterbody | | | Sediment Pond | | | Wetland | | | Bare / Sparse Vegetation | | | Public Road | | | Haul Road | | | Open Pit | | | Stockpile | | | Total Area (m²) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WHC | 150 mm | | WHC | 300 mm | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | Precip - PET | | WHC | 75 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 5 mm | | WHC | 10 mm | | | | | | | |
| | | | | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | Total Area (m²) | 0 | | | 0 | | | | | |
| | | | | | Infiltration Factor | 0.6 | | Infiltration Factor | 0.7 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.1 | | Infiltration Factor | 0.0 | | Infiltration Factor | 0.5 | | | | | | | |
| Month | Days | Temp | Precip | PET | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Actual ET | Surplus | | Total Surplus | Total Infiltr. | Groundwater Inflow | Total Runoff | Change in GW Contribution | Surface Water Flow |
| | | (°C) | (mm) | (mm) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (mm) | (mm) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) | (m³) |
| January | 31 | 0.0 | 129 | 2 | 2 | 102 | 0 | 2 | 100 | 0 | 2 | 127 | 0 | 2 | 127 | 0 | 2 | 127 | 0 | 2 | 103 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | 2 | 104 | 0 | **0** | 0 | 0 | 0 | -2,907 | -2,907 |
| February | 28 | 0.0 | 119 | 2 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 117 | 0 | 2 | 117 | 0 | 2 | 117 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | 2 | 92 | 0 | **0** | 0 | 0 | 0 | -2,625 | -2,625 |
| March | 31 | 0.0 | 119 | 5 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 114 | 0 | 5 | 114 | 0 | 5 | 114 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | 5 | 124 | 0 | **0** | 0 | 0 | 0 | -2,907 | -2,907 |
| April | 30 | 0.0 | 120 | 20 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 100 | 0 | 20 | 100 | 0 | 20 | 100 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | 20 | 151 | 0 | **0** | 0 | 0 | 0 | -2,813 | -2,813 |
| May | 31 | 0.0 | 121 | 51 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 70 | 0 | 51 | 70 | 0 | 51 | 70 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | 51 | 72 | 0 | **0** | 0 | 0 | 0 | -2,907 | -2,907 |
| June | 30 | 0.0 | 117 | 80 | 80 | 40 | 0 | 80 | 40 | 0 | 80 | 37 | 0 | 80 | 37 | 0 | 80 | 37 | 0 | 80 | 40 | 0 | 77 | 40 | 0 | 77 | 40 | 0 | 77 | 40 | 0 | 79 | 40 | 0 | **0** | 0 | 0 | 0 | -2,813 | -2,813 |
| July | 31 | 0.0 | 107 | 109 | 109 | 16 | 0 | 109 | 16 | 0 | 109 | -2 | 0 | 109 | -2 | 0 | 109 | -2 | 0 | 108 | 16 | 0 | 91 | 17 | 0 | 91 | 17 | 0 | 91 | 17 | 0 | 94 | 17 | 0 | **0** | 0 | 0 | 0 | -2,907 | -2,907 |
| August | 31 | 0.0 | 120 | 109 | 107 | 20 | 0 | 109 | 20 | 0 | 109 | 11 | 0 | 109 | 11 | 0 | 109 | 11 | 0 | 103 | 20 | 0 | 94 | 26 | 0 | 94 | 26 | 0 | 94 | 26 | 0 | 95 | 24 | 0 | **0** | 0 | 0 | 0 | -2,907 | -2,907 |
| September | 30 | 0.0 | 140 | 76 | 76 | 49 | 0 | 76 | 49 | 0 | 76 | 64 | 0 | 76 | 64 | 0 | 76 | 64 | 0 | 76 | 52 | 0 | 73 | 66 | 0 | 73 | 66 | 0 | 73 | 66 | 0 | 73 | 65 | 0 | **0** | 0 | 0 | 0 | -2,813 | -2,813 |
| October | 31 | 0.0 | 143 | 46 | 46 | 83 | 0 | 46 | 82 | 0 | 46 | 97 | 0 | 46 | 97 | 0 | 46 | 97 | 0 | 46 | 85 | 0 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 96 | 0 | 46 | 95 | 0 | **0** | 0 | 0 | 0 | -2,907 | -2,907 |
| November | 30 | 0.0 | 161 | 21 | 21 | 139 | 0 | 21 | 138 | 0 | 21 | 140 | 0 | 21 | 140 | 0 | 21 | 140 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | 21 | 139 | 0 | **0** | 0 | 0 | 0 | -2,813 | -2,813 |
| December | 31 | 0.0 | 157 | 7 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 150 | 0 | 7 | 150 | 0 | 7 | 150 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | 7 | 136 | 0 | **0** | 0 | 0 | 0 | -2,907 | -2,907 |
| ***Total*** | | | ***1,555.00*** | ***528.00*** | ***526.00*** | ***1,024.00*** | ***-*** | ***528.00*** | ***1,020.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***-*** | ***528.00*** | ***1,025.00*** | ***-*** | ***521.00*** | ***1,030.00*** | ***-*** | ***489.00*** | ***1,063.00*** | ***-*** | ***489.00*** | ***1,063.00*** | ***-*** | ***489.00*** | ***1,063.00*** | ***-*** | ***495.00*** | ***1,059.00*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***QA/QC (should be 0)*** | | | | ***0 mm*** | ***0 mm*** | | | ***0 mm*** | ***0 mm*** | | 0 | | | 0 | | | 0 | | | ***0 mm*** | ***0 mm*** | | ***#N/A*** | ***#N/A*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | ***0 mm*** | ***0 mm*** | | | | | | | |
| ***Actual evapotranspira*** | | | | | 526 | | | 528 | | | 528 | | | 528 | | | 528 | | | 521 | | | 489 | | | 489 | | | 489 | | | 495 | | | | | | | | |
| ***Infiltration (m³)*** | | | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | | | | | | |
| ***Infiltration (mm)*** | | | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | *0* | | | | | | | | |

**Table A-7: Expected Changes in Average Monthly Flow at Assessment Nodes under Project Conditions ($m^3$/day)**

**Base Case**

| Month | Flow at Assessment Node ($m^3$) | | | | |
|---|---|---|---|---|---|
| | Shoal Cove Pond | Shoal Cove Brook | Hares Ears Pond | East Branch Salt Cove Brook | Salt Cove Brook |
| January | 18,898 | 20,333 | 2,930 | 63,076 | 114,418 |
| February | 17,641 | 18,982 | 2,735 | 58,934 | 107,021 |
| March | 21,644 | 23,289 | 3,356 | 72,251 | 131,079 |
| April | 26,131 | 28,119 | 4,047 | 87,504 | 159,348 |
| May | 15,680 | 16,873 | 2,429 | 52,465 | 95,450 |
| June | 11,956 | 12,864 | 1,855 | 39,874 | 72,262 |
| July | 9,130 | 9,823 | 1,417 | 30,401 | 54,986 |
| August | 7,782 | 8,374 | 1,207 | 25,986 | 47,162 |
| September | 13,236 | 14,241 | 2,054 | 44,060 | 79,669 |
| October | 17,525 | 18,856 | 2,719 | 58,441 | 105,895 |
| November | 19,888 | 21,400 | 3,083 | 66,467 | 120,758 |
| December | 20,228 | 21,766 | 3,135 | 67,608 | 122,839 |
| Annual | 16,585 | 17,846 | 2,571 | 55,396 | 100,551 |

**Operations Case**

| Month | Flow at Assessment Node ($m^3$) | | | | |
|---|---|---|---|---|---|
| | Shoal Cove Pond | Shoal Cove Brook | Hares Ears Pond | East Branch Salt Cove Brook | Salt Cove Brook |
| January | 19,622 | 21,052 | 3,638 | 63,605 | 114,802 |
| February | 18,356 | 19,690 | 3,436 | 59,457 | 107,398 |
| March | 22,400 | 24,038 | 4,095 | 72,796 | 131,479 |
| April | 26,944 | 28,927 | 4,841 | 88,081 | 159,779 |
| May | 16,343 | 17,529 | 3,081 | 52,962 | 95,801 |
| June | 12,565 | 13,467 | 2,454 | 40,343 | 72,585 |
| July | 9,699 | 10,386 | 1,978 | 30,850 | 55,290 |
| August | 8,372 | 8,957 | 1,785 | 26,449 | 47,480 |
| September | 13,923 | 14,922 | 2,716 | 44,581 | 80,045 |
| October | 18,254 | 19,579 | 3,422 | 58,981 | 106,289 |
| November | 20,678 | 22,184 | 3,855 | 67,030 | 121,175 |
| December | 21,004 | 22,535 | 3,894 | 68,163 | 123,248 |
| Annual | 17,287 | 18,541 | 3,256 | 55,915 | 100,924 |

**Closure Case**

| Month | Flow at Assessment Node ($m^3$) | | | | |
|---|---|---|---|---|---|
| | Shoal Cove Pond | Shoal Cove Brook | Hares Ears Pond | East Branch Salt Cove Brook | Salt Cove Brook |
| January | 18,979 | 20,409 | 2,972 | 62,940 | 114,136 |
| February | 17,716 | 19,051 | 2,773 | 58,794 | 106,735 |
| March | 21,728 | 23,367 | 3,404 | 72,105 | 130,787 |
| April | 26,230 | 28,212 | 4,108 | 87,348 | 159,046 |
| May | 15,731 | 16,918 | 2,457 | 52,338 | 95,177 |
| June | 11,987 | 12,889 | 1,870 | 39,759 | 72,001 |
| July | 9,146 | 9,833 | 1,425 | 30,297 | 54,737 |
| August | 7,809 | 8,395 | 1,220 | 25,885 | 46,916 |
| September | 13,316 | 14,314 | 2,096 | 43,962 | 79,426 |
| October | 17,616 | 18,941 | 2,767 | 58,326 | 105,634 |
| November | 19,987 | 21,493 | 3,138 | 66,313 | 120,458 |
| December | 20,323 | 21,855 | 3,187 | 67,456 | 122,541 |
| Annual | 16,655 | 17,909 | 2,609 | 55,267 | 100,276 |

**Far Future Case**

| Month | Flow at Assessment Node ($m^3$) | | | | |
|---|---|---|---|---|---|
| | Shoal Cove Pond | Shoal Cove Brook | Hares Ears Pond | East Branch Salt Cove Brook | Salt Cove Brook |
| January | 18,960 | 20,390 | 3,335 | 63,307 | 114,515 |
| February | 17,700 | 19,035 | 3,143 | 59,171 | 107,122 |
| March | 21,708 | 23,347 | 3,732 | 72,438 | 131,131 |
| April | 26,203 | 28,186 | 4,405 | 87,650 | 159,359 |
| May | 15,721 | 16,907 | 2,676 | 52,563 | 95,413 |
| June | 11,982 | 12,885 | 2,010 | 39,904 | 72,157 |
| July | 9,143 | 9,830 | 1,462 | 30,340 | 54,790 |
| August | 7,797 | 8,383 | 1,285 | 25,955 | 46,996 |
| September | 13,274 | 14,272 | 2,285 | 44,156 | 79,630 |
| October | 17,577 | 18,902 | 3,038 | 58,603 | 105,921 |
| November | 19,963 | 21,469 | 3,543 | 66,724 | 120,880 |
| December | 20,301 | 21,833 | 3,607 | 67,882 | 122,977 |
| Annual | 16,635 | 17,889 | 2,866 | 55,531 | 100,550 |

# Appendix 6.5-2: Surface Water Quality – Existing Conditions and Assessment

# SURFACE WATER QUALITY EXISTING CONDITIONS: SOUTH RIDGE PROJECT

PREPARED FOR:
CANADA FLUORSPAR INC.

CFI-25-01-02

29 April 2026

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## Appendices

Appendix A. Surface Water Quality Existing Conditions Temporal Plots and Summaries

# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| **$CaCO_3$** | calcium carbonate |
| **CCME** | Canadian Council of Ministers of the Environment |
| **CFI** | Canada Fluorspar Inc. |
| **COA** | Certificate of Approval |
| **DL** | detection limit |
| **DO** | dissolved oxygen |
| **DOC** | dissolved organic carbon |
| **ECCC** | Environment and Climate Change Canada |
| **ETMF** | exposure and toxicity modifying factor |
| **Falkirk** | Falkirk Environmental Consultants Ltd. |
| **FEQG** | Federal Environmental Quality Guideline |
| **TDS** | total dissolved solids |

# 1 INTRODUCTION

Falkirk Environmental Consultants Ltd. (Falkirk) was retained by Canada Fluorspar Inc. (CFI) to complete a surface water quality baseline assessment for the proposed South Ridge Project (the Project) on the Burin Peninsula of the Island of Newfoundland. The South Ridge Project is a brownfield development, representing an expansion of an existing active mining operation at AGS Mine, located approximately 4 km southwest of the Town of St. Lawrence on the southern tip of the Burin Peninsula (Figure 1-1).

This report has been prepared in support of the Project's Environmental Assessment Registration and provides a summary of existing surface water quality conditions and informs the technical basis for evaluating potential project-related changes to surface water quality in the study area.

CFI
CANADA FLUORSPAR INC.

# SOUTH RIDGE MINE

## FIGURE 1-1
## SURFACE WATER QUALITY MONITORING LOCATIONS

APRIL, 2026

- Monitoring Locations
- Proposed New Road
- Existing Road Upgrades
- Proposed Surface Drainage Ditch
- Proposed Sedimentation Pond

Scale: 1:12,451
when printed on 11 by 17 inch paper

FALKIRK

This map and associated spatial data were prepared by Falkirk Environmental Consultant Ltd. for the exclusive use of the client and are not intended for distribution or use by any third party without the express written consent of Falkirk Environmental Consultant Ltd. Data featured in this map has been derived from a variety of digital sources and, as such, FEC does not warrant the accuracy, completeness, or reliability of this map or its data for any other purpose. Spatial Reference: Name: NAD83(CSRS)v2 UTM Zone 21N File: EA_Figures_20260428.aprx, Published to pdf on 2026-04-29 2:00 PM by PaulCampbell

# 2 METHODS

## 2.1 SURFACE WATER QUALITY MONITORING

Existing surface water quality in the Project area was characterized using monitoring data collected from 2015 to 2025 at select monitoring locations required by CFI's Certificate of Approval (COA) No. AA22-085691, issued August 17, 2022 (Table 2-1; Figure 1-1).

At each surface water monitoring location, available data were grouped by season, and descriptive statistics were calculated (i.e., minimum, 5$^{th}$ percentile, median, mean, 95$^{th}$ percentile, maximum, standard deviation, sample count, and count of non-detectable values) for each season as well as the full dataset. Concentrations measured below the detection limit (DL) were replaced with the DL value for the calculation of summary statistics.

Surface water quality samples were compared to the following aquatic life water quality guidelines:

- Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines (FEQGs; ECCC 2024).
- Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG.

Additionally, surface water quality samples were also compared to effluent discharge criteria for context:

- Newfoundland and Labrador (NL) Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003).
- CFI COA No. AA22-085691 - Effluent Discharge Criteria (NL 2022).

For guidelines that consider exposure and toxicity modifying factors (ETMFs), guideline values were calculated for each individual sample using sample-specific ETFM values, including dissolved organic carbon (DOC), hardness, pH, and/or temperature, as applicable.

Time series plots of surface water quality concentrations at each monitoring location were visually reviewed to identify seasonal, spatial, and temporal patterns. A summary of results for key parameters is provided in Section 3 and detailed results are provided in Appendix A.

**Table 2-1: Existing Surface Water Quality Sampling Location Descriptions and Sampling Requirements**

| Station Name | Location Description | EDMS Location Code | UTM Zone 21T | | Years of Data Available |
|---|---|---|---|---|---|
| | | | Easting | Northing | |
| WS-2 | Clarke's Pond Outlet, upstream of Port Access Road | 00741 | 621983 | 5195673 | 2020 to 2025 |
| WQ-STA-28 | Clarke's Pond Outlet, downstream of Port Access Road | 00739 | 622123 | 5195480 | 2020 to 2025 |
| WS-5 | Shoal Cove Pond Outlet, downstream of Port Access Road | 00740 | 622010 | 5194073 | 2020 to 2025 |
| WS-10 | Salt Cove Brook - Farfield | 00405 | 620347 | 5193512 | 2015 to 2025 |
| WQ-STA-26 | Hay Pook Pond Outlet #1, downstream of Port Access Road | 00737 | 620701 | 5195131 | 2020 to 2025 |
| WQ-STA-27 | Hay Pook Pond Outlet #2, downstream of Port Access Road | 00738 | 621000 | 5195187 | 2020 to 2025 |
| Sampling Parameters | **General Parameters**: temperature, dissolved oxygen, nitrate + nitrite, nitrate, nitrite, pH, TSS, colour, sodium, potassium, calcium, sulphide, magnesium, ammonia, alkalinity, sulphate, chloride, turbidity, reactive silica, orthophosphate, phosphorous, dissolved organic carbon, conductance, TDS (calculated), phenols, carbonate ($CaCO_3$), hardness ($CaCO_3$), bicarbonate ($CaCO_3$)<br><br>**Metals**: aluminium, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, mercury, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, zinc | | | | |
| Sampling Frequency | Four times per year, not less than 30 days apart | | | | |

*EDMS = Environmental Data Management System; TDS = total dissolved solids.*

## 2.2 Background Runoff Quality

In addition to routine surface water quality monitoring, additional sampling at four runoff locations occurred in January and March 2026 (Table 2-2; Figure 1-1). Runoff sample results were compared to guidelines for the protection of aquatic life and effluent discharge criteria as described in Section 2.1.

**Table 2-2: Runoff Sampling Locations**

| Station Name | Location Description | UTM Zone 21T | | Sample Dates |
|---|---|---|---|---|
| | | Easting | Northing | |
| BGR-1 | Background runoff station 1, west of Shoal Cove Pond | 621917 | 5194775 | Jan 13, 2026<br>Jan 20, 2026 (organics only)<br>March 10, 2026 |
| BGR-2 | Background runoff station 2, in unnamed watershed north of Shoal Cove | 621610 | 5193640 | |
| BGR-3 | Background runoff station 3, west of Hare Ears Pond | 620801 | 5194510 | |
| BGR-4 | Background runoff station 4, northwest of Hare Ears Pond | 620952 | 5194583 | |

# 3 RESULTS

## 3.1 SURFACE WATER QUALITY MONITORING

Key surface water quality results for samples collected from 2015 to 2025 are summarized below and detailed results tables and plots are provided in Appendix A.1 and Appendix A.2, respectively.

### 3.1.1 Clarke's Pond Outlet (WS-2 and WQ-STA-28)

From 2020 to 2025, surface water at Clarke's Pond Outlet upstream (WS-2) and downstream (WQ-STA-28) of Port Access Road was generally characterized as soft to moderately soft (hardness range of 37 to 69 mg/L), well oxygenated (median dissolved oxygen [DO] of 10.5 and 10.0 mg/L, respectively), with low total dissolved solids (TDS; median of 70 mg/L), low total suspended solids (median of <5 mg/L), and moderate organic carbon content (range of 3.8 to 15 mg/L; Appendix A.1, Tables A.1-1 and A.1-2).

Field pH at WS-2 and WQ-STA-28 (median 7.1) indicates slightly alkaline conditions, and total alkalinity (median 38 mg/L) suggests low acid sensitivity.

Total metals concentrations were measured below the DL in all or nearly all (>80%) samples for total antimony, arsenic, beryllium, bismuth, cadmium, chromium, cobalt, mercury, molybdenum, nickel, selenium, silver, thallium, tin, and vanadium from 2020 to 2025 at WS-2 and WQ-STA-27. However, some laboratory DLs were greater than or equal to the aquatic life water quality guidelines (i.e., phenols, cadmium, cobalt, copper, mercury, selenium, and silver), meaning that DLs were too high to determine whether concentrations met or exceeded water quality guidelines (Appendix A.1, Tables A.1-1 and A.1-2).

At WS-2, all concentrations were below effluent discharge criteria, and most parameter concentrations were below the aquatic life guidelines, or within the guideline range for pH except for the following parameters (Table 3-1):

**Short-term acute:**

- Total zinc in winter

**Long-term chronic:**

- Lab pH, phenols, and total aluminum, lead, and zinc in winter
- Nitrite in fall
- Total cobalt in fall
- Toal copper in winter, summer, and fall

**Table 3-1: Summary of Guideline Exceedances at WS-2, 2020 to 2025**

| Parameter | Units | Results Above Guideline at WS-2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full Dataset n = 21 | | Winter (Nov-Mar) n = 8 | | Spring (Apr-May) n = 2 | | Summer (Jun-Aug) n = 6 | | Fall (Sep-Oct) n = 5 | |
| | | SA | LC | SA | LC | SA | LC | SA | LC | SA | LC |
| Lab pH | - | - | 5% | - | 13% | - | - | - | - | - | - |
| Nitrite, as N | mg-N/L | - | 5% | - | - | - | - | - | - | - | 20% |
| Phenols | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Aluminum | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Cobalt | mg/L | - | 5% | - | - | - | - | - | - | - | 20% |
| Total Copper | mg/L | - | 38% | - | 50% | - | - | - | 33% | - | 40% |
| Total Lead | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Zinc | mg/L | 5% | 5% | 13% | 13% | - | - | - | - | - | - |

*SA = exceeds the short-term acute water quality guideline; LC = exceeds the long-term chronic water quality guideline; n = sample count; as N = as nitrogen; - = not applicable or no exceedance.*

From 2020 to 2025, all concentrations were below effluent discharge criteria at WQ-STA-28 and most parameter concentrations were below the aquatic life guidelines, or within the guideline range for pH except for the following parameters (Table 3-2):

**Long-term chronic:**

- Lab pH in winter and summer
- Phenols and total aluminum, lead, and zinc in winter
- Total cobalt in fall
- Total copper in winter, summer, and fall

**Table 3-2: Summary of Guideline Exceedances at WQ-STA-28, 2020 to 2025**

| Parameter | Units | Results Above Guideline at WQ-STA-28 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full Dataset n = 21 | | Winter (Nov-Mar) n = 8 | | Spring (Apr-May) n = 2 | | Summer (Jun-Aug) n = 6 | | Fall (Sep-Oct) n = 5 | |
| | | SA | LC | SA | LC | SA | LC | SA | LC | SA | LC |
| Lab pH | - | - | 10% | - | 13% | - | - | - | 17% | - | - |
| Phenols | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Aluminum | mg/L | - | 10% | - | 25% | - | - | - | - | - | - |
| Total Cobalt | mg/L | - | 5% | - | - | - | - | - | - | - | 20% |
| Total Copper | mg/L | - | 29% | - | 25% | - | - | - | 33% | - | 40% |

| Parameter | Units | Results Above Guideline at WQ-STA-28 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full Dataset n = 21 | | Winter (Nov-Mar) n = 8 | | Spring (Apr-May) n = 2 | | Summer (Jun-Aug) n = 6 | | Fall (Sep-Oct) n = 5 | |
| | | SA | LC | SA | LC | SA | LC | SA | LC | SA | LC |
| Total Lead | mg/L | - | 10% | - | 25% | - | - | - | - | - | - |
| Total Zinc | mg/L | - | 10% | - | 25% | - | - | - | - | - | - |

*SA = exceeds the short-term acute water quality guideline; LC = exceeds the long-term chronic water quality guideline; n = sample count; - = not applicable or no exceedance.*

### 3.1.2 Shoal Cove Pond Outlet (WS-5)

From 2020 to 2025, surface water at Shoal Cove Pond Outlet (WS-5) was generally characterized as soft (median hardness of 33 mg/L), well oxygenated (median DO of 10.6 mg/L), with low TDS (median of 62 mg/L), low total suspended solids (median of <5 mg/L), and moderate organic carbon content (median of 7.8 mg/L; Appendix A.1, Table A.1-3).

Field pH at WS-5 (median 7.2) indicates slightly alkaline conditions, and total alkalinity (median 23 mg/L) suggests low acid sensitivity.

Total metals concentrations were measured below the DL in all or nearly all (>80%) samples for total antimony, arsenic, beryllium, bismuth, cadmium, chromium, cobalt, mercury, molybdenum, nickel, selenium, silver, thallium, tin, and vanadium from 2020 to 2025 at WS-5. However, some laboratory DLs were greater than or equal to the aquatic life water quality guidelines (i.e., phenols, cadmium, cobalt, lead, mercury, selenium, and silver), meaning that DLs were too high to determine whether concentrations met or exceeded water quality guidelines (Appendix A.1, Table A.1-3).

At WS-5, all concentrations were below effluent discharge criteria, and most parameter concentrations were below the aquatic life guidelines, or within the guideline range for pH, except for the following parameters (Table 3-3):

**Short-term acute:**

- Total zinc in winter

**Long-term chronic:**

- Lab pH in all seasons
- Phenols and total aluminum, cadmium, iron, lead, manganese, and silver in winter
- Total zinc in winter, spring, and summer
- Total cobalt in winter and fall
- Total copper in winter and summer

**Table 3-3: Summary of Guideline Exceedances at WS-5, 2020 to 2025**

| Parameter | Units | Results Above Guideline at WS-5 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full Dataset n = 21 | | Winter (Nov-Mar) n = 8 | | Spring (Apr-May) n = 2 | | Summer (Jun-Aug) n = 6 | | Fall (Sep-Oct) n = 5 | |
| | | SA | LC | SA | LC | SA | LC | SA | LC | SA | LC |
| Lab pH | - | - | 19% | - | 13% | - | 50% | - | 17% | - | 20% |
| Phenols | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Aluminum | mg/L | - | 10% | - | 25% | - | - | - | - | - | - |
| Total Cadmium | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Cobalt | mg/L | - | 10% | - | 13% | - | - | - | - | - | 20% |
| Total Copper | mg/L | - | 38% | - | 75% | - | - | - | 33% | - | - |
| Total Iron | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Lead | mg/L | - | 10% | - | 25% | - | - | - | - | - | - |
| Total Manganese | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Silver | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Zinc | mg/L | 5% | 14% | 13% | 13% | - | 50% | - | 17% | - | - |

*SA = exceeds the short-term acute water quality guideline; LC = exceeds the long-term chronic water quality guideline; n = sample count; - = not applicable or no exceedance.*

### 3.1.3 Salt Cove Brook (WS-10)

From 2015 to 2025, surface water at Salt Cove Brook (WS-10) was generally characterized as soft (median hardness of 17 mg/L), well oxygenated (median DO of 12.6 mg/L), with low TDS (median of 39 mg/L), low total suspended solids (median of <5 mg/L), and moderate organic carbon content (median of 6.6 mg/L; Appendix A.1, Table A.1-4).

Field pH at WS-10 (median 7.2) indicates slightly alkaline conditions, and total alkalinity (median 13 mg/L) suggests moderate acid sensitivity.

Total metals concentrations were measured below the DL in all or nearly all (>80%) samples for total antimony, arsenic, beryllium, bismuth, cadmium, chromium, cobalt, mercury, nickel, selenium, silver, thallium, tin, and vanadium from 2015 to 2025 at WS-10. However, some laboratory DLs were greater than or equal to the NL ECWSR effluent discharge criteria (i.e., sulphide) or aquatic life water quality guidelines (i.e., phenols, cadmium, cobalt, copper, mercury, selenium, silver, and zinc), meaning that DLs were too high to determine whether concentrations met or exceeded water quality guidelines (Appendix A.1, Table A.1-4).

At WS-10, all detectable concentrations were below effluent discharge criteria, and most parameter concentrations measured at WS-10 were below the relevant guidelines, or within the guideline range for pH, except for the following parameters (Table 3-4):

**Short-term acute:**

- Total zinc in winter

**Long-term chronic:**

- Field pH in winter, summer, and fall
- Lab pH and total aluminum, iron, and lead in all seasons
- Fluoride, nitrite, and total molybdenum in summer
- Total cadmium and zinc in winter and summer
- Total lead and selenium in winter
- Total cobalt in summer and fall

**Table 3-4: Summary of Guideline Exceedances at WS-10, 2015 to 2025**

| Parameter | Units | Results Above Guideline at WS-10 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full Dataset n = 36 | | Winter (Nov-Mar) n = 15 | | Spring (Apr-May) n = 2 | | Summer (Jun-Aug) n = 11 | | Fall (Sep-Oct) n = 8 | |
| | | SA | LC | SA | LC | SA | LC | SA | LC | SA | LC |
| Field pH | - | - | 11% | - | 13% | - | - | - | 10% | - | 11% |
| Lab pH | - | - | 19% | - | 20% | - | 50% | - | 18% | - | 13% |
| Fluoride[(a)] | mg/L | - | 50% | - | - | - | - | - | 50% | - | - |
| Nitrite, as N | mg-N/L | - | 3% | - | - | - | - | - | 9% | - | - |
| Total Aluminum | mg/L | - | 28% | - | 27% | - | 50% | - | 36% | - | 13% |
| Total Cadmium | mg/L | - | 6% | - | 7% | - | - | - | 9% | - | - |
| Total Cobalt | mg/L | - | 6% | - | - | - | - | - | 9% | - | 13% |
| Total Copper | mg/L | - | 33% | - | 47% | - | - | - | 27% | - | 25% |
| Total Iron | mg/L | - | 50% | - | 33% | - | 50% | - | 55% | - | 75% |
| Total Lead | mg/L | - | 6% | - | 13% | - | - | - | - | - | - |
| Total Molybdenum | mg/L | - | 3% | - | - | - | - | - | 9% | - | - |
| Total Selenium | mg/L | - | 3% | - | 7% | - | - | - | - | - | - |
| Total Zinc | mg/L | 8% | 19% | 20% | 33% | - | - | - | 18% | - | - |

*(a) Sample count for fluoride is n = 2, collected in summer 2016 (Appendix A.1, Table A.1-4).*
*SA = exceeds the short-term acute water quality guideline; LC = exceeds the long-term chronic water quality guideline; n = sample count; as N = as nitrogen; - = not applicable or no exceedance.*

### 3.1.4 Hay Pook Pond Outlet #1 (WQ-STA-26)

From 2020 to 2025, surface water at Hay Pook Pond Outlet #1 (WQ-STA-26) was generally characterized as soft to moderately soft (hardness range of 38 to 92 mg/L), well oxygenated (median DO of 10.1 mg/L), with low to moderate TDS (range of 63 to 126 mg/L), low total suspended solids (all samples <5 mg/L), and low to moderate organic carbon content (range of 2.9 to 10 mg/L; Appendix A.1, Table A.1-5).

Field pH at WQ-STA-26 (median 7.3) indicates slightly alkaline conditions, and total alkalinity (median 50 mg/L) suggests low acid sensitivity.

Total metals concentrations were measured below the DL in all or nearly all (>80%) samples for total antimony, arsenic, beryllium, bismuth, cadmium, chromium, cobalt, mercury, molybdenum, nickel, selenium, silver, thallium, tin, titanium, and vanadium from 2020 to 2025 at WQ-STA-26. However, some laboratory DLs were greater than or equal to the aquatic life water quality guidelines (i.e., phenols, cadmium, cobalt, copper, mercury, selenium, and silver), meaning that DLs were too high to determine whether concentrations met or exceeded water quality guidelines (Appendix A.1, Table A.1-5).

At WQ-STA-26, all concentrations were below effluent discharge criteria, and most parameter concentrations were below the aquatic life guidelines, or within the guideline range for pH, except for the following parameters (Table 3-5):

**Short-term acute:**

- Total cadmium in winter

**Long-term chronic:**

- Total aluminum and cadmium in winter
- Total cobalt in fall
- Total copper, iron, lead, and manganese in all seasons
- Total lead in winter and spring
- Total zinc in winter and summer

**Table 3-5: Summary of Guideline Exceedances at WQ-STA-26, 2020 to 2025**

| Parameter | Units | Results Above Guideline at WQ-STA-26 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full Dataset n = 21 | | Winter (Nov-Mar) n = 8 | | Spring (Apr-May) n = 2 | | Summer (Jun-Aug) n = 6 | | Fall (Sep-Oct) n = 5 | |
| | | SA | LC | SA | LC | SA | LC | SA | LC | SA | LC |
| Total Aluminum | mg/L | - | 10% | - | 25% | - | - | - | - | - | - |
| Total Cadmium | mg/L | 5% | 5% | 13% | 13% | - | - | - | - | - | - |
| Total Cobalt | mg/L | - | 5% | - | - | - | - | - | - | - | 20% |
| Total Copper | mg/L | - | 38% | - | 38% | - | 50% | - | 33% | - | 40% |
| Total Iron | mg/L | - | 52% | - | 63% | - | 50% | - | 50% | - | 40% |
| Total Lead | mg/L | - | 14% | - | 25% | - | 50% | - | - | - | - |
| Total Manganese | mg/L | - | 76% | - | 63% | - | 50% | - | 83% | - | 100% |
| Total Zinc | mg/L | - | 14% | - | 25% | - | - | - | 17% | - | - |

*SA = exceeds the short-term acute water quality guideline; LC = exceeds the long-term chronic water quality guideline; n = sample count; - = no exceedance.*

### 3.1.5 Hay Pook Pond Outlet #2 (WQ-STA-27)

From 2020 to 2025, surface water at Hay Pook Pond Outlet #2 (WQ-STA-27) was generally characterized as soft (median hardness of 7.0 mg/L), well oxygenated (median DO of 12.0 mg/L), with low TDS (median of 19 mg/L), low total suspended solids (median of <5 mg/L), and moderate organic carbon content (range of 2.3 to 18 mg/L; Appendix A.1, Table A.1-6).

Field pH at WQ-STA-27 (median of 7.4) indicates slightly alkaline conditions, but low alkalinity (median <5 mg/L) suggests limited acid neutralizing capacity and high acid sensitivity.

Laboratory measured pH was notably lower than field measured pH for all samples collected at WQ-STA-27 from 2020 to 2025. All field measured pH values were within the long-term chronic guideline range and field measured pH values ranged from 6.7 to 8.2, whereas 81% of laboratory measured pH values were below the lower guideline range and range of 5.6 to 6.6 (Table 3-6). However, some laboratory DLs were greater than or equal to the aquatic life water quality guidelines (i.e., phenols, cadmium, cobalt, copper, mercury, selenium, silver, and zinc), meaning that DLs were too high to determine whether concentrations met or exceeded water quality guidelines (Appendix A.1, Table A.1-5).

Total metals concentrations were measured below the DL in all or nearly all (>80%) samples for total antimony, arsenic, beryllium, bismuth, cadmium, chromium, cobalt, copper, mercury, molybdenum, nickel, selenium, silver, thallium, tin, uranium, vanadium, and zinc from 2020 to 2025 at WQ-STA-27.

AT WS-STA-27, all concentrations were below effluent discharge criteria, and most parameter concentrations were below the aquatic life guidelines, or within the guideline range for pH, except for the following parameters (Table 3-6):

**Short-term acute:**

- Total cadmium in winter

**Long-term chronic:**

- Lab pH in all seasons
- Total aluminum, cadmium, and zinc in winter
- Total cobalt in fall
- Total iron in winter, summer, and fall

**Table 3-6: Summary of Guideline Exceedances at WQ-STA-27, 2020 to 2025**

| Parameter | Units | Results Above Guideline at WQ-STA-27 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full Dataset n = 21 | | Winter (Nov-Mar) n = 8 | | Spring (Apr-May) n = 2 | | Summer (Jun-Aug) n = 6 | | Fall (Sep-Oct) n = 5 | |
| | | SA | LC | SA | LC | SA | LC | SA | LC | SA | LC |
| Lab pH | - | - | 81% | - | 100% | - | 100% | - | 83% | - | 40% |
| Total Aluminum | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |
| Total Cadmium | mg/L | 5% | 5% | 13% | 13% | - | - | - | - | - | - |
| Total Cobalt | mg/L | - | 5% | - | - | - | - | - | - | - | 20% |
| Total Iron | mg/L | - | 57% | - | 50% | - | - | - | 67% | - | 80% |
| Total Zinc | mg/L | - | 5% | - | 13% | - | - | - | - | - | - |

*SA = exceeds the short-term acute water quality guideline; LC = exceeds the long-term chronic water quality guideline; n = sample count; - = not applicable or no exceedance.*

### 3.1.6 Spatial and Temporal Patterns

Conductivity and TDS, alkalinity, phosphorus, manganese, strontium, and uranium concentrations were typically highest at Hay Pook Pond Outlet #1 (WQ-STA-26) and lowest at Hay Pook Pond Outlet #2 (WQ-

STA-27; Figure 3-1). Total barium and lead concentrations were also generally lowest at WQ-STA-27 and highest, though similar, at WQ-STA-26 and Clarke's Pond Outlet stations (WS-2 and WQ-STA-28; Figure 3-2). In contrast, total iron concentrations were typically highest at WQ-STA-27 and Salt Cove Brook (WS-10) and lowest at WS-2 and WQ-STA-28 (Figure 3-3).

From 2015 to 2025, temporal patterns were not identified for most parameters; however, total phosphorus concentrations increased at all stations starting in December 2022 (maximum 2.1 mg/L at WQ-STA-26; Figure 3-4). An isolated increase in total cobalt concentrations was measured in one sampling event in September 2024 at all stations; concentrations from all other sampling events were at or below the DL (Figure 3-5).

No additional spatial and temporal patterns were identified for other parameters from 2015 to 2025 (Appendix A.2).

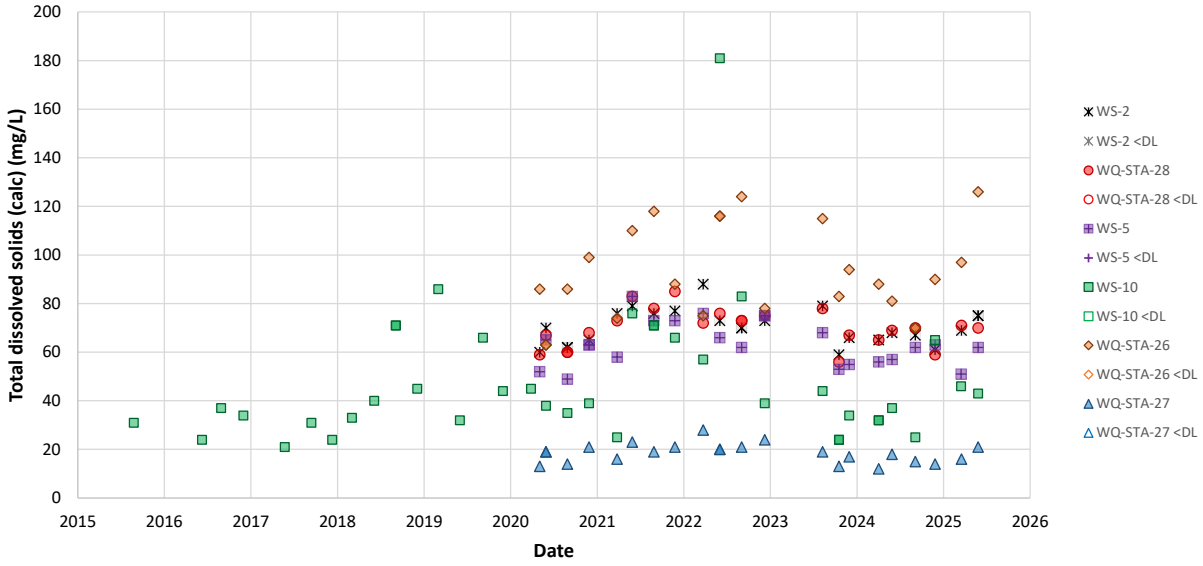



**Figure 3-1: Total Dissolved Solids at Surface Water Quality Monitoring Locations, 2015 to 2025**

*<DL = less than the detection limit.*

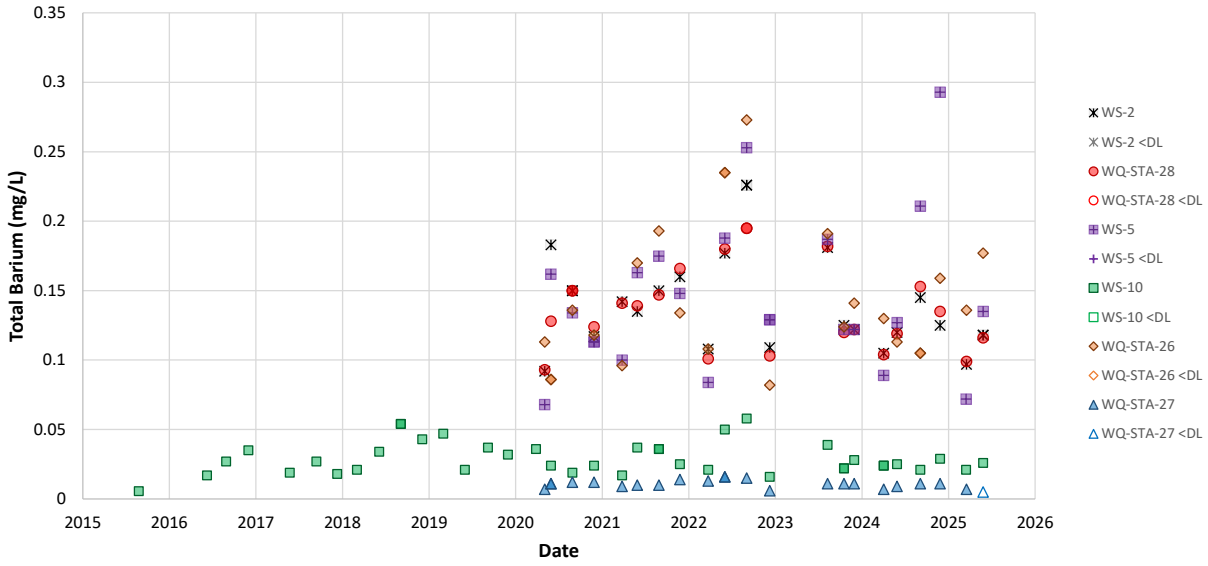



**Figure 3-2: Total Barium at Surface Water Quality Monitoring Locations, 2015 to 2025**

*<DL = less than the detection limit.*

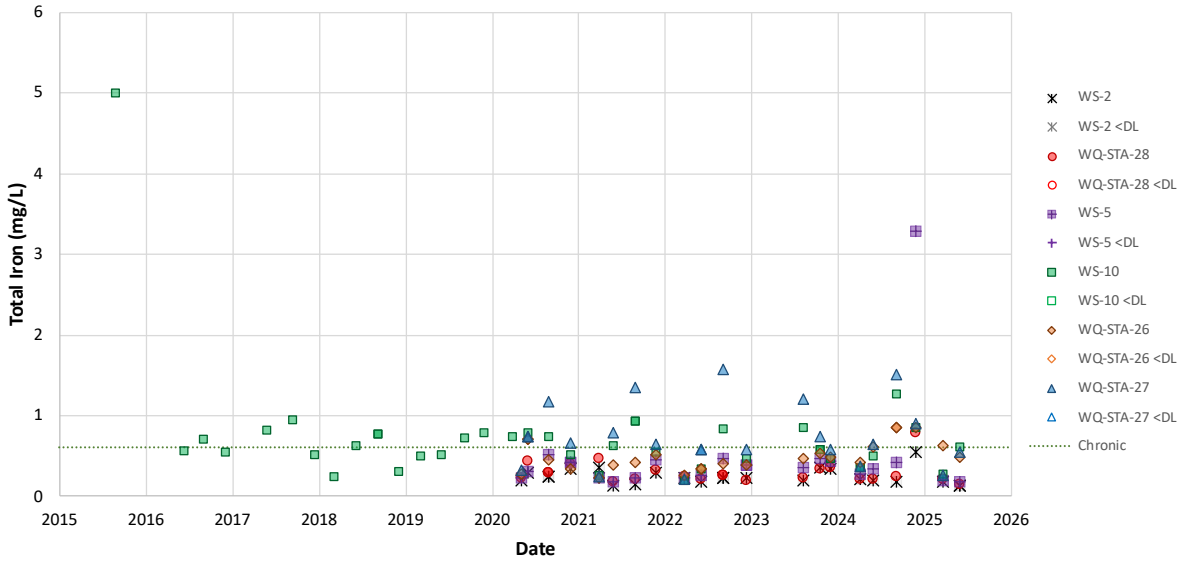



**Figure 3-3: Total Iron at Surface Water Quality Monitoring Locations, 2015 to 2025**

*Notes: Guidelines shown were calculated using median results for all samples (i.e., pH = 7.2, temperature = 11.3°C, hardness = 37 mg/L, and dissolved organic carbon = 7.2 mg/L), as applicable.*
*Chronic = long-term chronic guidelines for the protection of aquatic life; <DL = less than the detection limit.*

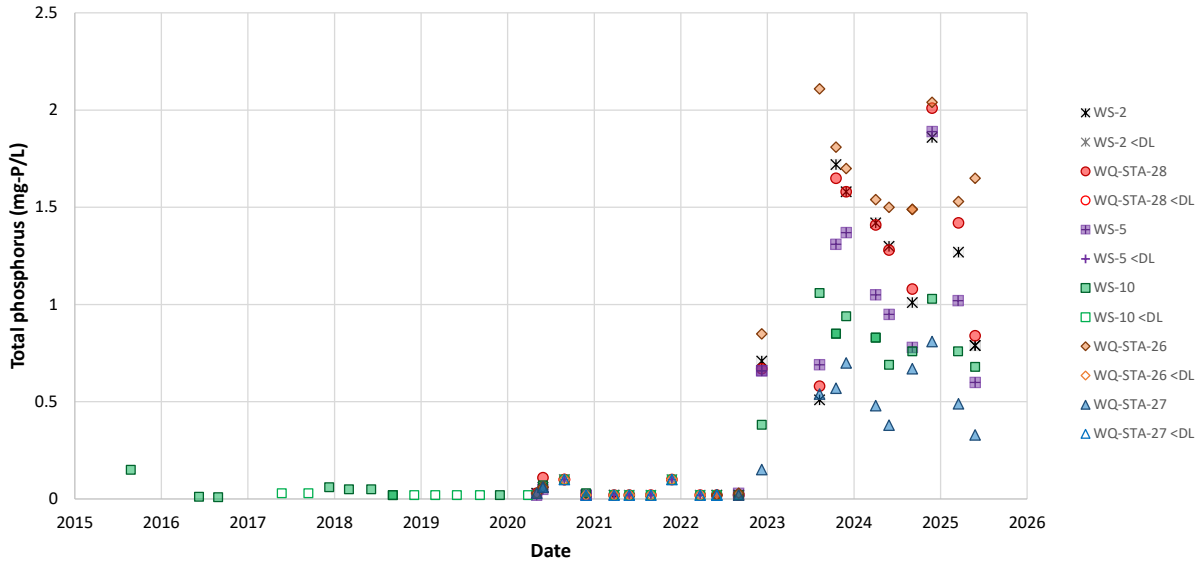



**Figure 3-4: Total Phosphorus at Surface Water Quality Monitoring Locations, 2015 to 2025**

*<DL = less than the detection limit.*

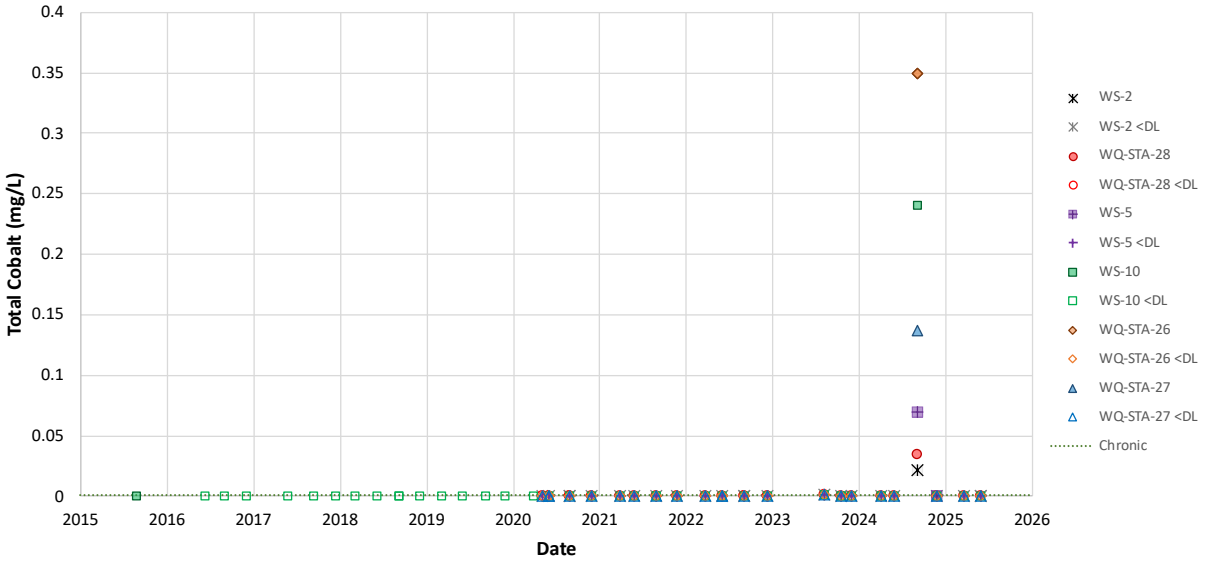



**Figure 3-5: Total Cobalt at Surface Water Quality Monitoring Locations, 2015 to 2025**

*Notes: Guidelines shown were calculated using median results for all samples (i.e., pH = 7.2, temperature = 11.3°C, hardness = 37 mg/L, and dissolved organic carbon = 7.2 mg/L), as applicable.*
*Chronic = long-term chronic guideline for the protection of aquatic life; <DL = less than the detection limit.*

## 3.2 BACKGROUND RUNOFF QUALITY

Key water quality results characterization for samples collected at background runoff monitoring locations in January and March 2026 are summarized below, and detailed results tables are provided in Appendix A.1. A summary of concentrations measured above guidelines at background runoff locations is provided in Table 3-7.

Runoff water quality at all locations was generally characterized as soft (hardness range of 12 to 46 mg/L), well oxygenated (DO range of 11 to 14 mg/L), with low TDS (range of 51 to 73 mg/L), low total suspended solids (<5 mg/L in all samples), and low to moderate DOC content (range of 4.1 to 6.1 mg/L; Appendix A.1, Table A.1-7).

Field pH at BGR-1 ranged from 8.0 to 8.5 and indicated slightly alkaline conditions, and total alkalinity (range of 21 to 30 mg/L) suggested low acid sensitivity.

Field pH at BGR-4 ranged from 6.1 to 8.8 and low alkalinity (range of 8 to 9 mg/L) suggests limited acid neutralizing capacity and high acid sensitivity (Appendix A.1, Table A.1-7). Laboratory measured pH (6.4) was notably lower than field measured pH of the sample collected at BGR-4 on January 13 (8.8). Field measured pH measured on March 10 (6.1) and both lab measured pH values measured on January 13, and March 10 (6.4) were below the long-term chronic guideline range at BGR-4.

Field and laboratory pH values were below the long-term chronic guideline range for samples collected at BGR-2 and BGR-3, except field pH values measured on January 13 at BGR-2 (7.2) and BGR-3 (7.9; Appendix A.1, Table A.1-7). Total alkalinity ranged from <5 to 9 mg/L at BGR-2 and BGR-3, suggesting limited acid neutralizing capacity and high sensitivity at these locations.

Fluoride concentrations were measured above the long-term chronic guideline, and the highest concentrations were measured at BGR-1 (Table 3-7).

Organics concentrations were measured below the DL in all runoff samples. Total metals concentrations were measured below the DL in all or most samples for antimony, arsenic, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, mercury, molybdenum, nickel, selenium, silver, thallium, tin, titanium uranium, and vanadium, at background runoff monitoring locations in January and March 2026. However, some laboratory DLs were greater than or equal to the water quality guidelines (i.e., cadmium, cobalt, copper, mercury, selenium, and silver), meaning that DLs were too high to determine whether concentrations met or exceeded water quality guidelines (Appendix A.1, Table A.1-7). Re-sampling using analytical methods with lower DLs would be required to determine whether or not sample concentrations exceeded guidelines.

Aluminum, cadmium, lead, manganese, and zinc concentrations were measured above the long-term chronic guideline in at least one background runoff sample (Table 3-7). All concentrations at background runoff locations were measured below the effluent discharge criteria.

**Table 3-7: Summary of Guideline Exceedances at Background Runoff Locations, January and March 2026**

| Parameter | Units | BGR-1 | | BGR-2 | | BGR-3 | | BGR-4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Jan 13 or 20 | Mar 20 | Jan 13 or 20 | Mar 20 | Jan 13 or 20 | Mar 20 | Jan 13 or 20 | Mar 20 |
| Field pH | - | - | - | 6.4 | 6.2 | 6.4 | 6.1 | - | 6.1 |
| Laboratory pH | - | - | - | 6.0 | 6.0 | 6.4 | 6.4 | 6.4 | 6.4 |
| Fluoride | mg/L | 2.08 | 2.06 | 0.73 | 0.88 | 0.79 | 1.0 | 0.76 | 1.05 |
| Total Aluminum | mg/L | - | - | 0.52 | 0.76 | - | 0.53 | - | 0.55 |
| Total Cadmium | mg/L | - | 0.00013 | - | - | - | - | - | - |
| Total Lead | mg/L | - | - | - | 0.039 | - | - | - | - |
| Total Manganese | mg/L | - | - | - | - | 0.59 | - | 0.53 | - |
| Dissolved Manganese | mg/L | - | - | - | - | 0.51 | - | 0.48 | - |
| Total Zinc | mg/L | 0.018 | 0.023 | - | - | 0.009 | - | 0.009 | - |
| Dissolved Zinc | mg/L | 0.014 | 0.016 | - | - | - | - | 0.016 | - |

*Notes:*
*- = not applicable or no exceedance.*

# 4 SUMMARY

Monitoring data collected from 2015 to 2025 was summarized to characterize existing surface water quality in the study area. Overall, surface waters were generally characterized as soft, well oxygenated, and low in total dissolved solids and suspended solids, with slightly alkaline pH and low to moderate alkalinity. These conditions indicate limited buffering capacity at some locations and elevated acid sensitivity, particularly where alkalinity was low.

At the surface water monitoring stations, all concentrations were measured below effluent discharge criteria, and concentrations of most parameters were below aquatic life guidelines or below the DLs. However, some laboratory DLs were too high to determine whether concentrations met or exceeded water quality guidelines. Re-sampling using analytical methods with lower DLs would be required to determine whether or not concentrations exceeded guidelines for some parameters (e.g., sulphide, phenols, cadmium, cobalt, copper, lead, mercury, selenium, silver, and zinc).

Exceedances of short-term aquatic life guidelines were measured for total zinc at Clarke's Pond Outlet (WS-2 and WQ-STA-28), Shoal Cove Pond Outlet (WS-5), and Salt Cove Brook (WS-10), and for total cadmium at Hay Pook Pond Outlets (WQ-STA-26 and WQ-STA-27). Exceedances of long-term chronic guidelines were observed for some parameters at one or more surface water monitoring location, including fluoride, nitrite, phenols, aluminum, cadmium, cobalt, copper, iron, lead, manganese, molybdenum, selenium, zinc, and pH.

Spatially, the highest TDS, alkalinity, phosphorus, manganese, strontium, and uranium concentrations were typically measured at Hay Pook Pond Outlet #1 (WQ-STA-26) and the lowest were measured at Hay Pook Pond Outlet #2 (WQ-STA-27). In contrast, total iron concentrations were typically higher at Salt Cove Brook (WS-10) and WQ-STA-27 relative to other stations.

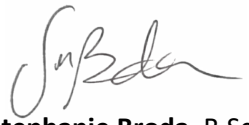
From 2015 to 2025, temporal trends were not identified for most parameters aside from an isolated increase in total phosphorus at all stations starting in December 2022 and elevated cobalt concentrations measured in September 2024.

Background runoff sampling was completed in January and March 2026, and results showed similar water quality characteristics to historical surface water monitoring locations, including soft water, low total dissolved solids, and low suspended solids. However, low alkalinity and pH values at several runoff locations indicate high acid sensitivity. Fluoride, aluminum, cadmium, lead, manganese, and zinc concentrations exceeded long-term chronic aquatic life guidelines in one or more background runoff sample.

# 5 CLOSURE

We trust this Report meets your present requirements. Please do not hesitate to contact the undersigned should you have any questions.

**Prepared by:**



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**Reviewed by:**

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ECCC (Environment and Climate Change Canada). 2024. Federal Environmental Quality Guidelines.

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NL. 2022. CFI Certificate of Approval No. AA22-085691 - Effluent Discharge Criteria.

# APPENDIX A. SURFACE WATER QUALITY EXISTING CONDITIONS TEMPORAL PLOTS AND SUMMARIES

# Appendix A.1 Existing Surface Water Quality Summary Tables

**Table A.1-1: Water Quality Summary for WS-2, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Full Dataset (2020 to 2025) | | | | | | | | | Results Above Guideline | | Winter (Nov-Mar) | | | | | | | | | Results Above Guideline | | Spring (Apr-May) | | | | | | | | | Results Above Guideline | | Summer (Jun-Aug) | | | | | | | | | Results Above Guideline | | Fall (Sep-Oct) | | | | | | | | | Results Above Guideline | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.5 | 6.5 | 7.1 | 7.2 | 7.9 | 8.0 | 0.42 | 22 | 0 | - | - | 6.5 | 6.6 | 7.0 | 7.1 | 7.7 | 7.9 | 0.44 | 8 | 0 | - | - | 7.2 | 7.2 | 7.5 | 7.5 | 7.7 | 7.7 | 0.35 | 2 | 0 | - | - | 6.5 | 6.6 | 7.2 | 7.2 | 7.9 | 8.0 | 0.53 | 6.0 | 0 | - | - | 6.8 | 6.8 | 7.1 | 7.2 | 7.6 | 7.7 | 0.34 | 6 | 0 | - | - |
| Field specific conductivity | µS/cm | - | - | - | - | 91 | 105 | 144 | 143 | 170 | 175 | 24 | 22 | 0 | - | - | 105 | 111 | 152 | 144 | 167 | 168 | 23 | 8 | 0 | - | - | 138 | 138 | 140 | 140 | 142 | 142 | 2.8 | 2 | 0 | - | - | 91 | 96 | 140 | 136 | 169 | 171 | 34 | 6.0 | 0 | - | - | 125 | 126 | 150 | 148 | 171 | 175 | 20 | 6 | 0 | - | - |
| Temperature | C | - | - | - | - | 2.4 | 2.5 | 11 | 12 | 20 | 21 | 6.7 | 22 | 0 | - | - | 2.4 | 2.4 | 4.7 | 5.3 | 9.1 | 9.7 | 2.8 | 8 | 0 | - | - | 3.7 | 4.0 | 6.4 | 6.4 | 8.8 | 9.1 | 3.8 | 2 | 0 | - | - | 12 | 12 | 17 | 17 | 21 | 21 | 3.5 | 6.0 | 0 | - | - | 9.6 | 12 | 19 | 18 | 20 | 21 | 4.0 | 6 | 0 | - | - |
| Field dissolved oxygen | mg/L | - | - | - | - | 0.7 | 5.2 | 11 | 10 | 16 | 18 | 4.2 | 17 | 0 | - | - | 0.7 | 2.6 | 13 | 12 | 18 | 18 | 6.2 | 6 | 0 | - | - | 12 | 12 | 12 | 12 | 12 | 12 | - | 1 | 0 | - | - | 6.9 | 7.0 | 7.9 | 9.7 | 13 | 14 | 3.3 | 5.0 | 0 | - | - | 6.3 | 6.5 | 7.4 | 8.8 | 12 | 13 | 2.7 | 5 | 0 | - | - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 1.0 | 1.0 | 4.0 | 4.0 | 1.3 | 21 | 0 | - | - | 0 | 0 | 1.0 | 0.86 | 1.7 | 2.0 | 0.69 | 7 | 0 | - | - | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0 | 2 | 0 | - | - | 0 | 0 | 0 | 0.83 | 3.3 | 4.0 | 1.6 | 6.0 | 0 | - | - | 0 | 0 | 0.5 | 1.3 | 3.8 | 4.0 | 1.8 | 6 | 0 | - | - |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.5 | 6.5 | 7.4 | 7.2 | 7.7 | 7.7 | 0.42 | 21 | 0 | - | 5% | 6.5 | 6.7 | 7.3 | 7.2 | 7.5 | 7.6 | 0.35 | 8 | 0 | - | 13% | 6.6 | 6.7 | 7.0 | 7.0 | 7.4 | 7.4 | 0.57 | 2 | 0 | - | - | 6.5 | 6.6 | 7.2 | 7.2 | 7.7 | 7.7 | 0.52 | 6.0 | 0 | - | - | 6.6 | 6.7 | 7.6 | 7.3 | 7.7 | 7.7 | 0.46 | 5 | 0 | - | - |
| Conductivity | µS/cm | - | - | - | - | 122 | 122 | 146 | 148 | 175 | 179 | 16 | 21 | 0 | - | - | 122 | 129 | 148 | 147 | 159 | 160 | 12 | 8 | 0 | - | - | 122 | 122 | 124 | 124 | 126 | 126 | 2.8 | 2 | 0 | - | - | 140 | 141 | 154 | 156 | 174 | 175 | 15 | 6.0 | 0 | - | - | 130 | 133 | 144 | 151 | 175 | 179 | 19 | 5 | 0 | - | - |
| Hardness | mg/L | - | - | - | - | 38 | 40 | 48 | 48 | 58 | 62 | 6.1 | 21 | 0 | - | - | 40 | 40 | 48 | 49 | 57 | 58 | 6.9 | 8 | 0 | - | - | 38 | 38 | 41 | 41 | 44 | 45 | 4.8 | 2 | 0 | - | - | 45 | 46 | 49 | 51 | 59 | 62 | 6.1 | 6.0 | 0 | - | - | 42 | 43 | 48 | 48 | 51 | 52 | 4.0 | 5 | 0 | - | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 27 | 29 | 38 | 39 | 48 | 49 | 6.3 | 21 | 0 | - | - | 29 | 30 | 36 | 36 | 41 | 42 | 4.4 | 8 | 0 | - | - | 27 | 27 | 32 | 32 | 36 | 36 | 6.4 | 2 | 0 | - | - | 34 | 36 | 42 | 42 | 48 | 48 | 5.4 | 6.0 | 0 | - | - | 35 | 35 | 46 | 42 | 48 | 49 | 6.4 | 5 | 0 | - | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 59 | 60 | 70 | 70 | 79 | 88 | 7.4 | 21 | 0 | - | - | 61 | 62 | 71 | 72 | 84 | 88 | 8.6 | 8 | 0 | - | - | 60 | 60 | 63 | 63 | 65 | 65 | 3.5 | 2 | 0 | - | - | 68 | 69 | 74 | 74 | 79 | 79 | 4.6 | 6.0 | 0 | - | - | 59 | 60 | 67 | 67 | 75 | 76 | 6.7 | 5 | 0 | - | - |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.2 | 5.0 | 9.0 | 0.87 | 21 | 20 | - | - | 5.0 | 5.0 | 5.0 | 5.5 | 7.6 | 9.0 | 1.4 | 8 | 7 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 6.0 | 6.0 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 5 | 5 | - | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 3.8 | 4.4 | 8.8 | 8.4 | 13 | 15 | 2.8 | 21 | 0 | - | - | 3.8 | 4.0 | 8.9 | 8.5 | 13 | 15 | 3.5 | 8 | 0 | - | - | 5.2 | 5.3 | 5.7 | 5.7 | 6.2 | 6.2 | 0.71 | 2 | 0 | - | - | 4.6 | 5.0 | 8.0 | 7.6 | 9.7 | 10 | 2.0 | 6.0 | 0 | - | - | 7.7 | 8.1 | 9.9 | 10 | 13 | 13 | 2.0 | 5 | 0 | - | - |
| Colour | TCU | - | - | - | - | 16 | 25 | 46 | 65 | 148 | 169 | 40 | 21 | 0 | - | - | 33 | 34 | 74 | 77 | 145 | 169 | 45 | 8 | 0 | - | - | 46 | 48 | 61 | 61 | 74 | 75 | 20 | 2 | 0 | - | - | 16 | 21 | 43 | 41 | 57 | 59 | 15 | 6.0 | 0 | - | - | 25 | 28 | 45 | 74 | 141 | 148 | 54 | 5 | 0 | - | - |
| Reactive Silica | mg/L | - | - | - | - | 1.5 | 1.7 | 3.2 | 3.7 | 6.0 | 6.4 | 1.5 | 21 | 0 | - | - | 4.0 | 4.1 | 5.0 | 5.1 | 6.2 | 6.4 | 0.74 | 8 | 0 | - | - | 2.3 | 2.4 | 3.4 | 3.4 | 4.4 | 4.5 | 1.6 | 2 | 0 | - | - | 1.7 | 1.8 | 2.6 | 2.4 | 2.9 | 2.9 | 0.5 | 6.0 | 0 | - | - | 1.5 | 1.6 | 2.9 | 3.2 | 5.4 | 6.0 | 1.7 | 5 | 0 | - | - |
| Turbidity | NTU | - | - | - | - | 0.9 | 1.0 | 2.1 | 2.4 | 4.4 | 8.8 | 1.7 | 21 | 0 | - | - | 2.1 | 2.1 | 3.0 | 3.6 | 7.3 | 8.8 | 2.2 | 8 | 0 | - | - | 1.5 | 1.6 | 2.2 | 2.2 | 2.7 | 2.8 | 0.92 | 2 | 0 | - | - | 0.9 | 0.95 | 1.4 | 1.5 | 2.2 | 2.3 | 0.57 | 6.0 | 0 | - | - | 1.0 | 1.0 | 1.3 | 1.6 | 2.2 | 2.2 | 0.59 | 5 | 0 | - | - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 27 | 29 | 38 | 39 | 48 | 49 | 6.3 | 21 | 0 | - | - | 29 | 30 | 36 | 36 | 41 | 42 | 4.4 | 8 | 0 | - | - | 27 | 27 | 32 | 32 | 36 | 36 | 6.4 | 2 | 0 | - | - | 34 | 36 | 42 | 42 | 48 | 48 | 5.4 | 6.0 | 0 | - | - | 35 | 35 | 46 | 42 | 48 | 49 | 6.4 | 5 | 0 | - | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 21 | 21 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 8 | 8 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 2 | 2 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 6.0 | 6.0 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 5 | 5 | - | - |
| Total Calcium | mg/L | - | - | - | - | 13 | 14 | 17 | 17 | 21 | 23 | 2.2 | 21 | 0 | - | - | 14 | 14 | 17 | 17 | 20 | 21 | 2.4 | 8 | 0 | - | - | 13 | 13 | 15 | 15 | 16 | 16 | 1.9 | 2 | 0 | - | - | 16 | 16 | 17 | 18 | 21 | 23 | 2.4 | 6 | 0 | - | - | 15 | 15 | 17 | 17 | 19 | 19 | 1.5 | 5 | 0 | - | - |
| Chloride | mg/L | 640 | 120 | - | - | 9.0 | 10 | 15 | 15 | 19 | 25 | 3.6 | 21 | 0 | - | - | 9.0 | 10 | 16 | 16 | 23 | 25 | 4.8 | 8 | 0 | - | - | 13 | 13 | 15 | 15 | 16 | 16 | 2.1 | 2 | 0 | - | - | 12 | 13 | 16 | 15 | 18 | 18 | 2.0 | 6 | 0 | - | - | 10 | 10 | 12 | 12 | 15 | 16 | 2.3 | 5 | 0 | - | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | 0 | 2 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.9 | 1.1 | 1.3 | 1.3 | 1.6 | 1.7 | 0.19 | 21 | 0 | - | - | 1.1 | 1.1 | 1.3 | 1.3 | 1.7 | 1.7 | 0.21 | 8 | 0 | - | - | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 0 | 2 | 0 | - | - | 1.1 | 1.1 | 1.4 | 1.3 | 1.6 | 1.6 | 0.18 | 6 | 0 | - | - | 0.9 | 0.94 | 1.2 | 1.2 | 1.3 | 1.3 | 0.17 | 5 | 0 | - | - |
| Total Potassium | mg/L | - | - | - | - | 0.5 | 0.5 | 0.61 | 0.66 | 0.9 | 1.2 | 0.15 | 21 | 1 | - | - | 0.5 | 0.54 | 0.7 | 0.75 | 1.1 | 1.2 | 0.2 | 8 | 1 | - | - | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0 | 2 | 0 | - | - | 0.5 | 0.53 | 0.65 | 0.65 | 0.78 | 0.8 | 0.1 | 6 | 0 | - | - | 0.5 | 0.5 | 0.5 | 0.56 | 0.68 | 0.7 | 0.089 | 5 | 0 | - | - |
| Total Sodium | mg/L | - | - | - | - | 8.8 | 8.8 | 10 | 11 | 13 | 18 | 2.1 | 21 | 0 | - | - | 8.8 | 9.0 | 10.0 | 11 | 16 | 18 | 3.1 | 8 | 0 | - | - | 9.6 | 9.6 | 9.9 | 9.9 | 10 | 10 | 0.42 | 2 | 0 | - | - | 8.9 | 9.1 | 11 | 11 | 12 | 12 | 1.1 | 6 | 0 | - | - | 8.8 | 8.8 | 9.3 | 9.4 | 10 | 10 | 0.59 | 5 | 0 | - | - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 2.4 | 3.0 | 4.0 | 0.59 | 21 | 7 | - | - | 2.0 | 2.0 | 2.5 | 2.6 | 3.7 | 4.0 | 0.74 | 8 | 1 | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 2 | 0 | - | - | 2.0 | 2.0 | 2.5 | 2.5 | 3.0 | 3.0 | 0.55 | 6 | 1 | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 5 | 5 | - | - |
| Sulphide | mg/L | - | - | 0.5 | - | 0.01 | 0.01 | 0.05 | 0.046 | 0.05 | 0.05 | 0.012 | 21 | 21 | - | - | 0.01 | 0.024 | 0.05 | 0.045 | 0.05 | 0.05 | 0.014 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.01 | 0.02 | 0.05 | 0.043 | 0.05 | 0.05 | 0.016 | 6 | 6 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - | - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.53 - 40 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.042 | 0.1 | 0.1 | 0.024 | 21 | 15 | - | - | 0.03 | 0.03 | 0.03 | 0.036 | 0.06 | 0.07 | 0.014 | 8 | 6 | - | - | 0.03 | 0.033 | 0.055 | 0.055 | 0.078 | 0.08 | 0.035 | 2 | 1 | - | - | 0.03 | 0.03 | 0.03 | 0.043 | 0.085 | 0.1 | 0.028 | 6 | 4 | - | - | 0.03 | 0.03 | 0.03 | 0.044 | 0.086 | 0.1 | 0.031 | 5 | 4 | - | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.08 | 0.099 | 0.18 | 0.19 | 0.05 | 21 | 7 | - | - | 0.09 | 0.1 | 0.14 | 0.14 | 0.18 | 0.19 | 0.031 | 8 | 0 | - | - | 0.08 | 0.082 | 0.1 | 0.1 | 0.12 | 0.12 | 0.028 | 2 | 0 | - | - | 0.05 | 0.05 | 0.05 | 0.075 | 0.15 | 0.18 | 0.052 | 6 | 3 | - | - | 0.05 | 0.05 | 0.05 | 0.056 | 0.074 | 0.08 | 0.013 | 5 | 4 | - | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.055 | 0.05 | 0.15 | 0.022 | 21 | 20 | - | 5% | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 6 | 6 | - | - | 0.05 | 0.05 | 0.05 | 0.07 | 0.13 | 0.15 | 0.045 | 5 | 4 | - | 20% |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.09 | 0.11 | 0.19 | 0.23 | 0.057 | 21 | 7 | - | - | 0.09 | 0.1 | 0.14 | 0.14 | 0.18 | 0.19 | 0.031 | 8 | 0 | - | - | 0.08 | 0.082 | 0.1 | 0.1 | 0.12 | 0.12 | 0.028 | 2 | 0 | - | - | 0.05 | 0.05 | 0.05 | 0.075 | 0.15 | 0.18 | 0.052 | 6 | 3 | - | - | 0.05 | 0.05 | 0.05 | 0.086 | 0.19 | 0.23 | 0.08 | 5 | 4 | - | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | 0 | 2 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.014 | 0.02 | 0.08 | 0.015 | 21 | 18 | - | - | 0.01 | 0.01 | 0.01 | 0.019 | 0.056 | 0.08 | 0.025 | 8 | 7 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 2 | 2 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 6 | 5 | - | - | 0.01 | 0.01 | 0.01 | 0.012 | 0.018 | 0.02 | 0.0045 | 5 | 4 | - | - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.1 | 0.6 | 1.7 | 1.9 | 0.67 | 21 | 6 | - | - | 0.02 | 0.02 | 0.4 | 0.7 | 1.8 | 1.9 | 0.77 | 8 | 3 | - | - | 0.03 | 0.10 | 0.73 | 0.73 | 1.4 | 1.4 | 0.98 | 2 | 0 | - | - | 0.02 | 0.02 | 0.29 | 0.45 | 1.2 | 1.3 | 0.52 | 6 | 1 | - | - | 0.02 | 0.02 | 0.1 | 0.57 | 1.6 | 1.7 | 0.77 | 5 | 2 | - | - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.002 | 0.004 | 0.01 | 0.0021 | 21 | 11 | - | 5% | 0.001 | 0.001 | 0.0015 | 0.0025 | 0.0072 | 0.01 | 0.0031 | 8 | 3 | - | 13% | 0.001 | 0.0012 | 0.0025 | 0.0025 | 0.0039 | 0.004 | 0.0021 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.0033 | 0.004 | 0.0012 | 6 | 5 | - | - | 0.001 | 0.001 | 0.001 | 0.0018 | 0.0036 | 0.004 | 0.0013 | 5 | 1 | - | - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.29 - 1.3[c] | - | - | 0.05 | 0.07 | 0.2 | 0.23 | 0.49 | 0.58 | 0.14 | 21 | 0 | - | 5% | 0.19 | 0.19 | 0.3 | 0.34 | 0.55 | 0.58 | 0.14 | 8 | 0 | - | 13% | 0.27 | 0.27 | 0.29 | 0.29 | 0.31 | 0.31 | 0.028 | 2 | 0 | - | - | 0.09 | 0.095 | 0.15 | 0.15 | 0.21 | 0.22 | 0.046 | 6 | 0 | - | - | 0.05 | 0.054 | 0.1 | 0.15 | 0.33 | 0.37 | 0.13 | 5 | 0 | - | - |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.092 | 0.097 | 0.13 | 0.14 | 0.18 | 0.23 | 0.033 | 21 | 0 | - | - | 0.097 | 0.1 | 0.12 | 0.12 | 0.15 | 0.16 | 0.02 | 8 | 0 | - | - | 0.092 | 0.093 | 0.099 | 0.099 | 0.1 | 0.11 | 0.0092 | 2 | 0 | - | - | 0.12 | 0.12 | 0.16 | 0.15 | 0.18 | 0.18 | 0.031 | 6 | 0 | - | - | 0.13 | 0.13 | 0.15 | 0.16 | 0.21 | 0.23 | 0.039 | 5 | 0 | - | - |
| Total Beryllium | mg/L | - | - | - | - | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.00022 | 21 | 21 | - | - | 0.001 | 0.0014 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.005 | 0.005 | 0.007 | 0.0079 | 0.013 | 0.018 | 0.0033 | 21 | 8 | - | - | 0.005 | 0.005 | 0.0055 | 0.007 | 0.012 | 0.013 | 0.003 | 8 | 5 | - | - | 0.006 | 0.0066 | 0.012 | 0.012 | 0.017 | 0.018 | 0.0085 | 2 | 0 | - | - | 0.005 | 0.005 | 0.0075 | 0.0077 | 0.011 | 0.012 | 0.0027 | 6 | 3 | - | - | 0.006 | 0.0062 | 0.008 | 0.0078 | 0.0096 | 0.01 | 0.0015 | 5 | 0 | - | - |
| Total Cadmium | mg/L | 0.00078 - 0.0013 | 0.000071 - 0.00011 | 0.05 | 0.05 | 0.0001 | 0.0001 | 0.0003 | 0.00028 | 0.0003 | 0.0003 | 0.00006 | 21 | 21 | - | - | 0.0001 | 0.00017 | 0.0003 | 0.00028 | 0.0003 | 0.0003 | 0.000071 | 8 | 8 | - | - | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 2 | 2 | - | - | 0.0001 | 0.00015 | 0.0003 | 0.00027 | 0.0003 | 0.0003 | 0.000082 | 6 | 6 | - | - | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 5 | 5 | - | - |
| Total Chromium | mg/L | - | 0.005[d,e] | 0.05[e] | 1 | 0.002 | 0.002 | 0.002 | 0.0022 | 0.003 | 0.004 | 0.00051 | 21 | 20 | - | - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.003 | 0.003 | 0.00046 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.0035 | 0.004 | 0.00082 | 6 | 6 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - |
| Total Cobalt | mg/L | - | 0.00078 - 0.00084[e] | - | - | 0.0005 | 0.001 | 0.001 | 0.002 | 0.002 | 0.022 | 0.0046 | 21 | 20 | - | 5% | 0.0005 | 0.00068 | 0.001 | 0.00094 | 0.001 | 0.001 | 0.00018 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0012 | 0.0018 | 0.002 | 0.00041 | 6 | 6 | - | - | 0.001 | 0.001 | 0.001 | 0.0052 | 0.018 | 0.022 | 0.0094 | 5 | 4 | - | 20% |
| Total Copper | mg/L | - | 0.00045 - 0.0056[e] | 0.3 | 0.3 | 0.001 | 0.001 | 0.002 | 0.002 | 0.003 | 0.009 | 0.0017 | 21 | 6 | - | 38% | 0.001 | 0.001 | 0.002 | 0.0016 | 0.002 | 0.002 | 0.00052 | 8 | 2 | - | 50% | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 1 | - | - | 0.001 | 0.001 | 0.002 | 0.003 | 0.0075 | 0.009 | 0.003 | 6 | 2 | - | 33% | 0.001 | 0.001 | 0.001 | 0.0016 | 0.0028 | 0.003 | 0.00089 | 5 | 1 | - | 40% |
| Total Iron | mg/L | - | 0.4 - 0.8[e] | 10 | 10 | 0.13 | 0.14 | 0.23 | 0.25 | 0.36 | 0.56 | 0.10 | 21 | 0 | - | - | 0.18 | 0.2 | 0.33 | 0.32 | 0.49 | 0.56 | 0.12 | 8 | 0 | - | - | 0.2 | 0.2 | 0.21 | 0.21 | 0.22 | 0.22 | 0.014 | 2 | 0 | - | - | 0.13 | 0.13 | 0.2 | 0.19 | 0.27 | 0.29 | 0.057 | 6 | 0 | - | - | 0.15 | 0.16 | 0.23 | 0.24 | 0.34 | 0.36 | 0.079 | 5 | 0 | - | - |
| Total Lead | mg/L | - | 0.0071 - 0.015[e] | 0.2 | 0.2 | 0.0007 | 0.0009 | 0.0027 | 0.0034 | 0.0057 | 0.012 | 0.0025 | 21 | 0 | - | 5% | 0.0018 | 0.0021 | 0.0042 | 0.0048 | 0.010 | 0.012 | 0.0033 | 8 | 0 | - | 13% | 0.0027 | 0.0027 | 0.0031 | 0.0031 | 0.0034 | 0.0034 | 0.00049 | 2 | 0 | - | - | 0.0015 | 0.0015 | 0.0019 | 0.0028 | 0.0052 | 0.0054 | 0.0017 | 6 | 0 | - | - | 0.0007 | 0.00074 | 0.0023 | 0.0021 | 0.004 | 0.0044 | 0.0015 | 5 | 0 | - | - |
| Total Manganese | mg/L | 2.8 - 4.4 | 0.27 - 0.5 | - | - | 0.02 | 0.023 | 0.045 | 0.061 | 0.14 | 0.19 | 0.043 | 21 | 0 | - | - | 0.023 | 0.024 | 0.052 | 0.062 | 0.15 | 0.19 | 0.053 | 8 | 0 | - | - | 0.02 | 0.021 | 0.033 | 0.033 | 0.044 | 0.045 | 0.018 | 2 | 0 | - | - | 0.036 | 0.036 | 0.042 | 0.056 | 0.11 | 0.14 | 0.04 | 6 | 0 | - | - | 0.032 | 0.036 | 0.073 | 0.076 | 0.12 | 0.12 | 0.037 | 5 | 0 | - | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 21 | 21 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 8 | 8 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 2 | 2 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 6 | 6 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 5 | 5 | - | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - |
| Total Nickel | mg/L | - | 0.025 - 0.067 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.0034 | 0.009 | 0.02 | 0.0041 | 21 | 18 | - | - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.003 | 0.003 | 0.00046 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.003 | 0.0065 | 0.017 | 0.02 | 0.0071 | 6 | 4 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 21 | 21 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 6 | 6 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 5 | 5 | - | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.00025 | 0.00025 | 0.00025 | 0.00026 | 0.00025 | 0.00049 | 0.000052 | 21 | 21 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 8 | 8 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 2 | 2 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00029 | 0.00043 | 0.00049 | 0.000098 | 6 | 6 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 5 | 5 | - | - |
| Total Strontium | mg/L | - | 2.5[e] | - | - | 0.019 | 0.024 | 0.032 | 0.032 | 0.039 | 0.043 | 0.0062 | 21 | 0 | - | - | 0.019 | 0.021 | 0.027 | 0.028 | 0.037 | 0.038 | 0.0063 | 8 | 0 | - | - | 0.025 | 0.025 | 0.027 | 0.027 | 0.028 | 0.028 | 0.0021 | 2 | 0 | - | - | 0.032 | 0.032 | 0.035 | 0.036 | 0.042 | 0.043 | 0.0042 | 6 | 0 | - | - | 0.028 | 0.028 | 0.037 | 0.034 | 0.039 | 0.039 | 0.0053 | 5 | 0 | - | - |
| Total Thallium | mg/L

**Table A.1-1: Water Quality Summary for WS-2, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[aa] | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 | WS-2 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | 7-May-20 | 2-Jun-20 | 1-Sep-20 | 1-Dec-20 | 30-Mar-21 | 2-Jun-21 | 1-Sep-21 | 29-Nov-21 | 29-Mar-22 | 7-Jun-22 | 7-Sep-22 | 14-Dec-22 | 15-Aug-23 | 24-Oct-23 | 6-Dec-23 | 9-Apr-24 | 4-Jun-24 | 10-Sep-24 | 3-Dec-24 | 25-Mar-25 | 3-Jun-25 | 16-Sep-25 |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.7 | 7.5 | 7.4 | 7.2 | 6.9 | 7.3 | 7.1 | 7.1 | 6.5 | 6.5 | 6.8 | 6.7 | 6.8 | 6.9 | 6.9 | 7.2 | 7.1 | 7.0 | 7.4 | 7.9 | 8.0 | 7.7 |
| Field specific conductivity | µS/cm | - | - | - | - | 138 | 91 | 162 | 166 | 158 | 171 | 175 | 161 | 168 | 164 | 160 | 122 | 163 | 129 | 146 | 142 | 118 | 125 | 105 | 128 | 111 | 139 |
| Temperature | C | - | - | - | - | 9.1 | 12 | 20 | 8.1 | 2.5 | 18 | 19 | 9.7 | 4.9 | 20 | 18 | 7.3 | 21 | 9.6 | 3.0 | 3.7 | 14 | 21 | 4.5 | 2.4 | 17 | 18 |
| Field dissolved oxygen | mg/L | - | - | - | - | 12 | 13 | 13 | 15 | 18 | 14 | 11 | 13 | 13 | 7.3 | 7.4 | 0.7 | - | - | - | - | 7.9 | 6.3 | 8.3 | - | 6.9 | 7.3 |
| Field total suspended solids | mg/L | - | - | 30 | - | 1.0 | 0 | 0 | 1.0 | 1.0 | 0 | 3.0 | - | 1.0 | 0 | 0 | 0 | 0 | 1.0 | 1.0 | 1.0 | 1.0 | 4.0 | 2.0 | 0 | 4.0 | 0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.4 | 7.6 | 7.6 | 7.5 | 7.4 | 7.7 | 7.7 | 7.6 | 7.2 | 7.7 | 7.1 | 7.1 | 6.8 | 6.6 | **6.45**[sC] | 6.6 | 6.5 | 7.7 | 7.4 | 7.1 | 6.9 | - |
| Conductivity | µS/cm | - | - | - | - | 122 | 145 | 143 | 151 | 149 | 175 | 179 | 142 | 158 | 171 | 161 | 160 | 161 | 130 | 143 | 126 | 140 | 144 | 122 | 147 | 146 | - |
| Hardness | mg/L | - | - | - | - | 38 | 48 | 47 | 40 | 47 | 50 | 51 | 58 | 56 | 49 | 48 | 40 | 62 | 42 | 46 | 45 | 49 | 52 | 54 | 49 | 45 | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 27 | 34 | 36 | 37 | 34 | 43 | 49 | 40 | 29 | 40 | 46 | 42 | 48 | 35 | 38 | 36 | 40 | 46 | 31 | 35 | 48 | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 60 | 70 | 62 | 65 | 76 | 79 | 76 | 77 | 88 | 73 | 70 | 73 | 79 | 59 | 66 | 65 | 68 | 67 | 61 | 69 | 75 | - |
| Total suspended solids | mg/L | - | - | - | - | <5.0 | <5.0 | <5.0 | <5.0 | 9.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 6.2 | 7.5 | 11 | 8.9 | 7.3 | 10.0 | 9.9 | 10.0 | 4.4 | 6.1 | 9.6 | 9.8 | 8.8 | 13 | 8.9 | 5.2 | 8.5 | 7.7 | 15 | 3.8 | 4.6 | - |
| Colour | TCU | - | - | - | - | 75 | 50 | 113 | 65 | 44 | 16 | 25 | 82 | 33 | 41 | 45 | 85 | 44 | 148 | 101 | 46 | 59 | 38 | 169 | 37 | 38 | - |
| Reactive Silica | mg/L | - | - | - | - | 2.3 | 1.9 | 1.5 | 5.7 | 4.9 | 2.7 | 2.2 | 5.1 | 4.0 | 2.5 | 2.9 | 4.9 | 1.7 | 6.0 | 6.4 | 4.5 | 2.8 | 3.2 | 5.0 | 4.4 | 2.9 | - |
| Turbidity | NTU | - | - | - | - | 2.8 | 2.0 | 2.2 | 2.3 | 8.8 | 0.9 | 1.1 | 2.1 | 3.0 | 1.7 | 1.0 | 2.1 | 1.1 | 2.2 | 2.9 | 1.5 | 1.1 | 1.3 | 4.4 | 3.4 | 2.3 | - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 27 | 34 | 36 | 37 | 34 | 43 | 49 | 40 | 29 | 40 | 46 | 42 | 48 | 35 | 38 | 36 | 40 | 46 | 31 | 35 | 48 | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | - |
| Total Calcium | mg/L | - | - | - | - | 13 | 17 | 17 | 14 | 17 | 18 | 18 | 21 | 20 | 17 | 17 | 14 | 23 | 15 | 16 | 16 | 18 | 19 | 19 | 18 | 16 | - |
| Chloride | mg/L | 640 | 120 | - | - | 16 | 16 | 12 | 14 | 19 | 18 | 16 | 16 | 25 | 16 | 13 | 18 | 14 | 11 | 12 | 13 | 12 | 10.0 | 9.0 | 16 | 15 | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.1 | 1.3 | 0.9 | 1.1 | 1.3 | 1.4 | 1.3 | 1.6 | 1.7 | 1.6 | 1.3 | 1.2 | 1.4 | 1.1 | 1.2 | 1.1 | 1.2 | 1.2 | 1.4 | 1.3 | 1.1 | - |
| Total Potassium | mg/L | - | - | - | - | 0.6 | 0.7 | 0.5 | 0.5 | 0.7 | 0.7 | 0.5 | <1.2 | 0.7 | 0.8 | 0.5 | 0.61 | 0.6 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.9 | 0.7 | 0.5 | - |
| Total Sodium | mg/L | - | - | - | - | 10 | 11 | 9.3 | 8.8 | 13 | 12 | 10 | 12 | 18 | 11 | 10.0 | 9.7 | 11 | 9.0 | 9.3 | 9.6 | 9.7 | 8.8 | 10 | 9.7 | 8.9 | - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 3.0 | <2.0 | 3.0 | 3.0 | 3.0 | <2.0 | 2.0 | 4.0 | 2.0 | <2.0 | 3.0 | <2.0 | <2.0 | 2.0 | 2.0 | 2.0 | <2.0 | <2.0 | 2.0 | 3.0 | - |
| Sulphide | mg/L | - | - | 0.5 | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.01 | <0.01 | - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.53 - 40 | 2 | 2 | 0.08 | 0.1 | 0.1 | 0.04 | <0.03 | 0.04 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | 0.07 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.08 | 0.05 | <0.05 | 0.12 | 0.19 | <0.05 | <0.05 | 0.09 | 0.14 | <0.05 | <0.05 | 0.16 | <0.05 | 0.08 | 0.17 | 0.12 | 0.07 | <0.05 | 0.13 | 0.14 | 0.18 | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | **0.15**[bG] | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.08 | 0.05 | <0.05 | 0.12 | 0.19 | <0.05 | <0.05 | 0.09 | 0.14 | <0.05 | <0.05 | 0.16 | <0.05 | 0.23 | 0.17 | 0.12 | 0.07 | <0.05 | 0.13 | 0.14 | 0.18 | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.01 | <0.01 | 0.08 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.03 | 0.06 | <0.1 | <0.02 | 0.02 | <0.02 | <0.02 | <0.1 | <0.02 | 0.02 | 0.02 | 0.71 | 0.51 | 1.7 | 1.6 | 1.4 | 1.3 | 1.0 | 1.9 | 1.3 | 0.79 | - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | *<0.004* [BK-sC] | *<0.004* [BK-sC] | 0.004 | 0.002 | 0.002 | <0.001 | 0.001 | <0.001 | **0.01**[bC] | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 | 0.002 | 0.001 | <0.001 | <0.001 | - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.29 - 1.3[bT] | - | - | 0.27 | 0.16 | 0.15 | 0.2 | 0.49 | 0.09 | 0.05 | 0.25 | **0.4**[sC] | 0.17 | 0.07 | 0.19 | 0.11 | 0.37 | 0.3 | 0.31 | 0.22 | 0.1 | 0.58 | 0.29 | 0.14 | - |
| Total Antimony | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.092 | 0.18 | 0.15 | 0.12 | 0.14 | 0.14 | 0.15 | 0.16 | 0.11 | 0.18 | 0.23 | 0.11 | 0.18 | 0.13 | 0.12 | 0.11 | 0.12 | 0.15 | 0.13 | 0.097 | 0.12 | - |
| Total Beryllium | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Bismuth | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.006 | 0.008 | 0.008 | 0.006 | <0.005 | 0.007 | 0.006 | <0.01 | <0.005 | 0.009 | 0.008 | <0.005 | <0.012 | 0.007 | <0.005 | 0.018 | <0.005 | 0.01 | 0.013 | 0.007 | <0.005 | - |
| Total Cadmium | mg/L | 0.00078 - 0.0013 | 0.000071 - 0.00011 | 0.05 | 0.05 | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | <0.0001 | *<0.0003* [BK-sC] | *<0.0001* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | *<0.0003* [BK-sC] | - |
| Total Chromium | mg/L | - | 0.005[bJ,dJ] | 0.05[dJ] | 1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.004 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 | <0.002 | - |
| Total Cobalt | mg/L | - | 0.00078 - 0.00084[bT] | - | - | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | <0.0005 | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.002* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | **0.022**[bU] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | - |
| Total Copper | mg/L | - | 0.00045 - 0.0056[bJ] | 0.3 | 0.3 | 0.001 | 0.003 | 0.002 | 0.002 | **0.002**[bU] | 0.001 | <0.001 | <0.002 | **0.001**[bC] | **0.002**[bD] | **0.001**[bC] | **0.001**[bD] | <0.002 [BK-sC] | **0.003**[bU] | **0.002**[bU] | <0.001 | **0.009**[bU] | 0.001 | 0.002 | <0.001 | <0.001 | - |
| Total Iron | mg/L | - | 0.4 - 0.8[bJ] | 10 | 10 | 0.2 | 0.29 | 0.25 | 0.35 | 0.36 | 0.14 | 0.15 | 0.3 | 0.23 | 0.19 | 0.23 | 0.24 | 0.2 | 0.36 | 0.35 | 0.22 | 0.2 | 0.19 | 0.56 | 0.18 | 0.13 | - |
| Total Lead | mg/L | - | 0.0071 - 0.015[bJ] | 0.2 | 0.2 | 0.0034 | 0.0047 | 0.0023 | 0.0051 | **0.0123**[bU] | 0.0016 | 0.0007 | 0.0038 | 0.0028 | 0.0018 | 0.0009 | 0.0026 | 0.0054 | 0.0044 | 0.0046 | 0.0027 | 0.0019 | 0.0024 | 0.0057 | 0.0018 | 0.0015 | - |
| Total Manganese | mg/L | 2.8 - 4.4 | 0.27 - 0.5 | - | - | 0.02 | 0.043 | 0.032 | 0.056 | 0.19 | 0.037 | 0.051 | 0.023 | 0.026 | 0.042 | 0.12 | 0.028 | 0.14 | 0.073 | 0.048 | 0.045 | 0.036 | 0.11 | 0.071 | 0.059 | 0.041 | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | *<0.000026* [BK-sC] | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Nickel | mg/L | - | 0.025 - 0.067 | 0.5 | 0.5 | <0.002 | 0.004 | <0.002 | <0.002 | <0.002 | 0.02 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.009 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 | <0.002 | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | *<0.001* [BK-sC] | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00049* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | *<0.00025* [BK-sC] | - |
| Total Strontium | mg/L | - | 2.5[bT] | - | - | 0.025 | 0.039 | 0.029 | 0.025 | 0.019 | 0.034 | 0.037 | 0.038 | 0.025 | 0.035 | 0.039 | 0.024 | 0.043 | 0.028 | 0.029 | 0.028 | 0.033 | 0.038 | 0.035 | 0.032 | 0.032 | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | - |
| Total Tin | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Titanium | mg/L | - | - | - | - | 0.003 | 0.002 | 0.003 | 0.004 | 0.006 | <0.002 | <0.002 | <0.01 | 0.004 | <0.002 | <0.002 | <0.002 | <0.003 | 0.004 | 0.002 | <0.002 | <0.002 | <0.002 | 0.007 | 0.003 | <0.002 | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0008 | 0.0014 | 0.0008 | 0.001 | 0.0012 | 0.0014 | 0.0012 | 0.0013 | 0.001 | 0.0013 | 0.001 | 0.0009 | 0.0011 | 0.001 | 0.0011 | 0.0011 | 0.0011 | 0.001 | 0.0013 | 0.001 | 0.0011 | - |
| Total Vanadium | mg/L | - | 0.12[bJ] | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Zinc | mg/L | 0.054 - 0.089 | 0.01 - 0.048 | 0.5 | 0.5 | <0.005 | 0.006 | <0.005 | 0.007 | 0.017 | <0.005 | <0.005 | <0.02 | 0.007 | <0.005 | <0.005 | <0.005 | <0.007 | 0.012 | 0.008 | 0.008 | <0.005 | 0.009 | **0.119**[bA,sG] | 0.009 | <0.005 | - |

**Table A.1-2: Water Quality Summary for WQ-STA-28, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Full Dataset (2020 to 2025) | | | | | | | | | Results Above Guideline | | Winter (Nov-Mar) | | | | | | | | | Results Above Guideline | | Spring (Apr-May) | | | | | | | | | Results Above Guideline | | Summer (Jun-Aug) | | | | | | | | | Results Above Guideline | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.5 | 6.8 | 7.1 | 7.2 | 7.9 | 8.0 | 0.4 | 22 | 0 | - | - | 6.5 | 6.6 | 7.1 | 7.2 | 7.8 | 8.0 | 0.44 | 8 | 0 | - | - | 7.0 | 7.0 | 7.4 | 7.4 | 7.7 | 7.7 | 0.49 | 2 | 0 | - | - | 6.8 | 6.8 | 7.1 | 7.2 | 7.9 | 7.9 | 0.46 | 6 | 0 | - | - |
| Field specific conductivity | µS/cm | - | - | - | - | 103 | 120 | 150 | 149 | 177 | 179 | 21 | 22 | 0 | - | - | 103 | 112 | 154 | 148 | 169 | 171 | 23 | 8 | 0 | - | - | 134 | 135 | 139 | 139 | 144 | 145 | 7.6 | 2 | 0 | - | - | 120 | 121 | 164 | 155 | 177 | 178 | 26 | 6 | 0 | - | - |
| Temperature | C | - | - | - | - | 3.3 | 3.8 | 11 | 12 | 21 | 21 | 6.7 | 22 | 0 | - | - | 3.3 | 3.5 | 5.0 | 5.8 | 9.3 | 9.6 | 2.3 | 8 | 0 | - | - | 4.5 | 4.8 | 7.0 | 7.0 | 9.3 | 9.5 | 3.5 | 2 | 0 | - | - | 12 | 12 | 17 | 17 | 21 | 21 | 3.6 | 6 | 0 | - | - |
| Field dissolved oxygen | mg/L | - | - | - | - | 1.2 | 2.6 | 10 | 10 | 18 | 19 | 4.8 | 17 | 0 | - | - | 1.2 | 3.3 | 13 | 12 | 19 | 19 | 6.4 | 6 | 0 | - | - | 12 | 12 | 12 | 12 | 12 | 12 | - | 1 | 0 | - | - | 3.0 | 4.0 | 8.2 | 8.9 | 13 | 13 | 4.1 | 5 | 0 | - | - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 1.0 | 1.0 | 5.0 | 5.0 | 1.5 | 21 | 0 | - | - | 0 | 0 | 1.0 | 1.0 | 2.0 | 2.0 | 1.0 | 7 | 0 | - | - | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0 | 2 | 0 | - | - | 0 | 0 | 0 | 1.0 | 4.0 | 5.0 | 2.0 | 6 | 0 | - | - |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.4 | 6.5 | 7.3 | 7.2 | 7.6 | 7.6 | 0.41 | 21 | 0 | - | 10% | 6.4 | 6.6 | 7.3 | 7.2 | 7.5 | 7.6 | 0.35 | 8 | 0 | - | 13% | 6.6 | 6.6 | 7.0 | 7.0 | 7.3 | 7.4 | 0.57 | 2 | 0 | - | - | 6.5 | 6.6 | 7.2 | 7.1 | 7.6 | 7.6 | 0.5 | 6 | 0 | - | 17% |
| Conductivity | µS/cm | - | - | - | - | 119 | 120 | 145 | 149 | 178 | 184 | 18 | 21 | 0 | - | - | 120 | 128 | 146 | 147 | 161 | 162 | 13 | 8 | 0 | - | - | 119 | 119 | 123 | 123 | 126 | 126 | 4.9 | 2 | 0 | - | - | 142 | 142 | 155 | 157 | 177 | 178 | 16 | 6 | 0 | - | - |
| Hardness | mg/L | - | - | - | - | 37 | 38 | 46 | 48 | 63 | 69 | 7.8 | 21 | 0 | - | - | 37 | 38 | 46 | 48 | 63 | 69 | 9.9 | 8 | 0 | - | - | 38 | 39 | 42 | 42 | 46 | 46 | 5.6 | 2 | 0 | - | - | 44 | 44 | 52 | 51 | 60 | 63 | 6.7 | 6 | 0 | - | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 27 | 29 | 38 | 39 | 49 | 50 | 6.7 | 21 | 0 | - | - | 29 | 29 | 37 | 36 | 43 | 45 | 5.3 | 8 | 0 | - | - | 27 | 27 | 32 | 32 | 36 | 36 | 6.4 | 2 | 0 | - | - | 33 | 35 | 41 | 41 | 46 | 46 | 4.8 | 6 | 0 | - | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 56 | 59 | 70 | 70 | 83 | 85 | 7.7 | 21 | 0 | - | - | 59 | 62 | 72 | 71 | 82 | 85 | 7.4 | 8 | 0 | - | - | 59 | 59 | 62 | 62 | 65 | 65 | 4.2 | 2 | 0 | - | - | 67 | 68 | 73 | 74 | 82 | 83 | 6.2 | 6 | 0 | - | - |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 6.0 | 0.22 | 21 | 19 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 8 | 7 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - | - | 5.0 | 5.0 | 5.0 | 5.2 | 5.8 | 6.0 | 0.41 | 6 | 5 | - | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 3.9 | 4.5 | 8.4 | 8.6 | 13 | 15 | 2.9 | 21 | 0 | - | - | 3.9 | 4.1 | 9.3 | 9.2 | 14 | 15 | 3.8 | 8 | 0 | - | - | 5.4 | 5.4 | 5.8 | 5.8 | 6.2 | 6.2 | 0.57 | 2 | 0 | - | - | 4.9 | 5.2 | 8.0 | 7.4 | 8.9 | 9.1 | 1.6 | 6 | 0 | - | - |
| Colour | TCU | - | - | - | - | 14 | 16 | 61 | 70 | 160 | 166 | 44 | 21 | 0 | - | - | 32 | 34 | 74 | 74 | 126 | 142 | 36 | 8 | 0 | - | - | 48 | 49 | 62 | 62 | 75 | 76 | 20 | 2 | 0 | - | - | 16 | 22 | 41 | 44 | 65 | 66 | 18 | 6 | 0 | - | - |
| Reactive Silica | mg/L | - | - | - | - | 1.5 | 2.0 | 3.3 | 3.7 | 6.1 | 6.5 | 1.4 | 21 | 0 | - | - | 2.6 | 3.0 | 4.9 | 4.8 | 6.2 | 6.5 | 1.2 | 8 | 0 | - | - | 2.4 | 2.5 | 3.5 | 3.5 | 4.5 | 4.6 | 1.6 | 2 | 0 | - | - | 2.0 | 2.0 | 2.9 | 2.7 | 3.1 | 3.2 | 0.49 | 6 | 0 | - | - |
| Turbidity | NTU | - | - | - | - | 0.7 | 0.8 | 2.0 | 2.4 | 3.6 | 9.3 | 1.8 | 21 | 0 | - | - | 1.1 | 1.3 | 2.5 | 3.2 | 7.3 | 9.3 | 2.6 | 8 | 0 | - | - | 1.6 | 1.7 | 2.5 | 2.5 | 3.2 | 3.3 | 1.2 | 2 | 0 | - | - | 0.8 | 0.95 | 1.8 | 1.7 | 2.5 | 2.7 | 0.63 | 6 | 0 | - | - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 27 | 29 | 38 | 39 | 49 | 50 | 6.7 | 21 | 0 | - | - | 29 | 29 | 37 | 36 | 43 | 45 | 5.3 | 8 | 0 | - | - | 27 | 27 | 32 | 32 | 36 | 36 | 6.4 | 2 | 0 | - | - | 33 | 35 | 41 | 41 | 46 | 46 | 4.8 | 6 | 0 | - | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 21 | 21 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 8 | 8 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 2 | 2 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 6 | 6 | - | - |
| Total Calcium | mg/L | - | - | - | - | 12 | 14 | 17 | 17 | 23 | 24 | 2.9 | 21 | 0 | - | - | 12 | 12 | 16 | 17 | 22 | 24 | 3.7 | 8 | 0 | - | - | 14 | 14 | 15 | 15 | 16 | 17 | 2.1 | 2 | 0 | - | - | 16 | 16 | 18 | 18 | 22 | 23 | 2.6 | 6 | 0 | - | - |
| Chloride | mg/L | 640 | 120 | - | - | 7.0 | 10 | 15 | 15 | 19 | 25 | 3.8 | 21 | 0 | - | - | 7.0 | 9.1 | 16 | 16 | 23 | 25 | 5.2 | 8 | 0 | - | - | 12 | 12 | 14 | 14 | 15 | 15 | 2.1 | 2 | 0 | - | - | 12 | 12 | 16 | 15 | 18 | 18 | 2.2 | 6 | 0 | - | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.9 | 1.1 | 1.3 | 1.4 | 1.8 | 2.0 | 0.26 | 21 | 0 | - | - | 1.2 | 1.2 | 1.3 | 1.4 | 1.9 | 2.0 | 0.31 | 8 | 0 | - | - | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 0.071 | 2 | 0 | - | - | 1.1 | 1.1 | 1.5 | 1.4 | 1.7 | 1.7 | 0.23 | 6 | 0 | - | - |
| Total Potassium | mg/L | - | - | - | - | 0.5 | 0.5 | 0.7 | 0.72 | 1.1 | 1.3 | 0.2 | 21 | 0 | - | - | 0.6 | 0.6 | 0.7 | 0.79 | 1.2 | 1.3 | 0.23 | 8 | 0 | - | - | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0 | 2 | 0 | - | - | 0.5 | 0.53 | 0.75 | 0.77 | 1.1 | 1.1 | 0.22 | 6 | 0 | - | - |
| Total Sodium | mg/L | - | - | - | - | 8.5 | 8.7 | 9.8 | 10 | 12 | 14 | 1.4 | 21 | 0 | - | - | 9.3 | 9.4 | 10 | 11 | 13 | 14 | 1.6 | 8 | 0 | - | - | 9.7 | 9.7 | 9.9 | 9.9 | 10.0 | 10 | 0.21 | 2 | 0 | - | - | 9.1 | 9.1 | 11 | 11 | 12 | 12 | 1.5 | 6 | 0 | - | - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.4 | 3.0 | 4.0 | 0.6 | 21 | 6 | - | 2.0 | 2.0 | 3.0 | 2.8 | 3.7 | 4.0 | 0.71 | 8 | 1 | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 2 | 0 | - | - | 2.0 | 2.0 | 2.5 | 2.5 | 3.0 | 3.0 | 0.55 | 6 | 1 | - | - |
| Sulphide | mg/L | - | - | 0.5 | - | 0.01 | 0.01 | 0.05 | 0.046 | 0.05 | 0.05 | 0.012 | 21 | 21 | - | - | 0.01 | 0.024 | 0.05 | 0.045 | 0.05 | 0.05 | 0.014 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.01 | 0.02 | 0.05 | 0.043 | 0.05 | 0.05 | 0.016 | 6 | 6 | - | - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.67 - 40 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.042 | 0.1 | 0.12 | 0.025 | 21 | 15 | - | - | 0.03 | 0.03 | 0.03 | 0.033 | 0.04 | 0.04 | 0.0046 | 8 | 6 | - | - | 0.03 | 0.032 | 0.05 | 0.05 | 0.068 | 0.07 | 0.028 | 2 | 1 | - | - | 0.03 | 0.03 | 0.03 | 0.047 | 0.09 | 0.1 | 0.029 | 6 | 4 | - | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.09 | 0.1 | 0.19 | 0.2 | 0.051 | 21 | 6 | - | - | 0.07 | 0.077 | 0.14 | 0.14 | 0.19 | 0.19 | 0.042 | 8 | 0 | - | - | 0.05 | 0.054 | 0.09 | 0.09 | 0.13 | 0.13 | 0.057 | 2 | 0 | - | - | 0.05 | 0.05 | 0.08 | 0.093 | 0.18 | 0.2 | 0.056 | 6 | 2 | - | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 21 | 21 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 6 | 6 | - | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.09 | 0.1 | 0.19 | 0.2 | 0.051 | 21 | 6 | - | - | 0.07 | 0.077 | 0.14 | 0.14 | 0.19 | 0.19 | 0.042 | 8 | 0 | - | - | 0.05 | 0.054 | 0.09 | 0.09 | 0.13 | 0.13 | 0.057 | 2 | 0 | - | - | 0.05 | 0.05 | 0.08 | 0.093 | 0.18 | 0.2 | 0.056 | 6 | 2 | - | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.0022 | 21 | 17 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 8 | 6 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 2 | 2 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 6 | 5 | - | - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.11 | 0.62 | 1.7 | 2.0 | 0.69 | 21 | 4 | - | - | 0.02 | 0.02 | 0.39 | 0.73 | 1.9 | 2.0 | 0.82 | 8 | 2 | - | - | 0.03 | 0.099 | 0.72 | 0.72 | 1.3 | 1.4 | 0.98 | 2 | 0 | - | - | 0.02 | 0.02 | 0.35 | 0.48 | 1.2 | 1.3 | 0.52 | 6 | 0 | - | - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0019 | 0.004 | 0.011 | 0.0023 | 21 | 16 | - | 5% | 0.001 | 0.001 | 0.001 | 0.0025 | 0.0079 | 0.011 | 0.0035 | 8 | 5 | - | 13% | 0.001 | 0.0012 | 0.0025 | 0.0025 | 0.0039 | 0.004 | 0.0021 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.0033 | 0.004 | 0.0012 | 6 | 6 | - | - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.37 - 1.3[d1] | - | - | 0.08 | 0.08 | 0.25 | 0.27 | 0.61 | 0.71 | 0.17 | 21 | 0 | - | 10% | 0.11 | 0.16 | 0.37 | 0.39 | 0.68 | 0.71 | 0.2 | 8 | 0 | - | 25% | 0.29 | 0.29 | 0.31 | 0.31 | 0.33 | 0.33 | 0.028 | 2 | 0 | - | - | 0.11 | 0.12 | 0.18 | 0.2 | 0.31 | 0.33 | 0.078 | 6 | 0 | - | - |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.093 | 0.099 | 0.13 | 0.13 | 0.18 | 0.2 | 0.029 | 21 | 0 | - | - | 0.099 | 0.10 | 0.12 | 0.12 | 0.16 | 0.17 | 0.023 | 8 | 0 | - | - | 0.093 | 0.094 | 0.099 | 0.099 | 0.1 | 0.1 | 0.0078 | 2 | 0 | - | - | 0.12 | 0.12 | 0.13 | 0.14 | 0.18 | 0.18 | 0.03 | 6 | 0 | - | - |
| Total Beryllium | mg/L | - | - | - | - | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.00022 | 21 | 21 | - | - | 0.001 | 0.0014 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.005 | 0.005 | 0.007 | 0.0084 | 0.016 | 0.017 | 0.0036 | 21 | 8 | - | - | 0.005 | 0.005 | 0.006 | 0.0075 | 0.014 | 0.016 | 0.0039 | 8 | 5 | - | - | 0.005 | 0.0056 | 0.011 | 0.011 | 0.016 | 0.017 | 0.0085 | 2 | 0 | - | - | 0.005 | 0.005 | 0.008 | 0.008 | 0.012 | 0.012 | 0.0028 | 6 | 3 | - | - |
| Total Cadmium | mg/L | 0.00076 - 0.0014 | 0.000069 - 0.00012 | 0.05 | 0.05 | 0.0001 | 0.0001 | 0.0003 | 0.00028 | 0.0003 | 0.0003 | 0.00006 | 21 | 21 | - | - | 0.0001 | 0.00017 | 0.0003 | 0.00028 | 0.0003 | 0.0003 | 0.000071 | 8 | 8 | - | - | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 2 | 2 | - | - | 0.0001 | 0.00015 | 0.0003 | 0.00027 | 0.0003 | 0.0003 | 0.000082 | 6 | 6 | - | - |
| Total Chromium | mg/L | - | 0.005[c,d] | 0.05[d] | 1 | 0.002 | 0.002 | 0.002 | 0.0021 | 0.003 | 0.004 | 0.00048 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.0035 | 0.004 | 0.00082 | 6 | 6 | - | - |
| Total Cobalt | mg/L | - | 0.00078 - 0.0008[d1] | - | - | 0.0005 | 0.001 | 0.001 | 0.0026 | 0.002 | 0.035 | 0.0074 | 21 | 20 | - | 5% | 0.0005 | 0.00068 | 0.001 | 0.00094 | 0.001 | 0.001 | 0.00018 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0012 | 0.0018 | 0.002 | 0.00041 | 6 | 6 | - | - |
| Total Copper | mg/L | - | 0.00037 - 0.0057[d1] | 0.3 | 0.3 | 0.001 | 0.001 | 0.002 | 0.0019 | 0.003 | 0.005 | 0.0010 | 21 | 7 | - | 29% | 0.001 | 0.001 | 0.002 | 0.0018 | 0.0027 | 0.003 | 0.00071 | 8 | 2 | - | 25% | 0.001 | 0.0011 | 0.0015 | 0.0015 | 0.002 | 0.002 | 0.00071 | 2 | 1 | - | - | 0.001 | 0.001 | 0.002 | 0.002 | 0.003 | 0.003 | 0.00089 | 6 | 3 | - | 33% |
| Total Iron | mg/L | - | 0.4 - 0.8[c] | 10 | 10 | 0.16 | 0.19 | 0.25 | 0.3 | 0.48 | 0.79 | 0.14 | 21 | 0 | - | - | 0.2 | 0.2 | 0.35 | 0.38 | 0.68 | 0.79 | 0.19 | 8 | 0 | - | - | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 | 0.23 | 0.014 | 2 | 0 | - | - | 0.16 | 0.17 | 0.22 | 0.24 | 0.39 | 0.44 | 0.10 | 6 | 0 | - | - |
| Total Lead | mg/L | - | 0.0072 - 0.015[d1] | 0.2 | 0.2 | 0.0009 | 0.0009 | 0.003 | 0.0044 | 0.015 | 0.02 | 0.0046 | 21 | 1 | - | 10% | 0.0023 | 0.0024 | 0.0043 | 0.0071 | 0.018 | 0.02 | 0.0066 | 8 | 0 | - | 25% | 0.0021 | 0.0022 | 0.0035 | 0.0035 | 0.0047 | 0.0048 | 0.0019 | 2 | 0 | - | - | 0.002 | 0.002 | 0.0023 | 0.0027 | 0.0047 | 0.0054 | 0.0013 | 6 | 1 | - | - |
| Total Manganese | mg/L | 2.8 - 4.8 | 0.27 - 0.5 | - | - | 0.027 | 0.041 | 0.073 | 0.094 | 0.2 | 0.23 | 0.057 | 21 | 0 | - | - | 0.041 | 0.043 | 0.074 | 0.099 | 0.21 | 0.23 | 0.067 | 8 | 0 | - | - | 0.027 | 0.029 | 0.044 | 0.044 | 0.058 | 0.06 | 0.023 | 2 | 0 | - | - | 0.054 | 0.055 | 0.069 | 0.082 | 0.14 | 0.16 | 0.038 | 6 | 0 | - | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 21 | 21 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 8 | 8 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 2 | 2 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 6 | 6 | - | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 20 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Nickel | mg/L | - | 0.025 - 0.072 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.0029 | 0.009 | 0.011 | 0.0024 | 21 | 18 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 7 | - | - | 0.002 | 0.0025 | 0.0065 | 0.0065 | 0.011 | 0.011 | 0.0064 | 2 | 1 | - | - | 0.002 | 0.002 | 0.002 | 0.0032 | 0.0073 | 0.009 | 0.0029 | 6 | 6 | - | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 21 | 21 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 6 | 6 | - | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.0001 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00049 | 0.000063 | 21 | 21 | - | - | 0.0001 | 0.00015 | 0.00025 | 0.00023 | 0.00025 | 0.00025 | 0.000053 | 8 | 8 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 2 | 2 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00029 | 0.00043 | 0.00049 | 0.000098 | 6 | 6 | - | - |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.019 | 0.024 | 0.031 | 0.032 | 0.044 | 0.045 | 0.0074 | 21 | 0 | - | - | 0.019 | 0.021 | 0.028 | 0.029 | 0.04 | 0.042 | 0.0072 | 8 | 0 | - | - | 0.024 | 0.024 | 0.026 | 0.026 | 0.028 | 0.028 | 0.0028 | 2 | 0 | - | - | 0.031 | 0.032 | 0.037 | 0.038 | 0.045 | 0.045 | 0.0058 | 6 | 0 | - | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00012 | 0.0003 | 0.0003 | 0.00006 | 21 | 21 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00023 | 0.0003 | 0.000071 | 8 | 8 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 2 | 2 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00025 | 0.0003 | 0.000082 | 6 | 6 | - | - |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.003 | 0.0038 | 0.009 | 0.01 | 0.0025 | 21 | 10 | - | - | 0.002 | 0.002 | 0.004 | 0.0054 | 0.0097 | 0.01 | 0.0034 | 8 | 2 | - | - | 0.002 | 0.0021 | 0.003 | 0.003 | 0.0039 | 0.004 | 0.0014 | 2 | 1 | - | - | 0.002 | 0.002 | 0.002 | 0.0027 | 0.0045 | 0.005 | 0.0012 | 6 | 4 | - | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0008 | 0.0009 | 0.0011 | 0.0011 | 0.0015 | 0.0017 | 0.00023 | 21 | 1 | - | - | 0.0009 | 0.0009 | 0.0012 | 0.0012 | 0.0015 | 0.0015 | 0.00022 | 8 | 0 | - | - | 0.0009 | 0.00091 | 0.001 | 0.001 | 0.0011 | 0.0011 | 0.00014 | 2 | 0 | - | - | 0.001 | 0.001 | 0.0012 | 0.0013 | 0.0017 | 0.0017 | 0.00027 | 6 | 1 | - | - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Zinc | mg/L | 0.049 - 0.10 | 0.011 - 0.054 | 0.5 | 0.5 | 0.005 | 0.005 | 0.009 | 0.012 | 0.022 | 0.063 | 0.012 | 21 | 3 | - | 10% | 0.006 | 0.0064 | 0.011 | 0.019 | 0.049 | 0.063 | 0.019 | 8 | 0 | - | 25% | 0.006 | 0.0061 | 0.007 | 0.007 | 0.0079 | 0.008 | 0.0014 | 2 | 0 | - | - | 0.005 | 0.0058 | 0.009 | 0.0085 | 0.011 | 0.011 | 0.002 | 6 | 1 | - | - |

Notes:

(a) Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines (FEQGs; ECCC 2024) or Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG. Guidelines are ECCC unless otherwise indicated. Shaded values indicate guideline is calculated based on ETMFs (e.g., hardness, pH, temperature, and/or dissolved organic carbon). Guidelines were calculated based on ETMFs for each individual sample. The range of guidelines calucalted for for the sample set is shown. Underlined values indicate aquatic life guideline is for dissolved fraction but was compared to results for total fraction.

(b) Effluent discharge criteria are the Newfoundland and Labrador Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003) and CFI Certificate of Approval (COA) No. AA22-085691 Effluent Discharge Criteria (NL 2022). Effluent discharge criteria were compared to both total and dissolved metal fractions.

(c) Guideline is an FEQG (ECCC 2024).

(d) Guideline is for hexavalent chromium.

Values that are <DL were transformed to DL prior to calculating summary statistics (i.e., minimum, P5, median, mean, P95, maximum, and standard deviation).

**Bolded** values identify concentrations above the guideline, and *italicized* values identify DLs above or equal to the guideline, as indicated by the following flag superscripts:

LC = Concentration is above the long-term chronic aquatic life guideline.

DL>LC = Detection limit is above or equal to the long-term chronic aquatic life guideline.

No concentrations were above the short-term acute aquatic life guidelines or the ECWSR or CFI COA effluent discharge criteria.

CCME = Canadian Council of Ministers of the Environment; ECCC = Environment and Climate Change Canada; FEQG = Federal Environmental Quality Guideline; ECWSR = Newfoundland and Labrador Environmental Control Water and Sewage Regulations; CFI COA = Canada Fluorspar Inc. Certificate of Approval Effluent Discharge Critieria; P5 = 5th percentile; P95 = 95th percentile; sd = standard deviation; ND = count of non-detectable values; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; DL = detection limit; ETMF = exposure and toxicity modifying factor; - = not applicable.

**Table A.1-2: Water Quality Summary for WQ-STA-28, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Fall (Sep-Oct) | | | | | | | | Results Above Guideline | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | | | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | SA | LC | 7-May-20 | 2-Jun-20 | 1-Sep-20 | 1-Dec-20 | 30-Mar-21 | 2-Jun-21 | 1-Sep-21 | 29-Nov-21 | 29-Mar-22 | 7-Jun-22 | 7-Sep-22 | 14-Dec-22 | 15-Aug-23 | 24-Oct-23 | 6-Dec-23 | 9-Apr-24 | 4-Jun-24 |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.8 | 6.9 | 7.1 | 7.2 | 7.7 | 7.7 | 0.36 | 6 | 0 | - | - | 7.7 | 7.7 | 7.6 | 7.4 | 6.5 | 7.2 | 7.0 | 7.0 | 6.9 | 6.8 | 6.8 | 7.0 | 6.9 | 7.0 | 7.2 | 7.0 | 6.9 |
| Field specific conductivity | µS/cm | - | - | - | - | 129 | 130 | 145 | 149 | 175 | 179 | 20 | 6 | 0 | - | - | 134 | 158 | 150 | 166 | 149 | 178 | 179 | 163 | 171 | 175 | 165 | 158 | 171 | 133 | 148 | 145 | 120 |
| Temperature | C | - | - | - | - | 9.4 | 12 | 20 | 18 | 21 | 21 | 4.5 | 6 | 0 | - | - | 9.5 | 12 | 21 | 8.8 | 4.9 | 18 | 20 | 9.6 | 5.0 | 20 | 19 | 6.6 | 21 | 9.4 | 3.3 | 4.5 | 14 |
| Field dissolved oxygen | mg/L | - | - | - | - | 3.7 | 4.6 | 8.7 | 8.7 | 12 | 13 | 3.4 | 5 | 0 | - | - | 12 | 13 | 13 | 18 | 19 | 13 | 10.0 | 13 | 13 | 8.2 | 8.2 | 1.2 | - | - | - | - | 7.9 |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 0.5 | 1.2 | 4.0 | 5.0 | 1.9 | 6 | 0 | - | - | 1.0 | 0 | 0 | 0 | 2.0 | 0 | 5.0 | - | 2.0 | 0 | 0 | 0 | 0 | 1.0 | 1.0 | 1.0 | 1.0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.6 | 6.7 | 7.6 | 7.3 | 7.6 | 7.6 | 0.45 | 5 | 0 | - | - | 7.4 | 7.5 | 7.6 | 7.4 | 7.3 | 7.6 | 7.6 | 7.6 | 7.2 | 7.6 | 7.1 | 7.1 | 6.7 | 6.6 | **6.41**[a,c] | 6.6 | **6.49**[a,c] |
| Conductivity | µS/cm | - | - | - | - | 133 | 135 | 145 | 154 | 181 | 184 | 21 | 5 | 0 | - | - | 119 | 142 | 141 | 153 | 144 | 178 | 184 | 145 | 159 | 173 | 167 | 162 | 163 | 133 | 144 | 126 | 142 |
| Hardness | mg/L | - | - | - | - | 40 | 41 | 48 | 47 | 53 | 54 | 5.4 | 5 | 0 | - | - | 38 | 45 | 43 | 45 | 46 | 53 | 50 | 69 | 37 | 53 | 48 | 40 | 63 | 40 | 46 | 46 | 50 |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 34 | 34 | 48 | 43 | 50 | 50 | 8.0 | 5 | 0 | - | - | 27 | 33 | 35 | 37 | 33 | 46 | 50 | 40 | 29 | 41 | 49 | 45 | 46 | 34 | 38 | 36 | 40 |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 56 | 57 | 70 | 67 | 77 | 78 | 9.2 | 5 | 0 | - | - | 59 | 67 | 60 | 68 | 73 | 83 | 78 | 85 | 72 | 76 | 73 | 75 | 78 | 56 | 67 | 65 | 69 |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 5 | 5 | - | - | <5.0 | 6.0 | <5.0 | <5.0 | 5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Dissolved organic carbon | mg/L | - | - | - | - | 7.8 | 8.0 | 9.2 | 10 | 13 | 13 | 2.1 | 5 | 0 | - | - | 6.2 | 7.9 | 12 | 8.4 | 13 | 9.1 | 9.2 | 10.0 | 4.5 | 6.1 | 8.9 | 9.8 | 8.1 | 13 | 8.7 | 5.4 | 8.4 |
| Colour | TCU | - | - | - | - | 14 | 20 | 110 | 99 | 165 | 166 | 68 | 5 | 0 | - | - | 76 | 66 | 110 | 70 | 45 | 16 | 14 | 78 | 32 | 44 | 166 | 86 | 38 | 160 | 97 | 48 | 61 |
| Reactive Silica | mg/L | - | - | - | - | 1.5 | 1.8 | 3.3 | 3.4 | 5.6 | 6.1 | 1.7 | 5 | 0 | - | - | 2.4 | 2.0 | 1.5 | 5.5 | 5.0 | 3.2 | 2.8 | 2.6 | 3.7 | 2.9 | 3.3 | 5.5 | 2.1 | 6.1 | 6.5 | 4.6 | 2.9 |
| Turbidity | NTU | - | - | - | - | 0.7 | 0.72 | 2.0 | 1.7 | 2.4 | 2.4 | 0.85 | 5 | 0 | - | - | 3.3 | 2.7 | 2.0 | 2.5 | 9.3 | 2.0 | 0.7 | 1.7 | 1.1 | 1.7 | 0.8 | 1.8 | 0.8 | 2.4 | 2.5 | 1.6 | 1.4 |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 34 | 34 | 48 | 43 | 50 | 50 | 8.0 | 5 | 0 | - | - | 27 | 33 | 35 | 37 | 33 | 46 | 50 | 40 | 29 | 41 | 49 | 45 | 46 | 34 | 38 | 36 | 40 |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 5 | 5 | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 |
| Total Calcium | mg/L | - | - | - | - | 14 | 15 | 17 | 17 | 19 | 19 | 1.9 | 5 | 0 | - | - | 14 | 16 | 16 | 16 | 16 | 19 | 18 | 24 | 12 | 18 | 17 | 14 | 23 | 14 | 16 | 17 | 18 |
| Chloride | mg/L | 640 | 120 | - | - | 10 | 10 | 12 | 12 | 16 | 16 | 2.6 | 5 | 0 | - | - | 15 | 16 | 12 | 14 | 18 | 18 | 16 | 16 | 25 | 16 | 14 | 19 | 13 | 10.0 | 13 | 12 | 12 |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.9 | 0.94 | 1.3 | 1.2 | 1.4 | 1.4 | 0.22 | 5 | 0 | - | - | 1.1 | 1.6 | 0.9 | 1.2 | 1.3 | 1.5 | 1.4 | 2.0 | 1.8 | 1.7 | 1.4 | 1.2 | 1.5 | 1.1 | 1.2 | 1.2 | 1.2 |
| Total Potassium | mg/L | - | - | - | - | 0.5 | 0.52 | 0.6 | 0.6 | 0.68 | 0.7 | 0.071 | 5 | 0 | - | - | 0.6 | 0.9 | 0.6 | 0.6 | 0.7 | 1.1 | 0.5 | 1.3 | 0.8 | 0.8 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.6 | 0.7 |
| Total Sodium | mg/L | - | - | - | - | 8.5 | 8.5 | 9.1 | 9.2 | 9.9 | 10 | 0.64 | 5 | 0 | - | - | 10.0 | 9.2 | 8.7 | 9.5 | 12 | 12 | 9.7 | 14 | 10.0 | 12 | 10.0 | 9.6 | 12 | 8.5 | 9.3 | 9.7 | 9.8 |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 5 | 4 | - | - | 2.0 | 3.0 | <2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 4.0 | 2.0 | <2.0 | 3.0 | <2.0 | <2.0 | 2.0 | 2.0 | 2.0 |
| Sulphide | mg/L | - | - | 0.5 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.67 - 40 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.048 | 0.1 | 0.12 | 0.04 | 5 | 4 | - | - | 0.07 | 0.1 | 0.12 | 0.04 | <0.03 | 0.06 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | 0.04 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.05 | 0.056 | 0.074 | 0.08 | 0.013 | 5 | 4 | - | - | 0.05 | 0.1 | <0.05 | 0.12 | 0.19 | 0.09 | <0.05 | 0.09 | 0.14 | <0.05 | <0.05 | 0.16 | <0.05 | 0.08 | 0.18 | 0.13 | 0.07 |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.05 | 0.056 | 0.074 | 0.08 | 0.013 | 5 | 4 | - | - | 0.05 | 0.1 | <0.05 | 0.12 | 0.19 | 0.09 | <0.05 | 0.09 | 0.14 | <0.05 | <0.05 | 0.16 | <0.05 | 0.08 | 0.18 | 0.13 | 0.07 |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.012 | 0.018 | 0.02 | 0.0045 | 5 | 4 | - | - | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.1 | 0.57 | 1.5 | 1.7 | 0.75 | 5 | 2 | - | - | 0.03 | 0.11 | <0.1 | 0.02 | 0.02 | 0.02 | <0.02 | <0.1 | <0.02 | 0.02 | 0.02 | 0.67 | 0.58 | 1.7 | 1.6 | 1.4 | 1.3 |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0012 | 0.0018 | 0.002 | 0.00045 | 5 | 3 | - | - | *<0.004* [DL=LC] | *<0.004* [DL=LC] | 0.002 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | **0.011**[a,c] | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.37 - 1.3[c] | - | - | 0.08 | 0.08 | 0.12 | 0.16 | 0.31 | 0.34 | 0.11 | 5 | 0 | - | - | 0.29 | 0.33 | 0.18 | 0.25 | **0.61**[a,c] | 0.16 | 0.08 | 0.27 | **0.46**[a,c] | 0.2 | 0.08 | 0.11 | 0.11 | 0.34 | 0.32 | 0.33 | 0.24 |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Barium | mg/L | - | - | 5 | 5 | 0.12 | 0.13 | 0.15 | 0.15 | 0.19 | 0.2 | 0.027 | 5 | 0 | - | - | 0.093 | 0.13 | 0.15 | 0.12 | 0.14 | 0.14 | 0.15 | 0.17 | 0.1 | 0.18 | 0.2 | 0.1 | 0.18 | 0.12 | 0.12 | 0.1 | 0.12 |
| Total Beryllium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.007 | 0.007 | 0.009 | 0.0092 | 0.012 | 0.013 | 0.0025 | 5 | 0 | - | - | 0.005 | 0.01 | 0.009 | 0.007 | <0.005 | 0.007 | 0.007 | <0.01 | <0.005 | 0.009 | 0.007 | <0.005 | <0.012 | 0.01 | <0.005 | 0.017 | <0.005 |
| Total Cadmium | mg/L | 0.00076 - 0.0014 | 0.000069 - 0.00012 | 0.05 | 0.05 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 5 | 5 | - | - | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | <0.0001 | *<0.0003* [DL=LC] | *<0.0001* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] | *<0.0003* [DL=LC] |
| Total Chromium | mg/L | - | 0.005[c,d] | 0.05[d] | 1 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.004 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Cobalt | mg/L | - | 0.00078 - 0.00087[c] | - | - | 0.001 | 0.001 | 0.001 | 0.0078 | 0.028 | 0.035 | 0.015 | 5 | 4 | - | 20% | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | <0.0005 | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.002* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] |
| Total Copper | mg/L | - | 0.00037 - 0.0057[c] | 0.3 | 0.3 | 0.001 | 0.001 | 0.002 | 0.0022 | 0.0044 | 0.005 | 0.0016 | 5 | 1 | - | 40% | 0.002 | 0.003 | 0.002 | 0.002 | **0.002**[a,c] | **0.003**[a,c] | <0.001 | <0.002 | **0.001**[a,c] | **0.002**[a,c] | **0.001**[a,c] | 0.001 | *<0.002* [DL=LC] | 0.002 | 0.002 | <0.001 | *<0.001* [DL=LC] |
| Total Iron | mg/L | - | 0.4 - 0.8[c] | 10 | 10 | 0.22 | 0.23 | 0.27 | 0.28 | 0.34 | 0.35 | 0.049 | 5 | 0 | - | - | 0.23 | 0.44 | 0.29 | 0.41 | 0.48 | 0.19 | 0.22 | 0.33 | 0.25 | 0.22 | 0.27 | 0.2 | 0.23 | 0.35 | 0.36 | 0.21 | 0.22 |
| Total Lead | mg/L | - | 0.0072 - 0.015[c] | 0.2 | 0.2 | 0.0009 | 0.0009 | 0.003 | 0.0024 | 0.0037 | 0.0038 | 0.0014 | 5 | 0 | - | - | 0.0048 | 0.0054 | 0.0032 | 0.0056 | **0.0148**[a,c] | 0.0023 | 0.0009 | 0.004 | 0.0031 | 0.0022 | 0.0009 | 0.0026 | <0.0021 | 0.0038 | 0.0045 | 0.0021 | 0.0024 |
| Total Manganese | mg/L | 2.8 - 4.8 | 0.27 - 0.5 | - | - | 0.044 | 0.054 | 0.11 | 0.12 | 0.19 | 0.2 | 0.061 | 5 | 0 | - | - | 0.027 | 0.069 | 0.044 | 0.075 | 0.23 | 0.059 | 0.11 | 0.047 | 0.041 | 0.087 | 0.2 | 0.071 | 0.16 | 0.092 | 0.082 | 0.06 | 0.068 |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 5 | 5 | - | - | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.002 | <0.002 | <0.002 |
| Total Nickel | mg/L | - | 0.025 - 0.072 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.0022 | 0.0028 | 0.003 | 0.00045 | 5 | 4 | - | - | 0.011 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.009 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 5 | 5 | - | - | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 5 | 5 | - | - | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | <0.0001 | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00049* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.026 | 0.026 | 0.038 | 0.034 | 0.039 | 0.039 | 0.0065 | 5 | 0 | - | - | 0.024 | 0.045 | 0.027 | 0.026 | 0.019 | 0.035 | 0.038 | 0.042 | 0.024 | 0.038 | 0.039 | 0.024 | 0.044 | 0.026 | 0.029 | 0.028 | 0.033 |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 5 | 5 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0028 | 0.004 | 0.004 | 0.0011 | 5 | 3 | - | - | 0.004 | 0.005 | 0.004 | 0.004 | 0.009 | <0.002 | <0.002 | <0.01 | 0.004 | 0.002 | <0.002 | <0.002 | <0.003 | 0.004 | 0.002 | <0.002 | <0.002 |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0008 | 0.00084 | 0.001 | 0.001 | 0.0012 | 0.0012 | 0.00015 | 5 | 0 | - | - | 0.0009 | 0.0017 | 0.0008 | 0.0011 | 0.0012 | 0.0015 | 0.0012 | 0.0014 | 0.0009 | 0.0013 | 0.0011 | 0.0009 | <0.0011 | 0.001 | 0.0012 | 0.0011 | 0.0011 |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Zinc | mg/L | 0.049 - 0.10 | 0.011 - 0.054 | 0.5 | 0.5 | 0.005 | 0.005 | 0.008 | 0.0074 | 0.0098 | 0.01 | 0.0023 | 5 | 2 | - | - | 0.006 | 0.008 | <0.005 | 0.009 | 0.02 | 0.009 | 0.01 | 0.022 | 0.007 | 0.009 | 0.008 | 0.006 | 0.009 | 0.009 | 0.01 | 0.008 | 0.011 |

**Table A.1-2: Water Quality Summary for WQ-STA-28, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 | WQ-STA-28 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | 10-Sep-24 | 3-Dec-24 | 25-Mar-25 | 3-Jun-25 | 16-Sep-25 |
| **Field Measured** | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.2 | 7.3 | 8.0 | 7.9 | 7.7 |
| Field specific conductivity | µS/cm | - | - | - | - | 129 | 103 | 128 | 126 | 140 |
| Temperature | C | - | - | - | - | 21 | 3.8 | 4.2 | 16 | 19 |
| Field dissolved oxygen | mg/L | - | - | - | - | 3.7 | 9.5 | - | 3.0 | 8.7 |
| Field total suspended solids | mg/L | - | - | 30 | - | 1.0 | 2.0 | 0 | 5.0 | 0 |
| **Conventional Parameters** | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.6 | 7.4 | 7.1 | 6.8 | - |
| Conductivity | µS/cm | - | - | - | - | 145 | 120 | 147 | 146 | - |
| Hardness | mg/L | - | - | - | - | 54 | 54 | 51 | 44 | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 48 | 30 | 36 | 41 | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 70 | 59 | 71 | 70 | - |
| Total suspended solids | mg/L | - | - | - | - | <5.0 | <5.0 | <5.0 | <5.0 | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 7.8 | 15 | 3.9 | 4.9 | - |
| Colour | TCU | - | - | - | - | 44 | 142 | 38 | 39 | - |
| Reactive Silica | mg/L | - | - | - | - | 3.4 | 4.7 | 4.5 | 2.9 | - |
| Turbidity | NTU | - | - | - | - | 2.4 | 3.3 | 3.6 | 1.8 | - |
| **Major Ions** | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 48 | 30 | 36 | 41 | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | <10.0 | <10.0 | <10.0 | <10.0 | - |
| Total Calcium | mg/L | - | - | - | - | 19 | 19 | 18 | 16 | - |
| Chloride | mg/L | 640 | 120 | - | - | 10.0 | 7.0 | 16 | 15 | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.3 | 1.4 | 1.3 | 1.1 | - |
| Total Potassium | mg/L | - | - | - | - | 0.6 | 0.9 | 0.7 | 0.5 | - |
| Total Sodium | mg/L | - | - | - | - | 9.1 | 10.0 | 10.0 | 9.1 | - |
| Sulphate | mg/L | - | - | - | - | <2.0 | <2.0 | 2.0 | 3.0 | - |
| Sulphide | mg/L | - | - | 0.5 | - | <0.05 | <0.05 | <0.01 | <0.01 | - |
| **Nutrients** | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.67 - 40 | 2 | 2 | <0.03 | <0.03 | <0.03 | <0.03 | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | <0.05 | 0.07 | 0.14 | 0.2 | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | <0.05 | 0.07 | 0.14 | 0.2 | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | <0.01 | 0.01 | <0.01 | <0.01 | - |
| Total phosphorus | mg-P/L | - | - | - | - | 1.1 | 2.0 | 1.4 | 0.84 | - |
| **Organics** | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.002 | <0.001 | <0.001 | - |
| **Total Metals** | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.37 - 1.3[c1] | - | - | 0.12 | 0.71 | 0.42 | 0.15 | - |
| Total Antimony | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.15 | 0.14 | 0.099 | 0.12 | - |
| Total Beryllium | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Bismuth | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.013 | 0.016 | 0.007 | <0.005 | - |
| Total Cadmium | mg/L | 0.00076 - 0.0014 | 0.000069 - 0.00012 | 0.05 | 0.05 | *<0.0003 [DL>LC]* | *<0.0003 [DL>LC]* | *<0.0003 [DL>LC]* | *<0.0003 [DL>LC]* | - |
| Total Chromium | mg/L | - | 0.005[c1,d] | 0.05[d] | 1 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Cobalt | mg/L | - | 0.00078 - 0.0087[c1] | - | - | **0.035[sLC]** | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | - |
| Total Copper | mg/L | - | 0.00037 - 0.0057[c1] | 0.3 | 0.3 | **0.005[sLC]** | 0.003 | <0.001 | <0.001 | - |
| Total Iron | mg/L | - | 0.4 - 0.8[c1] | 10 | 10 | 0.25 | 0.79 | 0.21 | 0.16 | - |
| Total Lead | mg/L | - | 0.0072 - 0.015[c1] | 0.2 | 0.2 | 0.003 | **0.02[sLC]** | 0.0023 | 0.002 | - |
| Total Manganese | mg/L | 2.8 - 4.8 | 0.27 - 0.5 | - | - | 0.17 | 0.17 | 0.073 | 0.054 | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | *<0.000026 [DL>LC]* | *<0.000026 [DL>LC]* | *<0.000026 [DL>LC]* | *<0.000026 [DL>LC]* | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Nickel | mg/L | - | 0.025 - 0.072 | 0.5 | 0.5 | 0.003 | <0.002 | 0.002 | <0.002 | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | *<0.00025 [DL>LC]* | *<0.00025 [DL>LC]* | *<0.00025 [DL>LC]* | *<0.00025 [DL>LC]* | - |
| Total Strontium | mg/L | - | 2.5[c1] | - | - | 0.038 | 0.035 | 0.029 | 0.031 | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | - |
| Total Tin | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Titanium | mg/L | - | - | - | - | <0.002 | 0.009 | 0.003 | <0.002 | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.001 | 0.0015 | 0.001 | 0.001 | - |
| Total Vanadium | mg/L | - | 0.12[c1] | - | - | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Zinc | mg/L | 0.049 - 0.10 | 0.011 - 0.054 | 0.5 | 0.5 | <0.005 | **0.063[sLC]** | **0.012[sLC]** | <0.005 | - |

**Table A.1-3: Water Quality Summary for WS-5, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[c] | | Effluent Discharge Criteria[b] | | Full Dataset (2020 to 2025) | | | | | | | | | Results Above Guideline | | Winter (Nov-Mar) | | | | | | | | | Results Above Guideline | | Spring (Apr-May) | | | | | | | | | Results Above Guideline | | Summer (Jun-Aug) | | | | | | | | | Results Above Guideline | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | SA | LC |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.9 | 6.9 | 7.2 | 7.3 | 7.8 | 7.8 | 0.29 | 22 | 0 | - | - | 6.9 | 6.9 | 7.1 | 7.2 | 7.5 | 7.5 | 0.23 | 8 | 0 | - | - | 7.3 | 7.3 | 7.5 | 7.5 | 7.7 | 7.7 | 0.28 | 2 | 0 | - | - | 6.9 | 7.0 | 7.3 | 7.3 | 7.8 | 7.8 | 0.33 | 6 | 0 | - | - |
| Field specific conductivity | µS/cm | - | - | - | - | 87 | 98 | 140 | 139 | 183 | 192 | 27 | 22 | 0 | - | - | 87 | 93 | 141 | 138 | 181 | 192 | 34 | 8 | 0 | - | - | 122 | 123 | 125 | 125 | 127 | 127 | 3.3 | 2 | 0 | - | - | 98 | 105 | 153 | 145 | 177 | 183 | 30 | 6 | 0 | - | - |
| Temperature | C | - | - | - | - | 2.2 | 3.0 | 11 | 12 | 21 | 22 | 6.9 | 22 | 0 | - | - | 2.2 | 2.4 | 4.5 | 5.1 | 8.2 | 8.6 | 2.2 | 8 | 0 | - | - | 4.8 | 5.0 | 7.0 | 7.0 | 8.9 | 9.1 | 3.0 | 2 | 0 | - | - | 12 | 12 | 16 | 16 | 20 | 21 | 3.4 | 6 | 0 | - | - |
| Field dissolved oxygen | mg/L | - | - | - | - | 0.7 | 4.9 | 11 | 11 | 17 | 19 | 4.3 | 17 | 0 | - | - | 0.7 | 3.1 | 14 | 12 | 18 | 19 | 6.3 | 6 | 0 | - | - | 13 | 13 | 13 | 13 | 13 | 13 | - | 1 | 0 | - | - | 6.8 | 6.9 | 9.1 | 9.6 | 13 | 13 | 2.7 | 5 | 0 | - | - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 1.0 | 1.2 | 5.0 | 5.0 | 1.8 | 21 | 0 | - | - | 0 | 0 | 1.0 | 1.1 | 2.7 | 3.0 | 1.1 | 7 | 0 | - | - | 0 | 0.25 | 2.5 | 2.5 | 4.8 | 5.0 | 3.5 | 2 | 0 | - | - | 0 | 0 | 0.5 | 1.2 | 4.0 | 5.0 | 1.9 | 6 | 0 | - | - |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.3 | 6.4 | 7.0 | 7.0 | 7.5 | 7.5 | 0.4 | 21 | 0 | - | 19% | 6.3 | 6.5 | 7.0 | 7.0 | 7.3 | 7.3 | 0.32 | 8 | 0 | - | 13% | 6.5 | 6.5 | 6.8 | 6.8 | 7.0 | 7.1 | 0.43 | 2 | 0 | - | 50% | 6.4 | 6.5 | 7.0 | 7.0 | 7.5 | 7.5 | 0.5 | 6 | 0 | - | 17% |
| Conductivity | µS/cm | - | - | - | - | 100 | 109 | 128 | 134 | 171 | 177 | 22 | 21 | 0 | - | - | 100 | 105 | 128 | 132 | 159 | 162 | 21 | 8 | 0 | - | - | 109 | 109 | 110 | 110 | 111 | 111 | 1.4 | 2 | 0 | - | - | 117 | 119 | 142 | 143 | 172 | 177 | 21 | 6 | 0 | - | - |
| Hardness | mg/L | - | - | - | - | 22 | 27 | 33 | 35 | 45 | 52 | 7.0 | 21 | 0 | - | - | 27 | 28 | 32 | 35 | 49 | 52 | 8.5 | 8 | 0 | - | - | 22 | 23 | 26 | 26 | 29 | 29 | 4.8 | 2 | 0 | - | - | 33 | 33 | 36 | 38 | 45 | 45 | 5.1 | 6 | 0 | - | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 12 | 14 | 23 | 23 | 34 | 35 | 7.3 | 21 | 0 | - | - | 14 | 14 | 19 | 20 | 28 | 28 | 6.1 | 8 | 0 | - | - | 12 | 12 | 15 | 15 | 18 | 18 | 4.2 | 2 | 0 | - | - | 22 | 22 | 26 | 27 | 32 | 33 | 4.2 | 6 | 0 | - | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 49 | 51 | 62 | 63 | 76 | 83 | 9.2 | 21 | 0 | - | - | 51 | 52 | 63 | 64 | 76 | 76 | 9.5 | 8 | 0 | - | - | 52 | 52 | 54 | 54 | 56 | 56 | 2.8 | 2 | 0 | - | - | 57 | 58 | 66 | 67 | 79 | 83 | 8.8 | 6 | 0 | - | - |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.5 | 9.0 | 10 | 1.4 | 21 | 18 | - | - | 5.0 | 5.0 | 5.0 | 5.6 | 8.0 | 9.0 | 1.4 | 8 | 6 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 6 | 6 | - | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 4.1 | 4.3 | 7.8 | 8.2 | 13 | 15 | 3.1 | 21 | 0 | - | - | 4.1 | 4.2 | 7.3 | 7.4 | 11 | 12 | 2.7 | 8 | 0 | - | - | 5.6 | 5.6 | 5.6 | 5.6 | 5.6 | 5.6 | 0 | 2 | 0 | - | - | 5.0 | 5.2 | 6.3 | 7.6 | 12 | 13 | 2.9 | 6 | 0 | - | - |
| Colour | TCU | - | - | - | - | 10 | 13 | 50 | 66 | 159 | 170 | 44 | 21 | 0 | - | - | 26 | 27 | 56 | 64 | 118 | 133 | 36 | 8 | 0 | - | - | 46 | 49 | 70 | 70 | 91 | 93 | 33 | 2 | 0 | - | - | 10 | 17 | 46 | 50 | 81 | 82 | 27 | 6 | 0 | - | - |
| Reactive Silica | mg/L | - | - | - | - | 1.2 | 1.7 | 2.7 | 3.1 | 5.1 | 5.1 | 1.2 | 21 | 0 | - | - | 2.6 | 2.7 | 4.2 | 4.1 | 5.1 | 5.1 | 0.99 | 8 | 0 | - | - | 1.7 | 1.8 | 2.5 | 2.5 | 3.2 | 3.3 | 1.1 | 2 | 0 | - | - | 1.2 | 1.4 | 2.2 | 2.1 | 2.6 | 2.7 | 0.5 | 6 | 0 | - | - |
| Turbidity | NTU | - | - | - | - | 0.7 | 0.9 | 2.4 | 3.0 | 8.0 | 8.8 | 2.1 | 21 | 0 | - | - | 1.7 | 2.0 | 3.1 | 4.4 | 8.5 | 8.8 | 2.7 | 8 | 0 | - | - | 2.4 | 2.5 | 3.0 | 3.0 | 3.5 | 3.6 | 0.85 | 2 | 0 | - | - | 0.7 | 0.85 | 1.7 | 1.7 | 2.5 | 2.5 | 0.66 | 6 | 0 | - | - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 12 | 14 | 23 | 23 | 34 | 35 | 7.3 | 21 | 0 | - | - | 14 | 14 | 19 | 20 | 28 | 28 | 6.1 | 8 | 0 | - | - | 12 | 12 | 15 | 15 | 18 | 18 | 4.2 | 2 | 0 | - | - | 22 | 22 | 26 | 27 | 32 | 33 | 4.2 | 6 | 0 | - | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 21 | 21 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 8 | 8 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 2 | 2 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 6 | 6 | - | - |
| Total Calcium | mg/L | - | - | - | - | 7.0 | 8.5 | 11 | 11 | 15 | 18 | 2.6 | 21 | 0 | - | - | 8.5 | 8.7 | 10.0 | 11 | 17 | 18 | 3.2 | 8 | 0 | - | - | 7.0 | 7.1 | 8.2 | 8.2 | 9.3 | 9.4 | 1.7 | 2 | 0 | - | - | 11 | 11 | 12 | 13 | 15 | 15 | 1.7 | 6 | 0 | - | - |
| Chloride | mg/L | 640 | 120 | - | - | 10 | 13 | 18 | 19 | 27 | 33 | 5.1 | 21 | 0 | - | - | 10 | 11 | 21 | 21 | 31 | 33 | 7.2 | 8 | 0 | - | - | 17 | 17 | 19 | 19 | 20 | 20 | 2.1 | 2 | 0 | - | - | 15 | 16 | 19 | 19 | 24 | 25 | 3.5 | 6 | 0 | - | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.1 | 1.2 | 1.5 | 1.5 | 2.0 | 2.2 | 0.28 | 21 | 0 | - | - | 1.3 | 1.3 | 1.5 | 1.6 | 2.1 | 2.2 | 0.32 | 8 | 0 | - | - | 1.2 | 1.2 | 1.3 | 1.3 | 1.4 | 1.4 | 0.14 | 2 | 0 | - | - | 1.2 | 1.3 | 1.6 | 1.6 | 1.9 | 1.9 | 0.26 | 6 | 0 | - | - |
| Total Potassium | mg/L | - | - | - | - | 0.6 | 0.6 | 0.72 | 0.77 | 1.0 | 1.2 | 0.13 | 21 | 1 | - | - | 0.7 | 0.7 | 0.76 | 0.83 | 1.1 | 1.2 | 0.17 | 8 | 1 | - | - | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0 | 2 | 0 | - | - | 0.6 | 0.6 | 0.75 | 0.73 | 0.88 | 0.9 | 0.12 | 6 | 0 | - | - |
| Total Sodium | mg/L | - | - | - | - | 9.4 | 10 | 12 | 13 | 16 | 16 | 1.8 | 21 | 0 | - | - | 11 | 11 | 12 | 13 | 16 | 16 | 1.8 | 8 | 0 | - | - | 12 | 12 | 12 | 12 | 12 | 12 | 0.071 | 2 | 0 | - | - | 10 | 11 | 13 | 13 | 16 | 16 | 2.0 | 6 | 0 | - | - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 3.0 | 2.7 | 4.0 | 5.0 | 0.85 | 21 | 4 | - | - | 2.0 | 2.0 | 3.0 | 3.0 | 4.7 | 5.0 | 1.1 | 8 | 0 | - | - | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 0 | 2 | 0 | - | - | 2.0 | 2.0 | 2.5 | 2.7 | 3.8 | 4.0 | 0.82 | 6 | 1 | - | - |
| Sulphide | mg/L | - | - | 0.5 | - | 0.01 | 0.01 | 0.05 | 0.046 | 0.05 | 0.05 | 0.012 | 21 | 21 | - | - | 0.01 | 0.024 | 0.05 | 0.045 | 0.05 | 0.05 | 0.014 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.01 | 0.02 | 0.05 | 0.043 | 0.05 | 0.05 | 0.016 | 6 | 6 | - | - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.87 - 17 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.04 | 0.09 | 0.11 | 0.022 | 21 | 16 | - | - | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0 | 8 | 8 | - | - | 0.03 | 0.032 | 0.05 | 0.05 | 0.068 | 0.07 | 0.028 | 2 | 1 | - | - | 0.03 | 0.03 | 0.03 | 0.042 | 0.078 | 0.09 | 0.024 | 6 | 4 | - | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.08 | 0.088 | 0.14 | 0.15 | 0.038 | 21 | 9 | - | - | 0.08 | 0.084 | 0.12 | 0.11 | 0.15 | 0.15 | 0.024 | 8 | 0 | - | - | 0.05 | 0.052 | 0.065 | 0.065 | 0.079 | 0.08 | 0.021 | 2 | 1 | - | - | 0.05 | 0.05 | 0.05 | 0.078 | 0.14 | 0.14 | 0.044 | 6 | 4 | - | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 21 | 20 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 6 | 6 | - | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.08 | 0.088 | 0.14 | 0.15 | 0.038 | 21 | 8 | - | - | 0.08 | 0.084 | 0.12 | 0.11 | 0.15 | 0.15 | 0.024 | 8 | 0 | - | - | 0.05 | 0.052 | 0.065 | 0.065 | 0.079 | 0.08 | 0.021 | 2 | 1 | - | - | 0.05 | 0.05 | 0.05 | 0.078 | 0.14 | 0.14 | 0.044 | 6 | 4 | - | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.013 | 0.02 | 0.06 | 0.011 | 21 | 18 | - | - | 0.01 | 0.01 | 0.01 | 0.016 | 0.043 | 0.06 | 0.018 | 8 | 7 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 2 | 2 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 6 | 5 | - | - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.1 | 0.51 | 1.4 | 1.9 | 0.58 | 21 | 7 | - | - | 0.02 | 0.02 | 0.38 | 0.64 | 1.7 | 1.9 | 0.73 | 8 | 3 | - | - | 0.02 | 0.072 | 0.54 | 0.54 | 1.0 | 1.1 | 0.73 | 2 | 0 | - | - | 0.02 | 0.02 | 0.33 | 0.39 | 0.89 | 0.95 | 0.41 | 6 | 2 | - | - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0018 | 0.004 | 0.006 | 0.0014 | 21 | 12 | - | 5% | 0.001 | 0.001 | 0.001 | 0.0019 | 0.005 | 0.006 | 0.0018 | 8 | 5 | - | 13% | 0.002 | 0.0021 | 0.003 | 0.003 | 0.0039 | 0.004 | 0.0014 | 2 | 0 | - | - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.0033 | 0.004 | 0.0012 | 6 | 4 | - | - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.33 - 1.5[d] | - | - | 0.08 | 0.08 | 0.29 | 0.35 | 0.42 | 2.0 | 0.4 | 21 | 0 | - | 10% | 0.27 | 0.27 | 0.35 | 0.55 | 1.5 | 2.0 | 0.6 | 8 | 0 | - | 25% | 0.32 | 0.32 | 0.33 | 0.33 | 0.33 | 0.33 | 0.0071 | 2 | 0 | - | - | 0.08 | 0.093 | 0.19 | 0.18 | 0.27 | 0.28 | 0.073 | 6 | 0 | - | - |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.068 | 0.072 | 0.13 | 0.15 | 0.25 | 0.29 | 0.057 | 21 | 0 | - | - | 0.072 | 0.076 | 0.12 | 0.13 | 0.24 | 0.29 | 0.069 | 8 | 0 | - | - | 0.068 | 0.069 | 0.079 | 0.079 | 0.088 | 0.089 | 0.015 | 2 | 0 | - | - | 0.13 | 0.13 | 0.16 | 0.16 | 0.19 | 0.19 | 0.025 | 6 | 0 | - | - |
| Total Beryllium | mg/L | - | - | - | - | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.00022 | 21 | 21 | - | - | 0.001 | 0.0014 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.005 | 0.005 | 0.008 | 0.0086 | 0.016 | 0.019 | 0.0038 | 21 | 6 | - | - | 0.005 | 0.005 | 0.006 | 0.0075 | 0.014 | 0.016 | 0.0038 | 8 | 3 | - | - | 0.006 | 0.0067 | 0.013 | 0.013 | 0.018 | 0.019 | 0.0092 | 2 | 0 | - | - | 0.005 | 0.005 | 0.0075 | 0.0078 | 0.012 | 0.012 | 0.0028 | 6 | 3 | - | - |
| Total Cadmium | mg/L | 0.00046 - 0.0011 | 0.000046 - 0.000093 | 0.05 | 0.05 | 0.0001 | 0.0001 | 0.0003 | 0.00029 | 0.0003 | 0.0005 | 0.000077 | 21 | 20 | - | 5% | 0.0001 | 0.00017 | 0.0003 | 0.0003 | 0.00043 | 0.0005 | 0.00011 | 8 | 7 | - | 13% | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 2 | 2 | - | - | 0.0001 | 0.00015 | 0.0003 | 0.00027 | 0.0003 | 0.0003 | 0.000082 | 6 | 6 | - | - |
| Total Chromium | mg/L | - | 0.005[c,d] | 0.05[d,b] | 1 | 0.002 | 0.002 | 0.002 | 0.0021 | 0.003 | 0.004 | 0.00048 | 21 | 20 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.0035 | 0.004 | 0.00082 | 6 | 6 | - | - |
| Total Cobalt | mg/L | - | 0.00078[d] | - | - | 0.0005 | 0.001 | 0.001 | 0.0043 | 0.002 | 0.07 | 0.015 | 21 | 19 | - | 10% | 0.0005 | 0.00068 | 0.001 | 0.00094 | 0.001 | 0.001 | 0.00018 | 8 | 7 | - | 13% | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0012 | 0.0018 | 0.002 | 0.00041 | 6 | 6 | - | - |
| Total Copper | mg/L | - | 0.00022 - 0.0086[d] | 0.3 | 0.3 | 0.001 | 0.001 | 0.002 | 0.0022 | 0.003 | 0.01 | 0.0019 | 21 | 5 | - | 38% | 0.001 | 0.001 | 0.002 | 0.003 | 0.0076 | 0.01 | 0.0029 | 8 | 1 | - | 75% | 0.001 | 0.0011 | 0.0015 | 0.0015 | 0.002 | 0.002 | 0.00071 | 2 | 1 | - | - | 0.001 | 0.0013 | 0.002 | 0.0018 | 0.002 | 0.002 | 0.00041 | 6 | 2 | - | 33% |
| Total Iron | mg/L | - | 0.42 - 0.8[d] | 10 | 10 | 0.19 | 0.19 | 0.35 | 0.48 | 0.52 | 3.3 | 0.65 | 21 | 0 | - | 5% | 0.2 | 0.21 | 0.41 | 0.71 | 2.3 | 3.3 | 1.0 | 8 | 0 | - | 13% | 0.23 | 0.23 | 0.26 | 0.26 | 0.28 | 0.28 | 0.035 | 2 | 0 | - | - | 0.19 | 0.19 | 0.29 | 0.28 | 0.36 | 0.36 | 0.075 | 6 | 0 | - | - |
| Total Lead | mg/L | - | 0.0066 - 0.013[c] | 0.2 | 0.2 | 0.001 | 0.0018 | 0.0031 | 0.0067 | 0.0095 | 0.062 | 0.013 | 21 | 1 | - | 10% | 0.002 | 0.0024 | 0.0066 | 0.013 | 0.043 | 0.062 | 0.02 | 8 | 0 | - | 25% | 0.003 | 0.0031 | 0.0039 | 0.0039 | 0.0046 | 0.0047 | 0.0012 | 2 | 0 | - | - | 0.0018 | 0.0019 | 0.0024 | 0.0024 | 0.003 | 0.0031 | 0.0005 | 6 | 1 | - | - |
| Total Manganese | mg/L | 2.0 - 3.8 | 0.27 - 0.43 | - | - | 0.045 | 0.049 | 0.074 | 0.23 | 0.26 | 3.1 | 0.66 | 21 | 0 | - | 5% | 0.065 | 0.065 | 0.085 | 0.46 | 2.0 | 3.1 | 1.1 | 8 | 0 | - | 13% | 0.045 | 0.046 | 0.059 | 0.059 | 0.072 | 0.073 | 0.02 | 2 | 0 | - | - | 0.049 | 0.052 | 0.077 | 0.071 | 0.082 | 0.082 | 0.013 | 6 | 0 | - | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 21 | 21 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 8 | 8 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 2 | 2 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 6 | 6 | - | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 20 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.0025 | 0.003 | 0.009 | 0.0015 | 21 | 18 | - | - | 0.002 | 0.002 | 0.002 | 0.0024 | 0.003 | 0.003 | 0.00052 | 8 | 6 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 1 | - | - | 0.002 | 0.002 | 0.002 | 0.0032 | 0.0073 | 0.009 | 0.0029 | 6 | 6 | - | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 21 | 21 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 6 | 6 | - | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.00025 | 0.00025 | 0.00025 | 0.00044 | 0.00049 | 0.004 | 0.00082 | 21 | 20 | - | 5% | 0.00025 | 0.00025 | 0.00025 | 0.00072 | 0.0027 | 0.004 | 0.0013 | 8 | 7 | - | 13% | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 2 | 2 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00029 | 0.00043 | 0.00049 | 0.000098 | 6 | 6 | - | - |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.015 | 0.019 | 0.03 | 0.031 | 0.046 | 0.047 | 0.0096 | 21 | 0 | - | - | 0.015 | 0.017 | 0.025 | 0.025 | 0.032 | 0.032 | 0.0057 | 8 | 0 | - | - | 0.019 | 0.019 | 0.022 | 0.022 | 0.024 | 0.024 | 0.0035 | 2 | 0 | - | - | 0.03 | 0.03 | 0.037 | 0.037 | 0.045 | 0.046 | 0.0064 | 6 | 0 | - | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00012 | 0.0003 | 0.0003 | 0.00006 | 21 | 21 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00023 | 0.0003 | 0.000071 | 8 | 8 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 2 | 2 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00025 | 0.0003 | 0.000082 | 6 | 6 | - | - |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0036 | 0.01 | 0.016 | 0.0034 | 21 | 10 | - | - | 0.002 | 0.002 | 0.003 | 0.0053 | 0.014 | 0.016 | 0.0051 | 8 | 1 | - | - | 0.002 | 0.0021 | 0.0025 | 0.0025 | 0.003 | 0.003 | 0.00071 | 2 | 1 | - | - | 0.002 | 0.002 | 0.002 | 0.0022 | 0.0028 | 0.003 | 0.00041 | 6 | 6 | - | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0006 | 0.0006 | 0.0011 | 0.0012 | 0.0018 | 0.0033 | 0.0006 | 21 | 0 | - | - | 0.0006 | 0.0006 | 0.00085 | 0.0011 | 0.0026 | 0.0033 | 0.0009 | 8 | 0 | - | - | 0.0006 | 0.00062 | 0.0008 | 0.0008 | 0.00098 | 0.001 | 0.00028 | 2 | 0 | - | - | 0.0011 | 0.0011 | 0.0014 | 0.0014 | 0.0016 | 0.0016 | 0.00021 | 6 | 0 | - | - |
| Total Vanadium | mg/L | - | 0.12[d] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Zinc | mg/L | 0.034 - 0.083 | 0.0075 - 0.032 | 0.5 | 0.5 | 0.005 | 0.005 | 0.007 | 0.024 | 0.02 | 0.33 | 0.071 | 21 | 8 | 5% | 14% | 0.006 | 0.0064 | 0.013 | 0.052 | 0.22 | 0.33 | 0.11 | 8 | 1 | 13% | 13% | 0.006 | 0.0061 | 0.007 | 0.007 | 0.0079 | 0.008 | 0.0014 | 2 | 0 | - | 50% | 0.005 | 0.005 | 0.0055 | 0.007 | 0.012 | 0.014 | 0.0035 | 6 | 4 | - | 17% |

Notes:

(a) Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines (FEQGs; ECCC 2024) or Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG. Guidelines are ECCC unless otherwise indicated. Shaded values indicate guideline is calculated based on ETMFs (e.g., hardness, pH, temperature, and/or dissolved organic carbon). Guidelines were calculated based on ETMFs for each individual sample. The range of guidelines calucalted for for the sample set is shown. Underlined values indicate aquatic life guideline is for dissolved fraction but was compared to results for total fraction.

(b) Effluent discharge criteria are the Newfoundland and Labrador Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003) and CFI Certificate of Approval (COA) No. AA22-085691 Effluent Discharge Criteria (NL 2022). Effluent discharge criteria were compared to both total and dissolved metal fractions.

(c) Guideline is an FEQG (ECCC 2024).

(d) Guideline is for hexavalent chromium.

Values that are <DL were transformed to DL prior to calculating summary statistics (i.e., minimum, P5, median, mean, P95, maximum, and standard deviation).

**Bolded** values identify concentrations above the guideline, and *italicized* values identify DLs above or equal to the guideline, as indicated by the following flag superscripts:

SA = Concentration is above the short-term acute aquatic life guideline.

LC = Concentration is above the long-term chronic aquatic life guideline.

DL>LC = Detection limit is above or equal to the long-term chronic aquatic life guideline.

No concentrations were above the ECWSR or CFI COA effluent discharge criteria.

CCME = Canadian Council of Ministers of the Environment; ECCC = Environment and Climate Change Canada; FEQG = Federal Environmental Quality Guideline; ECWSR = Newfoundland and Labrador Environmental Control Water and Sewage Regulations; CFI COA = Canada Fluorspar Inc. Certificate of Approval Effluent Discharge Critieria; P5 = 5th percentile; P95 = 95th percentile; sd = standard deviation; ND = count of non-detectable values; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; DL = detection limit; ETMF = exposure and toxicity modifying factor; - = not applicable.

**Table A.1-3: Water Quality Summary for WS-5, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Fall (Sep-Oct) | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 | WS-5 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | | SA | LC | 7-May-20 | 2-Jun-20 | 1-Sep-20 | 1-Dec-20 | 30-Mar-21 | 2-Jun-21 | 1-Sep-21 | 29-Nov-21 | 29-Mar-22 | 7-Jun-22 | 7-Sep-22 | 14-Dec-22 | 15-Aug-23 | 24-Oct-23 | 6-Dec-23 | 9-Apr-24 | 4-Jun-24 | 10-Sep-24 |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.0 | 7.0 | 7.2 | 7.3 | 7.8 | 7.8 | 0.32 | 6.0 | 0 | - | - | 7.7 | 7.8 | 7.6 | 7.4 | 6.9 | 7.2 | 7.0 | 7.1 | 6.9 | 6.9 | 7.2 | 7.1 | 7.1 | 7.1 | 7.1 | 7.3 | 7.3 | 7.1 |
| Field specific conductivity | µS/cm | - | - | - | - | 115 | 115 | 140 | 139 | 165 | 170 | 21 | 6.0 | 0 | - | - | 122 | 153 | 140 | 160 | 123 | 183 | 170 | 150 | 192 | 159 | 150 | 157 | 153 | 115 | 132 | 127 | 98 | 116 |
| Temperature | C | - | - | - | - | 9.5 | 11 | 20 | 18 | 22 | 22 | 4.7 | 6.0 | 0 | - | - | 9.1 | 12 | 22 | 7.5 | 4.0 | 16 | 21 | 8.6 | 4.6 | 19 | 20 | 6.4 | 21 | 9.5 | 2.9 | 4.8 | 14 | 21 |
| Field dissolved oxygen | mg/L | - | - | - | - | 6.0 | 6.2 | 8.5 | 9.2 | 13 | 14 | 3.1 | 5.0 | 0 | - | - | 13 | 13 | 14 | 16 | 19 | 12 | 11 | 14 | 14 | 7.3 | 7.1 | 0.7 | - | - | - | - | 6.8 | 6.0 |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 0 | 1.0 | 4.0 | 5.0 | 2.0 | 6.0 | 0 | - | - | 5.0 | 0 | 0 | 0 | 1.0 | 0 | 5.0 | - | 1.0 | 1.0 | 0 | 3.0 | 0 | 1.0 | 2.0 | 0 | 1.0 | 0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.5 | 6.6 | 7.4 | 7.2 | 7.5 | 7.5 | 0.45 | 5.0 | 0 | - | 20% | 7.1 | 7.4 | 7.4 | 7.2 | 7.0 | 7.5 | 7.5 | 7.3 | 6.9 | 7.4 | 7.0 | 7.0 | 6.7 | **6.46**[bLC] | **6.31**[bLC] | **6.46**[bLC] | **6.39**[bLC] | 7.5 |
| Conductivity | µS/cm | - | - | - | - | 113 | 114 | 135 | 137 | 167 | 171 | 24 | 5.0 | 0 | - | - | 109 | 139 | 117 | 148 | 120 | 177 | 171 | 127 | 154 | 155 | 149 | 162 | 145 | 113 | 128 | 111 | 117 | 135 |
| Hardness | mg/L | - | - | - | - | 27 | 28 | 36 | 34 | 39 | 39 | 5.1 | 5.0 | 0 | - | - | 22 | 36 | 32 | 29 | 30 | 44 | 39 | 42 | 32 | 37 | 36 | 33 | 45 | 27 | 32 | 29 | 35 | 38 |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 18 | 19 | 33 | 28 | 35 | 35 | 7.8 | 5.0 | 0 | - | - | 12 | 22 | 22 | 23 | 14 | 33 | 35 | 27 | 14 | 26 | 33 | 28 | 30 | 18 | 22 | 18 | 23 | 34 |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 49 | 50 | 62 | 60 | 71 | 73 | 9.3 | 5.0 | 0 | - | - | 52 | 65 | 49 | 63 | 58 | 83 | 73 | 73 | 76 | 66 | 62 | 75 | 68 | 53 | 55 | 56 | 57 | 62 |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 6.0 | 9.0 | 10 | 2.2 | 5.0 | 4 | - | - | <5.0 | <5.0 | <5.0 | <5.0 | 9.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 6.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 10.0 |
| Dissolved organic carbon | mg/L | - | - | - | - | 8.5 | 8.7 | 12 | 11 | 14 | 15 | 2.6 | 5.0 | 0 | - | - | 5.6 | 5.9 | 15 | 6.2 | 6.8 | 6.1 | 9.3 | 10.0 | 4.1 | 6.5 | 12 | 7.8 | 13 | 13 | 7.8 | 5.6 | 9.7 | 8.5 |
| Colour | TCU | - | - | - | - | 13 | 19 | 53 | 88 | 168 | 170 | 72 | 5.0 | 0 | - | - | 93 | 42 | 170 | 50 | 40 | 10 | 13 | 84 | 26 | 49 | 53 | 63 | 82 | 159 | 91 | 46 | 77 | 44 |
| Reactive Silica | mg/L | - | - | - | - | 2.1 | 2.1 | 2.4 | 2.9 | 4.3 | 4.6 | 1.0 | 5.0 | 0 | - | - | 1.7 | 1.2 | 2.1 | 4.9 | 3.4 | 2.7 | 3.1 | 5.1 | 2.6 | 2.3 | 2.3 | 4.4 | 2.3 | 4.6 | 5.1 | 3.3 | 2.0 | 2.4 |
| Turbidity | NTU | - | - | - | - | 0.9 | 0.96 | 2.3 | 2.5 | 4.5 | 4.9 | 1.6 | 5.0 | 0 | - | - | 3.6 | 1.7 | 3.0 | 3.0 | 8.0 | 1.3 | 0.9 | 3.2 | 1.7 | 2.3 | 1.2 | 8.8 | 0.7 | 4.9 | 5.0 | 2.4 | 1.7 | 2.3 |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 18 | 19 | 33 | 28 | 35 | 35 | 7.8 | 5.0 | 0 | - | - | 12 | 22 | 22 | 23 | 14 | 33 | 35 | 27 | 14 | 26 | 33 | 28 | 30 | 18 | 22 | 18 | 23 | 34 |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 5.0 | 5 | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 |
| Total Calcium | mg/L | - | - | - | - | 8.7 | 9.2 | 12 | 11 | 13 | 13 | 1.8 | 5.0 | 0 | - | - | 7.0 | 12 | 11 | 9.3 | 9.6 | 14 | 13 | 14 | 9.2 | 12 | 12 | 11 | 15 | 8.7 | 10 | 9.4 | 12 | 13 |
| Chloride | mg/L | 640 | 120 | - | - | 13 | 13 | 16 | 16 | 20 | 21 | 3.0 | 5.0 | 0 | - | - | 20 | 21 | 13 | 22 | 20 | 25 | 21 | 22 | 33 | 19 | 17 | 27 | 17 | 16 | 14 | 17 | 15 | 15 |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.1 | 1.1 | 1.5 | 1.4 | 1.6 | 1.6 | 0.23 | 5.0 | 0 | - | - | 1.2 | 1.5 | 1.1 | 1.5 | 1.5 | 1.9 | 1.6 | 2.0 | 2.2 | 1.8 | 1.6 | 1.5 | 1.7 | 1.2 | 1.4 | 1.4 | 1.4 | 1.5 |
| Total Potassium | mg/L | - | - | - | - | 0.6 | 0.62 | 0.7 | 0.7 | 0.78 | 0.8 | 0.071 | 5.0 | 0 | - | - | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.9 | 0.6 | <1.2 | 0.9 | 0.8 | 0.7 | 0.72 | 0.6 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 |
| Total Sodium | mg/L | - | - | - | - | 9.4 | 9.6 | 11 | 11 | 13 | 13 | 1.3 | 5.0 | 0 | - | - | 12 | 13 | 9.4 | 11 | 13 | 16 | 13 | 15 | 16 | 14 | 11 | 13 | 14 | 11 | 12 | 12 | 12 | 11 |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 2.2 | 2.8 | 3.0 | 0.45 | 5.0 | 3 | - | - | 3.0 | 3.0 | <2.0 | 3.0 | 3.0 | 4.0 | 2.0 | 3.0 | 5.0 | 2.0 | <2.0 | 4.0 | <2.0 | 3.0 | 2.0 | 3.0 | 2.0 | <2.0 |
| Sulphide | mg/L | - | - | 0.5 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5.0 | 5 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.87 - 17 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.048 | 0.096 | 0.11 | 0.035 | 5.0 | 3 | - | - | 0.07 | 0.09 | 0.11 | <0.03 | <0.03 | 0.04 | <0.03 | <0.03 | <0.03 | <0.03 | 0.04 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.05 | 0.068 | 0.12 | 0.14 | 0.04 | 5.0 | 4 | - | - | <0.05 | <0.05 | <0.05 | 0.1 | 0.12 | <0.05 | <0.05 | 0.14 | 0.11 | 0.13 | <0.05 | 0.15 | <0.05 | 0.14 | 0.12 | 0.08 | <0.05 | <0.05 |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5.0 | 4 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.05 | 0.068 | 0.12 | 0.14 | 0.04 | 5.0 | 3 | - | - | <0.05 | <0.05 | <0.05 | 0.1 | 0.12 | <0.05 | 0.05 | 0.14 | 0.11 | 0.13 | <0.05 | 0.15 | <0.05 | 0.14 | 0.12 | 0.08 | <0.05 | <0.05 |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.012 | 0.018 | 0.02 | 0.0045 | 5.0 | 4 | - | - | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.01 | <0.01 | 0.06 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.022 | 0.1 | 0.45 | 1.2 | 1.3 | 0.58 | 5.0 | 2 | - | - | 0.02 | 0.05 | <0.1 | 0.02 | <0.02 | <0.02 | <0.02 | <0.1 | <0.02 | <0.02 | 0.03 | 0.66 | 0.69 | 1.3 | 1.4 | 1.1 | 0.95 | 0.78 |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0014 | 0.0026 | 0.003 | 0.00089 | 5.0 | 3 | - | - | 0.004 | *<0.004*[BLvLC] | 0.003 | 0.003 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | **0.006**[bLC] | 0.002 | <0.001 | 0.001 |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.33 - 1.5[c] | - | - | 0.08 | 0.094 | 0.17 | 0.23 | 0.39 | 0.39 | 0.14 | 5.0 | 0 | - | - | 0.32 | 0.15 | 0.37 | 0.32 | 0.42 | 0.08 | 0.08 | 0.33 | **0.4**[bLC] | 0.22 | 0.15 | 0.27 | 0.22 | 0.39 | 0.36 | 0.33 | 0.28 | 0.17 |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Barium | mg/L | - | - | 5 | 5 | 0.12 | 0.12 | 0.18 | 0.18 | 0.24 | 0.25 | 0.054 | 5.0 | 0 | - | - | 0.068 | 0.16 | 0.13 | 0.11 | 0.1 | 0.16 | 0.18 | 0.15 | 0.084 | 0.19 | 0.25 | 0.13 | 0.19 | 0.12 | 0.12 | 0.089 | 0.13 | 0.21 |
| Total Beryllium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.008 | 0.008 | 0.009 | 0.0096 | 0.012 | 0.013 | 0.0021 | 5.0 | 0 | - | - | 0.006 | 0.007 | 0.01 | 0.007 | 0.006 | 0.008 | 0.008 | <0.01 | <0.005 | 0.01 | 0.009 | 0.005 | <0.012 | 0.008 | <0.005 | 0.019 | <0.005 | 0.013 |
| Total Cadmium | mg/L | 0.00046 - 0.0011 | 0.000046 - 0.000093 | 0.05 | 0.05 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 5.0 | 5 | - | - | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0001*[BLvLC] | *<0.0003*[BLvLC] | *<0.0001*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] | *<0.0003*[BLvLC] |
| Total Chromium | mg/L | - | 0.005[e,d] | 0.05[dB] | 1 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.004 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Cobalt | mg/L | - | 0.00078[d] | - | - | 0.001 | 0.001 | 0.001 | 0.015 | 0.056 | 0.07 | 0.031 | 5.0 | 4 | - | 20% | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | <0.0005 | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.002*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | **0.07**[bLC] |
| Total Copper | mg/L | - | 0.00022 - 0.0086[d] | 0.3 | 0.3 | 0.001 | 0.001 | 0.002 | 0.0016 | 0.002 | 0.002 | 0.00055 | 5.0 | 1 | - | - | 0.002 | 0.002 | 0.002 | **0.002**[bLC] | **0.002**[bLC] | **0.002**[bLC] | <0.001 | **0.003**[bLC] | **0.001**[bLC] | **0.002**[bLC] | 0.002 | **0.003**[bLC] | <0.002 | 0.002 | 0.002 | <0.001 | 0.002 | 0.001 |
| Total Iron | mg/L | - | 0.42 - 0.8[d] | 10 | 10 | 0.24 | 0.28 | 0.47 | 0.43 | 0.51 | 0.52 | 0.11 | 5.0 | 0 | - | - | 0.23 | 0.31 | 0.52 | 0.42 | 0.24 | 0.19 | 0.24 | 0.46 | 0.23 | 0.27 | 0.47 | 0.4 | 0.36 | 0.47 | 0.44 | 0.28 | 0.35 | 0.43 |
| Total Lead | mg/L | - | 0.0066 - 0.013[d] | 0.2 | 0.2 | 0.001 | 0.0012 | 0.0035 | 0.0033 | 0.005 | 0.005 | 0.0017 | 5.0 | 0 | - | - | 0.0047 | 0.0031 | 0.0035 | 0.0068 | **0.0095**[bLC] | 0.0021 | 0.001 | 0.005 | 0.003 | 0.0028 | 0.0022 | 0.0077 | <0.0021 | 0.0048 | 0.0064 | 0.003 | 0.0027 | 0.005 |
| Total Manganese | mg/L | 2.0 - 3.8 | 0.27 - 0.43 | - | - | 0.054 | 0.056 | 0.064 | 0.11 | 0.23 | 0.26 | 0.088 | 5.0 | 0 | - | - | 0.045 | 0.049 | 0.064 | 0.097 | 0.083 | 0.074 | 0.054 | 0.065 | 0.066 | 0.081 | 0.099 | 0.096 | 0.062 | 0.062 | 0.086 | 0.073 | 0.079 | 0.26 |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 5.0 | 5 | - | - | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] | *<0.000026*[BLvLC] |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 | <0.002 | <0.002 | <0.002 |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | 0.002 | <0.002 | <0.002 | <0.002 | 0.003 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.009 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 5.0 | 5 | - | - | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] | *<0.001*[BLvLC] |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 5.0 | 5 | - | - | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | **0.004**[bLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00049*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] | *<0.00025*[BLvLC] |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.022 | 0.023 | 0.043 | 0.036 | 0.046 | 0.047 | 0.012 | 5.0 | 0 | - | - | 0.019 | 0.037 | 0.026 | 0.024 | 0.015 | 0.043 | 0.047 | 0.032 | 0.021 | 0.036 | 0.044 | 0.025 | 0.046 | 0.022 | 0.026 | 0.024 | 0.03 | 0.043 |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 5.0 | 5 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.003 | 0.0048 | 0.005 | 0.0014 | 5.0 | 2 | - | - | 0.003 | <0.002 | 0.005 | 0.004 | 0.004 | <0.002 | <0.002 | <0.01 | 0.002 | <0.002 | 0.002 | 0.002 | <0.003 | 0.004 | 0.002 | <0.002 | <0.002 | <0.002 |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0009 | 0.0009 | 0.0012 | 0.0013 | 0.0018 | 0.0018 | 0.00045 | 5.0 | 0 | - | - | 0.0006 | 0.0015 | 0.0009 | 0.0009 | 0.0007 | 0.0016 | 0.0018 | 0.0012 | 0.0006 | 0.0014 | 0.0018 | 0.0008 | 0.0014 | 0.0009 | 0.001 | 0.001 | 0.0011 | 0.0012 |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5.0 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Zinc | mg/L | 0.034 - 0.083 | 0.0075 - 0.032 | 0.5 | 0.5 | 0.005 | 0.005 | 0.005 | 0.0078 | 0.014 | 0.015 | 0.0044 | 5.0 | 3 | - | - | **0.008**[bLC] | <0.005 | <0.005 | 0.009 | 0.012 | 0.006 | <0.005 | <0.02 | 0.007 | <0.005 | <0.005 | 0.014 | <0.007 | 0.015 | 0.013 | 0.006 | <0.005 | 0.009 |

**Table A.1-3: Water Quality Summary for WS-5, 2020 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | WS-5 | WS-5 | WS-5 | WS-5 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | 3-Dec-24 | 23-Mar-25 | 3-Jun-25 | 16-Sep-25 |
| **Field Measured** | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.4 | 7.5 | 7.6 | 7.8 |
| Field specific conductivity | µS/cm | - | - | - | - | 87 | 106 | 125 | 140 |
| Temperature | C | - | - | - | - | 4.3 | 2.2 | 17 | 17 |
| Field dissolved oxygen | mg/L | - | - | - | - | 10 | - | 9.1 | 8.5 |
| Field total suspended solids | mg/L | - | - | 30 | - | 1.0 | 0 | 5.0 | 0 |
| **Conventional Parameters** | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.2 | 6.8 | 6.7 | - |
| Conductivity | µS/cm | - | - | - | - | 100 | 114 | 126 | - |
| Hardness | mg/L | - | - | - | - | 52 | 27 | 33 | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 15 | 14 | 26 | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 63 | 51 | 62 | - |
| Total suspended solids | mg/L | - | - | - | - | <5.0 | <5.0 | <5.0 | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 12 | 4.3 | 5.0 | - |
| Colour | TCU | - | - | - | - | 133 | 29 | 37 | - |
| Reactive Silica | mg/L | - | - | - | - | 4.0 | 2.9 | 2.0 | - |
| Turbidity | NTU | - | - | - | - | 2.4 | 2.7 | 2.5 | - |
| **Major Ions** | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 15 | 14 | 26 | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | <10.0 | <10.0 | <10.0 | - |
| Total Calcium | mg/L | - | - | - | - | 18 | 8.5 | 11 | - |
| Chloride | mg/L | 640 | 120 | - | - | 10.0 | 18 | 18 | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.7 | 1.3 | 1.2 | - |
| Total Potassium | mg/L | - | - | - | - | 1.0 | 0.7 | 0.6 | - |
| Total Sodium | mg/L | - | - | - | - | 12 | 11 | 10 | - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 3.0 | - |
| Sulphide | mg/L | - | - | 0.5 | - | <0.05 | <0.01 | <0.01 | - |
| **Nutrients** | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.87 - 17 | 2 | 2 | <0.03 | <0.03 | <0.03 | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.09 | 0.08 | 0.14 | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | <0.05 | <0.05 | <0.05 | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.09 | 0.08 | 0.14 | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | <0.01 | <0.01 | <0.01 | - |
| Total phosphorus | mg-P/L | - | - | - | - | 1.9 | 1.0 | 0.6 | - |
| **Organics** | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | <0.001 | <0.001 | - |
| **Total Metals** | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.33 - 1.5[d] | - | - | **2.03**[a,c] | 0.29 | 0.13 | - |
| Total Antimony | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.29 | 0.072 | 0.14 | - |
| Total Beryllium | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | - |
| Total Bismuth | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.016 | 0.006 | <0.005 | - |
| Total Cadmium | mg/L | 0.00046 - 0.0011 | 0.000046 - 0.000093 | 0.05 | 0.05 | **0.0005**[a,c] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | - |
| Total Chromium | mg/L | - | 0.005 [c,d] | 0.05[a] | 1 | 0.002 | <0.002 | <0.002 | - |
| Total Cobalt | mg/L | - | 0.00078[a] | - | - | **0.001**[a,c] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | - |
| Total Copper | mg/L | - | 0.00022 - 0.0086[a,c] | 0.3 | 0.3 | **0.01**[a,c] | <0.001 | <0.001 | - |
| Total Iron | mg/L | - | 0.42 - 0.8[c] | 10 | 10 | **3.29**[a,c] | 0.2 | 0.19 | - |
| Total Lead | mg/L | - | 0.0066 - 0.013[c] | 0.2 | 0.2 | **0.0618**[a,c] | 0.002 | 0.0018 | - |
| Total Manganese | mg/L | 2.0 - 3.8 | 0.27 - 0.43 | - | - | **3.1**[a,c] | 0.072 | 0.082 | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | <0.002 | <0.002 | <0.002 | - |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | 0.003 | <0.002 | <0.002 | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | - |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.032 | 0.022 | 0.031 | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | <0.0001 | <0.0001 | <0.0001 | - |
| Total Tin | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | - |
| Total Titanium | mg/L | - | - | - | - | 0.016 | 0.002 | <0.002 | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0033 | 0.0006 | 0.0011 | - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | <0.002 | <0.002 | <0.002 | - |
| Total Zinc | mg/L | 0.034 - 0.083 | 0.0075 - 0.032 | 0.5 | 0.5 | **0.333**[DL, LC] | 0.006 | **0.014**[a,c] | - |

**Table A.1-4: Water Quality Summary for WS-10, 2015 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Full Dataset (2015 to 2025) | | | | | | | | | | Winter (Nov-Mar) | | | | | | | | | | Spring (Apr-May) | | | | | | | | | | Summer (Jun-Aug) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | | SA LC | | | | | | | | | | SA LC | | | | | | | | | | SA LC | | | | | | | | | | SA LC |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 5.8 | 6.4 | 7.2 | 7.2 | 7.9 | 8.2 | 0.53 | 36 | 0 | - 11% | 5.8 | 6.1 | 7.2 | 7.2 | 8.1 | 8.2 | 0.64 | 15 | 0 | - 13% | 6.8 | 6.8 | 7.0 | 7.0 | 7.1 | 7.1 | 0.21 | 2 | 0 | - - | 6.4 | 6.4 | 7.2 | 7.1 | 7.8 | 7.8 | 0.47 | 10 | 0 | - 10% |
| Field specific conductivity | µS/cm | - | - | - | - | 7.5 | 56 | 95 | 107 | 190 | 359 | 59 | 36 | 0 | - - | 59 | 65 | 99 | 100 | 146 | 167 | 28 | 15 | 0 | - - | 69 | 69 | 71 | 71 | 73 | 73 | 3.0 | 2 | 0 | - - | 7.5 | 35 | 84 | 112 | 266 | 359 | 94 | 10 | 0 | - - |
| Temperature | C | - | - | - | - | 1.5 | 2.3 | 11 | 12 | 21 | 22 | 6.6 | 36 | 0 | - - | 1.5 | 2.0 | 6.2 | 5.4 | 9.2 | 9.8 | 2.7 | 15 | 0 | - - | 4.9 | 5.4 | 9.6 | 9.6 | 14 | 14 | 6.6 | 2 | 0 | - - | 11 | 11 | 17 | 16 | 20 | 21 | 3.5 | 10 | 0 | - - |
| Field dissolved oxygen | mg/L | - | - | - | - | 0.6 | 6.8 | 13 | 12 | 19 | 22 | 4.3 | 31 | 0 | - - | 0.6 | 7.8 | 15 | 14 | 19 | 19 | 4.6 | 13 | 0 | - - | 10 | 10 | 10 | 10 | 10 | 10 | - | 1 | 0 | - - | 7.6 | 7.8 | 11 | 12 | 19 | 22 | 4.3 | 9 | 0 | - - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 0 | 1.7 | 5.0 | 20 | 3.7 | 31 | 0 | - - | 0 | 0 | 0.5 | 2.5 | 11 | 20 | 5.6 | 12 | 0 | - - | 0 | 0.15 | 1.5 | 1.5 | 2.9 | 3.0 | 2.1 | 2 | 0 | - - | 0 | 0 | 0.5 | 1.4 | 4.3 | 5.0 | 1.8 | 8 | 0 | - - |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 5.8 | 6.2 | 6.9 | 6.9 | 7.6 | 8.2 | 0.5 | 36 | 0 | - 19% | 6.2 | 6.3 | 7.0 | 6.9 | 7.4 | 7.4 | 0.41 | 15 | 0 | - 20% | 6.3 | 6.3 | 6.5 | 6.5 | 6.7 | 6.7 | 0.26 | 2 | 0 | - 50% | 5.8 | 6.0 | 6.9 | 6.9 | 7.9 | 8.2 | 0.65 | 11 | 0 | - 18% |
| Conductivity | µS/cm | - | - | - | - | 52 | 56 | 85 | 100 | 162 | 355 | 55 | 36 | 0 | - - | 56 | 60 | 93 | 95 | 134 | 158 | 26 | 15 | 0 | - - | 58 | 58 | 62 | 62 | 66 | 66 | 5.7 | 2 | 0 | - - | 52 | 54 | 82 | 108 | 253 | 355 | 86 | 11 | 0 | - - |
| Hardness | mg/L | - | - | - | - | 6.9 | 9.5 | 17 | 19 | 30 | 42 | 7.7 | 36 | 0 | - - | 9.0 | 11 | 17 | 18 | 29 | 30 | 5.7 | 15 | 0 | - - | 11 | 12 | 14 | 14 | 16 | 16 | 3.3 | 2 | 0 | - - | 6.9 | 8.7 | 18 | 19 | 29 | 30 | 7.5 | 11 | 0 | - - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 5.0 | 5.0 | 13 | 19 | 41 | 114 | 20 | 36 | 4 | - - | 5.0 | 5.0 | 13 | 14 | 28 | 29 | 8.0 | 15 | 2 | - - | 5.0 | 5.3 | 7.5 | 7.5 | 9.8 | 10 | 3.5 | 2 | 1 | - - | 5.0 | 5.5 | 12 | 22 | 74 | 114 | 31 | 11 | 1 | - - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 21 | 24 | 39 | 48 | 84 | 181 | 29 | 36 | 0 | - - | 24 | 25 | 44 | 45 | 72 | 86 | 17 | 15 | 0 | - - | 21 | 22 | 27 | 27 | 31 | 32 | 7.8 | 2 | 0 | - - | 24 | 28 | 38 | 53 | 129 | 181 | 44 | 11 | 0 | - - |
| Total suspended solids | mg/L | - | - | - | - | 2.5 | 5.0 | 5.0 | 5.4 | 8.3 | 11 | 1.4 | 36 | 30 | - - | 5.0 | 5.0 | 5.0 | 5.9 | 9.6 | 11 | 1.8 | 15 | 11 | - - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - - | 2.5 | 3.8 | 5.0 | 5.0 | 6.5 | 8.0 | 1.2 | 11 | 9 | - - |
| Dissolved organic carbon | mg/L | - | - | - | - | 0.5 | 3.1 | 6.6 | 7.2 | 14 | 15 | 3.4 | 32 | 1 | - - | 0.5 | 2.1 | 5.5 | 5.4 | 7.9 | 8.0 | 2.1 | 14 | 1 | - - | 4.6 | 4.7 | 5.5 | 5.5 | 6.3 | 6.4 | 1.3 | 2 | 0 | - - | 4.9 | 5.0 | 7.0 | 7.5 | 11 | 12 | 2.6 | 8 | 0 | - - |
| Colour | TCU | - | - | - | - | 13 | 23 | 79 | 80 | 162 | 210 | 45 | 34 | 0 | - - | 13 | 17 | 48 | 52 | 91 | 92 | 27 | 14 | 0 | - - | 46 | 48 | 65 | 65 | 82 | 84 | 27 | 2 | 0 | - - | 45 | 47 | 95 | 94 | 166 | 210 | 49 | 10 | 0 | - - |
| Reactive Silica | mg/L | - | - | - | - | 1.3 | 1.6 | 2.6 | 2.8 | 4.9 | 5.1 | 0.97 | 36 | 0 | - - | 1.8 | 1.9 | 2.9 | 2.9 | 4.3 | 4.9 | 0.84 | 15 | 0 | - - | 1.7 | 1.7 | 2.1 | 2.1 | 2.5 | 2.5 | 0.57 | 2 | 0 | - - | 1.3 | 1.4 | 2.2 | 2.4 | 4.0 | 4.6 | 0.98 | 11 | 0 | - - |
| Turbidity | NTU | - | - | - | - | 0.5 | 0.83 | 2.4 | 4.1 | 16 | 34 | 6.3 | 36 | 1 | - - | 0.5 | 1.2 | 2.5 | 4.5 | 16 | 20 | 5.3 | 15 | 1 | - - | 1.6 | 3.2 | 18 | 18 | 33 | 34 | 23 | 2 | 0 | - - | 0.6 | 0.75 | 2.6 | 2.7 | 4.8 | 5.4 | 1.4 | 11 | 0 | - - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 1.0 | 5.0 | 13 | 19 | 41 | 114 | 20 | 36 | 4 | - - | 5.0 | 5.0 | 13 | 14 | 28 | 29 | 8.0 | 15 | 2 | - - | 5.0 | 5.3 | 7.5 | 7.5 | 9.8 | 10 | 3.5 | 2 | 1 | - - | 1.0 | 3.5 | 12 | 22 | 74 | 114 | 32 | 11 | 1 | - - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 1.0 | 10 | 10 | 9.8 | 10 | 10 | 1.5 | 36 | 36 | - - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 15 | 15 | - - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 2 | 2 | - - | 1.0 | 5.5 | 10 | 9.2 | 10 | 10 | 2.7 | 11 | 11 | - - |
| Total Calcium | mg/L | - | - | - | - | 1.2 | 2.8 | 5.1 | 5.8 | 9.8 | 15 | 2.7 | 36 | 0 | - - | 2.3 | 2.8 | 5.0 | 5.3 | 8.8 | 9.2 | 2.0 | 15 | 0 | - - | 3.4 | 3.5 | 4.3 | 4.3 | 5.0 | 5.1 | 1.2 | 2 | 0 | - - | 1.2 | 2.1 | 5.9 | 5.9 | 9.6 | 9.9 | 2.7 | 11 | 0 | - - |
| Chloride | mg/L | 640 | 120 | - | - | 7.0 | 8.0 | 12 | 12 | 19 | 23 | 3.6 | 36 | 0 | - - | 8.0 | 8.7 | 13 | 13 | 20 | 23 | 3.8 | 15 | 0 | - - | 9.0 | 9.1 | 9.5 | 9.5 | 10.0 | 10 | 0.71 | 2 | 0 | - - | 8.0 | 8.0 | 12 | 12 | 18 | 19 | 3.4 | 11 | 0 | - - |
| Fluoride | mg/L | - | 0.12 | - | - | 0.1 | 0.13 | 0.42 | 0.42 | 0.7 | 0.73 | 0.45 | 2 | 1 | - 50% | - | - | - | - | - | - | - | 0 | 0 | - - | - | - | - | - | - | - | - | 0 | 0 | - - | 0.1 | 0.13 | 0.42 | 0.42 | 0.7 | 0.73 | 0.45 | 2 | 1 | - 50% |
| Total Magnesium | mg/L | - | - | - | - | 0.6 | 0.7 | 1.0 | 1.0 | 1.5 | 1.6 | 0.25 | 36 | 0 | - - | 0.8 | 0.87 | 1.0 | 1.1 | 1.6 | 1.6 | 0.24 | 15 | 0 | - - | 0.7 | 0.71 | 0.75 | 0.75 | 0.8 | 0.8 | 0.071 | 2 | 0 | - - | 0.7 | 0.75 | 0.9 | 0.98 | 1.3 | 1.3 | 0.21 | 11 | 0 | - - |
| Total Potassium | mg/L | - | - | - | - | 0.14 | 0.28 | 0.5 | 0.83 | 1.8 | 5.1 | 0.85 | 36 | 0 | - - | 0.37 | 0.39 | 0.5 | 0.79 | 1.7 | 1.9 | 0.49 | 15 | 0 | - - | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 2 | 0 | - - | 0.14 | 0.17 | 0.5 | 0.96 | 3.2 | 5.1 | 1.4 | 11 | 0 | - - |
| Total Sodium | mg/L | - | - | - | - | 5.8 | 6.1 | 8.8 | 13 | 24 | 66 | 11 | 36 | 0 | - - | 6.7 | 7.1 | 8.8 | 12 | 24 | 29 | 6.6 | 15 | 0 | - - | 6.1 | 6.2 | 6.6 | 6.6 | 7.1 | 7.1 | 0.71 | 2 | 0 | - - | 7.0 | 7.3 | 8.7 | 15 | 43 | 66 | 17 | 11 | 0 | - - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 3.2 | 7.5 | 11 | 2.1 | 36 | 7 | - - | 2.0 | 2.0 | 3.0 | 3.3 | 6.2 | 9.0 | 1.8 | 15 | 0 | - - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 2 | 1 | - - | 2.0 | 2.0 | 2.0 | 3.5 | 8.0 | 11 | 2.8 | 11 | 3 | - - |
| Sulphide | mg/L | - | - | 0.5 | - | 0.01 | 0.017 | 0.05 | 0.1 | 0.5 | 1.0 | 0.19 | 35 | 34 | - - | 0.01 | 0.038 | 0.05 | 0.11 | 0.33 | 1.0 | 0.25 | 15 | 15 | - - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - - | 0.01 | 0.028 | 0.05 | 0.096 | 0.32 | 0.5 | 0.14 | 10 | 9 | - - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.56 - 168 | 2 | 2 | 0.03 | 0.03 | 0.035 | 0.06 | 0.12 | 0.53 | 0.085 | 36 | 27 | - - | 0.03 | 0.03 | 0.03 | 0.045 | 0.093 | 0.1 | 0.023 | 15 | 12 | - - | 0.03 | 0.031 | 0.04 | 0.04 | 0.049 | 0.05 | 0.014 | 2 | 2 | - - | 0.03 | 0.03 | 0.05 | 0.095 | 0.35 | 0.53 | 0.15 | 11 | 7 | - - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.075 | 0.09 | 0.2 | 0.3 | 0.057 | 36 | 13 | - - | 0.05 | 0.05 | 0.08 | 0.098 | 0.21 | 0.3 | 0.063 | 15 | 2 | - - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - - | 0.05 | 0.05 | 0.08 | 0.093 | 0.16 | 0.18 | 0.044 | 11 | 4 | - - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.01 | 0.05 | 0.05 | 0.05 | 0.05 | 0.08 | 0.0084 | 36 | 35 | - 3% | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 15 | 15 | - - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - - | 0.01 | 0.03 | 0.05 | 0.049 | 0.065 | 0.08 | 0.016 | 11 | 10 | - 9% |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.08 | 0.091 | 0.2 | 0.3 | 0.057 | 36 | 12 | - - | 0.05 | 0.05 | 0.08 | 0.098 | 0.21 | 0.3 | 0.063 | 15 | 2 | - - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - - | 0.05 | 0.05 | 0.08 | 0.095 | 0.16 | 0.18 | 0.042 | 11 | 3 | - - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | - | 1 | 0 | - - | - | - | - | - | - | - | - | 0 | 0 | - - | - | - | - | - | - | - | - | 0 | 0 | - - | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | - | 1 | 0 | - - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.014 | 0.02 | 0.13 | 0.02 | 36 | 30 | - - | 0.01 | 0.01 | 0.01 | 0.019 | 0.053 | 0.13 | 0.031 | 15 | 12 | - - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 2 | 2 | - - | 0.01 | 0.01 | 0.01 | 0.010 | 0.01 | 0.01 | 0 | 11 | 10 | - - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.009 | 0.017 | 0.03 | 0.26 | 0.97 | 1.1 | 0.36 | 35 | 14 | - - | 0.02 | 0.02 | 0.04 | 0.25 | 0.97 | 1.0 | 0.37 | 14 | 6 | - - | 0.03 | 0.07 | 0.43 | 0.43 | 0.79 | 0.83 | 0.57 | 2 | 1 | - - | 0.009 | 0.010 | 0.05 | 0.25 | 0.88 | 1.1 | 0.37 | 11 | 3 | - - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.004 | 0.004 | 0.001 | 35 | 27 | - - | 0.001 | 0.001 | 0.001 | 0.0016 | 0.004 | 0.004 | 0.0012 | 15 | 14 | - - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - - | 0.001 | 0.001 | 0.001 | 0.0016 | 0.0031 | 0.004 | 0.00097 | 10 | 7 | - - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.11 - 1.7[c] | - | - | 0.15 | 0.16 | 0.25 | 0.29 | 0.45 | 0.97 | 0.15 | 36 | 0 | - 28% | 0.15 | 0.16 | 0.26 | 0.33 | 0.73 | 0.97 | 0.21 | 15 | 0 | - 27% | 0.24 | 0.25 | 0.29 | 0.29 | 0.34 | 0.34 | 0.071 | 2 | 0 | - 50% | 0.16 | 0.18 | 0.25 | 0.28 | 0.38 | 0.39 | 0.078 | 11 | 0 | - 36% |
| Total Antimony | mg/L | - | - | - | - | 0.001 | 0.002 | 0.002 | 0.0022 | 0.0023 | 0.009 | 0.0012 | 36 | 35 | - - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0023 | 0.003 | 0.00026 | 15 | 15 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.001 | 0.0015 | 0.002 | 0.0025 | 0.0055 | 0.009 | 0.0022 | 11 | 10 | - - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.0014 | 0.002 | 0.002 | 0.0021 | 0.0023 | 0.004 | 0.00039 | 36 | 34 | - - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0023 | 0.003 | 0.00026 | 15 | 15 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.0014 | 0.0017 | 0.002 | 0.0021 | 0.003 | 0.004 | 0.00065 | 11 | 9 | - - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.0057 | 0.017 | 0.026 | 0.029 | 0.051 | 0.058 | 0.012 | 36 | 0 | - - | 0.016 | 0.017 | 0.025 | 0.028 | 0.044 | 0.047 | 0.0094 | 15 | 0 | - - | 0.019 | 0.019 | 0.022 | 0.022 | 0.024 | 0.024 | 0.0035 | 2 | 0 | - - | 0.0057 | 0.011 | 0.026 | 0.028 | 0.045 | 0.05 | 0.012 | 11 | 0 | - - |
| Total Beryllium | mg/L | - | - | - | - | 0.001 | 0.0018 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.00023 | 36 | 36 | - - | 0.001 | 0.0017 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.00026 | 15 | 15 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.001 | 0.0015 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.0003 | 11 | 11 | - - |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 36 | 36 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 15 | 15 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 11 | 11 | - - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.005 | 0.005 | 0.007 | 0.0087 | 0.016 | 0.05 | 0.0076 | 36 | 12 | - - | 0.005 | 0.005 | 0.005 | 0.0067 | 0.01 | 0.011 | 0.0022 | 15 | 8 | - - | 0.006 | 0.0065 | 0.011 | 0.011 | 0.015 | 0.015 | 0.0064 | 2 | 0 | - - | 0.005 | 0.005 | 0.007 | 0.012 | 0.034 | 0.05 | 0.013 | 11 | 4 | - - |
| Total Cadmium | mg/L | 0.00014 - 0.00087 | 0.000037 - 0.000077 | 0.05 | 0.05 | 0.000019 | 0.00025 | 0.0003 | 0.00029 | 0.0003 | 0.0004 | 0.00006 | 36 | 33 | - 6% | 0.0001 | 0.00024 | 0.0003 | 0.00029 | 0.0003 | 0.0003 | 0.000052 | 15 | 14 | - 7% | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 2 | 2 | - - | 0.000019 | 0.00016 | 0.0003 | 0.00028 | 0.00035 | 0.0004 | 0.000093 | 11 | 9 | - 9% |
| Total Chromium | mg/L | - | 0.005[d,d] | 0.05[d] | 1 | 0.001 | 0.002 | 0.002 | 0.0021 | 0.0023 | 0.004 | 0.00041 | 36 | 36 | - - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0023 | 0.003 | 0.00026 | 15 | 15 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.001 | 0.0015 | 0.002 | 0.0021 | 0.003 | 0.004 | 0.0007 | 11 | 11 | - - |
| Total Cobalt | mg/L | - | 0.00078[c] | - | - | 0.0005 | 0.00098 | 0.001 | 0.0077 | 0.0013 | 0.24 | 0.04 | 36 | 34 | - 6% | 0.0005 | 0.00085 | 0.001 | 0.00097 | 0.001 | 0.001 | 0.00013 | 15 | 15 | - - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - - | 0.0009 | 0.00095 | 0.001 | 0.0011 | 0.0015 | 0.002 | 0.00031 | 11 | 10 | - 9% |
| Total Copper | mg/L | - | 0.0002 - 0.0083[c] | 0.3 | 0.3 | 0.001 | 0.001 | 0.001 | 0.0019 | 0.0053 | 0.011 | 0.0019 | 36 | 19 | - 33% | 0.001 | 0.001 | 0.002 | 0.0027 | 0.0075 | 0.011 | 0.0028 | 15 | 8 | - 47% | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.0025 | 0.003 | 0.00069 | 11 | 5 | - 27% |
| Total Iron | mg/L | - | 0.1 - 0.8[c] | 10 | 10 | 0.2 | 0.27 | 0.6 | 0.74 | 1.0 | 5.0 | 0.77 | 36 | 0 | - 50% | 0.2 | 0.24 | 0.51 | 0.49 | 0.82 | 0.86 | 0.2 | 15 | 0 | - 33% | 0.36 | 0.38 | 0.59 | 0.59 | 0.8 | 0.82 | 0.33 | 2 | 0 | - 50% | 0.35 | 0.43 | 0.63 | 1.0 | 2.9 | 5.0 | 1.3 | 11 | 0 | - 55% |
| Total Lead | mg/L | - | 0.0022 - 0.011[c] | 0.2 | 0.2 | 0.0005 | 0.00087 | 0.0018 | 0.0046 | 0.015 | 0.047 | 0.0096 | 36 | 2 | - 6% | 0.0005 | 0.00078 | 0.0018 | 0.0078 | 0.041 | 0.047 | 0.014 | 15 | 1 | - 13% | 0.0017 | 0.0017 | 0.002 | 0.002 | 0.0023 | 0.0023 | 0.00042 | 2 | 0 | - - | 0.00076 | 0.00088 | 0.002 | 0.0023 | 0.0048 | 0.0056 | 0.0015 | 11 | 1 | - - |
| Total Manganese | mg/L | 2.0 - 3.1 | 0.2 - 0.38 | - | - | 0.053 | 0.062 | 0.11 | 0.12 | 0.23 | 0.32 | 0.061 | 36 | 0 | - - | 0.053 | 0.059 | 0.1 | 0.11 | 0.21 | 0.3 | 0.06 | 15 | 0 | - - | 0.071 | 0.073 | 0.086 | 0.086 | 0.10 | 0.1 | 0.021 | 2 | 0 | - - | 0.061 | 0.066 | 0.099 | 0.11 | 0.18 | 0.2 | 0.043 | 11 | 0 | - - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000013 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.0000022 | 36 | 36 | - - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 15 | 15 | - - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 2 | 2 | - - | 0.000013 | 0.00002 | 0.000026 | 0.000025 | 0.000026 | 0.000026 | 0.0000039 | 11 | 11 | - - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.0086 | 0.027 | 0.089 | 0.016 | 36 | 16 | - 3% | 0.002 | 0.002 | 0.002 | 0.0058 | 0.017 | 0.024 | 0.0062 | 15 | 7 | - - | 0.002 | 0.0021 | 0.0025 | 0.0025 | 0.003 | 0.003 | 0.00071 | 2 | 1 | - - | 0.002 | 0.002 | 0.002 | 0.012 | 0.054 | 0.089 | 0.026 | 11 | 5 | - 9% |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.0023 | 0.0038 | 0.009 | 0.0013 | 36 | 33 | - - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.0039 | 0.006 | 0.001 | 15 | 12 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.002 | 0.002 | 0.002 | 0.0026 | 0.0055 | 0.009 | 0.0021 | 11 | 11 | - - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.00017 | 36 | 34 | - 3% | 0.001 | 0.001 | 0.001 | 0.0011 | 0.0013 | 0.002 | 0.00026 | 15 | 14 | - 7% | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 11 | 10 | - - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.0001 | 0.00021 | 0.00025 | 0.00025 | 0.00025 | 0.00049 | 0.000054 | 36 | 36 | - - | 0.0001 | 0.00021 | 0.00025 | 0.00024 | 0.00025 | 0.00025 | 0.000039 | 15 | 15 | - - | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 2 | 2 | - - | 0.0001 | 0.00018 | 0.00025 | 0.00026 | 0.00037 | 0.00049 | 0.000089 | 11 | 11 | - - |
| Total Strontium | mg/L | - | 2.5[e] | - | - | 0.008 | 0.012 | 0.023 | 0.026 | 0.048 | 0.058 | 0.013 | 36 | 0 | - - | 0.008 | 0.012 | 0.023 | 0.024 | 0.04 | 0.045 | 0.0096 | 15 | 0 | - - | 0.015 | 0.015 | 0.019 | 0.019 | 0.022 | 0.022 | 0.0049 | 2 | 0 | - - | 0.01 | 0.011 | 0.025 | 0.026 | 0.042 | 0.045 | 0.012 | 11 | 0 | - - |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00011 | 0.00015 | 0.0003 | 0.000046 | 36 | 36 | - - | 0.0001 | 0.0001 | 0.0001 | 0.00011 | 0.00016 | 0.0003 | 0.000052 | 15 | 15 | - - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 2 | 2 | - - | 0.0001 | 0.0001 | 0.0001 | 0.00012 | 0.0002 | 0.0003 | 0.00006 | 11 | 11 | - - |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 36 | 36 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 15 | 15 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 11 | 11 | - - |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0031 | 0.007 | 0.015 | 0.0026 | 36 | 20 | - - | 0.002 | 0.002 | 0.002 | 0.0041 | 0.012 | 0.015 | 0.0038 | 15 | 7 | - - | 0.002 | 0.0021 | 0.003 | 0.003 | 0.0039 | 0.004 | 0.0014 | 2 | 1 | - - | 0.002 | 0.002 | 0.002 | 0.0025 | 0.0035 | 0.004 | 0.00067 | 11 | 6 | - - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.00018 | 0.00038 | 0.0009 | 0.0014 | 0.0028 | 0.0091 | 0.0015 | 36 | 0 | - - | 0.0003 | 0.00037 | 0.001 | 0.0011 | 0.0024 | 0.0027 | 0.0007 | 15 | 0 | - - | 0.0006 | 0.00062 | 0.00075 | 0.00075 | 0.00089 | 0.0009 | 0.00021 | 2 | 0 | - - | 0.00018 | 0.00034 | 0.0009 | 0.0017 | 0.0055 | 0.0091 | 0.0025 | 11 | 0 | - - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 36 | 36 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 15 | 15 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 11 | 11 | - - |
| Total Zinc | mg/L | 0.021 - 0.051 | 0.0046 - 0.029 | 0.5 | 0.5 | 0.005 | 0.005 | 0.007 | 0.016 | 0.07 | 0.13 | 0.024 | 36 | 7 | 8% 19% | 0.005 | 0.005 | 0.008 | 0.026 | 0.09 | 0.13 | 0.036 | 15 | 2 | 20% 33% | 0.007 | 0.0071 | 0.008 | 0.008 | 0.0089 | 0.009 | 0.0014 | 2 | 0 | - - | 0.005 | 0.005 | 0.007 | 0.0078 | 0.013 | 0.014 | 0.0029 | 11 | 3 | - 18% |

Notes:

(a) Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines (FEQGs; ECCC 2024) or Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG. Guidelines are ECCC unless otherwise indicated. Shaded values indicate guideline is calculated based on ETMFs (e.g., hardness, pH, temperature, and/or dissolved organic carbon). Guidelines were calculated based on ETMFs for each individual sample. The range of guidelines calucalted for for the sample set is shown. Underlined values indicate aquatic life guideline is for dissolved fraction but was compared to results for total fraction.

(b) Effluent discharge criteria are the Newfoundland and Labrador Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003) and CFI Certificate of Approval (COA) No. AA22-085691 Effluent Discharge Criteria (NL 2022). Effluent discharge criteria were compared to both total and dissolved metal fractions.

(c) Guideline is an FEQG (ECCC 2024).

(d) Guideline is for hexavalent chromium.

Values that are <DL were transformed to DL prior to calculating summary statistics (i.e., minimum, P5, median, mean, P95, maximum, and standard deviation).

**Bolded** values identify concentrations above the guideline, and *italicized* values identify DLs above or equal to the guideline, as indicated by the following flag superscripts:

SA = Concentration is above the short-term acute aquatic life guideline.

LC = Concentration is above the long-term chronic aquatic life guideline.

DL>SA = Detection limit is above or equal to the short-term acute aquatic life guideline.

DL>LC = Detection limit is above or equal to the long-term chronic aquatic life guideline.

DL>N = Detection limit is above or equal to the Newfoundland and Labrador ECWSR effluent discharge criteria.

No detectable concentrations were above the ECWSR or CFI COA effluent discharge criteria.

CCME = Canadian Council of Ministers of the Environment; ECCC = Environment and Climate Change Canada; FEQG = Federal Environmental Quality Guideline; ECWSR = Newfoundland and Labrador Environmental Control Water and Sewage Regulations; CFI COA = Canada Fluorspar Inc. Certificate of Approval Effluent Discharge Critieria; P5 = 5th percentile; P95 = 95th percentile; sd = standard deviation; ND = count of non-detectable values; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; DL = detection limit; ETMF = exposure and toxicity modifying factor; - = not applicable.

**Table A.1-4: Water Quality Summary for WS-10, 2015 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Fall (Sep-Oct) | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | | SA | LC | 26-Aug-15 | 9-Jun-16 | 29-Aug-16 | 1-Dec-16 | 25-May-17 | 14-Sep-17 | 11-Dec-17 | 5-Mar-18 | 7-Jun-18 | 6-Sep-18 | 6-Dec-18 | 5-Mar-19 | 4-Jun-19 | 10-Sep-19 | 3-Dec-19 | 31-Mar-20 | 2-Jun-20 |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.4 | 6.5 | 7.2 | 7.2 | 7.8 | 7.9 | 0.5 | 9 | 0 | - | 11% | - | **6.4**[LC] | 6.9 | 7.4 | 6.8 | **6.4**[LC] | **5.8**[LC] | **6.2**[LC] | 6.5 | 6.8 | 6.5 | 7.2 | 6.9 | 7.6 | 7.5 | 8.2 | 7.7 |
| Field specific conductivity | µS/cm | - | - | - | - | 50 | 55 | 113 | 120 | 203 | 219 | 58 | 9 | 0 | - | - | - | 101 | 82 | 137 | 69 | 63 | 59 | 74 | 86 | 150 | 94 | 167 | 81 | 219 | 100 | 107 | 83 |
| Temperature | C | - | - | - | - | 9.5 | 12 | 19 | 18 | 22 | 22 | 3.8 | 9 | 0 | - | - | - | 12 | 19 | 6.5 | 14 | 18 | 7.1 | 6.9 | 18 | 19 | 2.2 | 1.5 | 12 | 16 | 6.2 | 9.8 | 11 |
| Field dissolved oxygen | mg/L | - | - | - | - | 6.0 | 6.6 | 9.9 | 9.7 | 13 | 13 | 2.3 | 8 | 0 | - | - | - | 22 | 9.7 | 14 | 10 | 12 | 14 | 18 | 11 | 9.2 | 19 | 14 | 14 | 11 | 14 | 15 | 14 |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 0 | 1.1 | 3.8 | 5.0 | 1.7 | 9 | 0 | - | - | - | - | - | 1.0 | 3.0 | 0 | 4.0 | - | 3.0 | 2.0 | 0 | - | 2.0 | 0 | 2.0 | 20 | 0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.2 | 6.4 | 7.0 | 7.0 | 7.7 | 7.7 | 0.49 | 8 | 0 | - | 13% | **5.79**[LC] | 6.8 | 7.1 | 7.0 | 6.7 | 6.8 | 6.5 | **6.4**[LC] | 7.3 | 7.7 | 7.3 | 7.4 | 7.1 | 6.6 | 7.1 | 7.2 | 6.9 |
| Conductivity | µS/cm | - | - | - | - | 55 | 56 | 105 | 108 | 167 | 175 | 48 | 8 | 0 | - | - | 52 | 56 | 78 | 72 | 58 | 64 | 56 | 71 | 92 | 145 | 105 | 158 | 82 | 131 | 84 | 100 | 75 |
| Hardness | mg/L | - | - | - | - | 9.7 | 11 | 21 | 22 | 38 | 42 | 11 | 8 | 0 | - | - | 6.9 | 11 | 16 | 16 | 11 | 16 | 11 | 15 | 23 | 42 | 28 | 30 | 13 | 26 | 17 | 21 | 14 |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 7.0 | 7.7 | 29 | 26 | 44 | 47 | 16 | 8 | 0 | - | - | <5.0 | 6.0 | 11 | 9.0 | <5.0 | 9.0 | <5.0 | 5.0 | 13 | 38 | 12 | 27 | 9.0 | 39 | 10.0 | 15 | 10.0 |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 24 | 24 | 51 | 51 | 79 | 83 | 24 | 8 | 0 | - | - | 31 | 24 | 37 | 34 | 21 | 31 | 24 | 33 | 40 | 71 | 45 | 86 | 32 | 66 | 44 | 45 | 38 |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 8 | 8 | - | - | 2.5 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 7.0 | 9.0 | 8.0 | <5.0 | 6.0 | <5.0 | <5.0 |
| Dissolved organic carbon | mg/L | - | - | - | - | 3.2 | 4.8 | 11 | 11 | 15 | 15 | 3.9 | 8 | 0 | - | - | - | - | - | - | 6.4 | 14 | 7.1 | 4.4 | 5.1 | 3.2 | 6.8 | <0.5 | 6.3 | 7.9 | 7.1 | 4.5 | 8.3 |
| Colour | TCU | - | - | - | - | 74 | 75 | 119 | 117 | 164 | 165 | 37 | 8 | 0 | - | - | 210 | 93 | - | - | 84 | 135 | 79 | 13 | 63 | 86 | 48 | 19 | 112 | 103 | 80 | 37 | 106 |
| Reactive Silica | mg/L | - | - | - | - | 1.9 | 2.1 | 2.9 | 3.2 | 5.0 | 5.1 | 1.2 | 8 | 0 | - | - | 1.6 | 1.3 | 2.6 | 3.1 | 1.7 | 2.6 | 2.2 | 2.4 | 2.5 | 4.9 | 2.8 | 3.1 | 2.0 | 3.1 | 2.9 | 2.0 | 1.4 |
| Turbidity | NTU | - | - | - | - | 1.2 | 1.3 | 1.9 | 2.1 | 3.2 | 3.3 | 0.77 | 8 | 0 | - | - | 3.6 | 4.1 | 1.6 | 2.0 | 34 | 3.3 | 2.3 | 1.5 | 2.6 | 1.2 | 2.2 | 14 | 5.4 | 1.7 | 3.8 | 20 | 3.7 |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 7.0 | 7.7 | 29 | 26 | 44 | 47 | 16 | 8 | 0 | - | - | <1.0 | 6.0 | 11 | 9.0 | <5.0 | 9.0 | <5.0 | 5.0 | 13 | 38 | 12 | 27 | 9.0 | 39 | 10.0 | 15 | 10.0 |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 8 | 8 | - | - | <1.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 |
| Total Calcium | mg/L | - | - | - | - | 2.9 | 3.1 | 6.7 | 7.0 | 13 | 15 | 4.0 | 8 | 0 | - | - | 1.2 | 2.9 | 5.1 | 4.9 | 3.4 | 5.0 | 3.0 | 4.1 | 7.2 | 15 | 8.6 | 9.2 | 4.2 | 8.3 | 5.3 | 6.7 | 4.2 |
| Chloride | mg/L | 640 | 120 | - | - | 7.0 | 7.4 | 10 | 11 | 15 | 15 | 3.2 | 8 | 0 | - | - | 14 | 8.0 | 12 | 11 | 9.0 | 8.0 | 10.0 | 13 | 10.0 | 12 | 15 | 23 | 10.0 | 13 | 13 | 13 | 12 |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | <0.1 | **0.73**[LC] | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.6 | 0.67 | 1.0 | 1.1 | 1.5 | 1.5 | 0.31 | 8 | 0 | - | - | 0.88 | 0.8 | 0.8 | 1.0 | 0.7 | 0.9 | 0.9 | 1.1 | 1.1 | 1.4 | 1.6 | 1.6 | 0.7 | 1.2 | 1.0 | 1.1 | 0.9 |
| Total Potassium | mg/L | - | - | - | - | 0.4 | 0.4 | 0.75 | 0.84 | 1.6 | 1.8 | 0.49 | 8 | 0 | - | - | 0.14 | 0.3 | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.7 | 0.7 | 1.0 | 0.6 | 0.8 | 0.5 | 1.2 | 0.8 |
| Total Sodium | mg/L | - | - | - | - | 5.8 | 5.8 | 12 | 12 | 19 | 19 | 5.8 | 8 | 0 | - | - | 7.6 | 7.0 | 8.6 | 7.8 | 6.1 | 6.9 | 6.7 | 8.8 | 9.6 | 16 | 7.9 | 29 | 7.9 | 16 | 12 | 9.4 | 9.8 |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 2.9 | 6.0 | 7.0 | 1.8 | 8 | 3 | - | - | <2.0 | <2.0 | 2.0 | 2.0 | <2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 4.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 |
| Sulphide | mg/L | - | - | 0.5 | - | 0.02 | 0.031 | 0.05 | 0.1 | 0.34 | 0.5 | 0.16 | 8 | 8 | - | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | *<0.5* [DL>LC] | *<0.5* [DL>LC] | *<1* [DL>LC] | <0.05 | <0.05 |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.56 - 168 | 2 | 2 | 0.03 | 0.03 | 0.04 | 0.046 | 0.08 | 0.09 | 0.021 | 8 | 6 | - | - | 0.53 | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.06 | <0.05 | <0.05 | 0.1 | <0.05 | <0.05 | 0.06 | 0.09 | <0.03 | 0.16 |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.05 | 0.081 | 0.19 | 0.25 | 0.07 | 8 | 5 | - | - | <0.05 | <0.05 | <0.05 | 0.07 | <0.05 | 0.25 | 0.08 | 0.07 | 0.08 | 0.06 | 0.1 | 0.12 | 0.08 | 0.09 | 0.3 | 0.17 | 0.11 |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | <0.01 | <0.05 | **0.08**[LC] | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.05 | 0.081 | 0.19 | 0.25 | 0.07 | 8 | 5 | - | - | <0.05 | <0.05 | 0.08 | 0.07 | <0.05 | 0.25 | 0.08 | 0.07 | 0.08 | 0.06 | 0.1 | 0.12 | 0.08 | 0.09 | 0.3 | 0.17 | 0.11 |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | 0.4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.011 | 0.017 | 0.02 | 0.0035 | 8 | 6 | - | - | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.025 | 0.23 | 0.82 | 0.85 | 0.36 | 8 | 4 | - | - | 0.15 | 0.011 | 0.009 | - | <0.03 | <0.03 | 0.06 | 0.05 | 0.05 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.07 |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.0027 | 0.003 | 0.00076 | 8 | 4 | - | - | - | <0.001 | <0.001 | <0.001 | <0.001 | <0.002 | <0.001 | <0.001 | 0.002 | 0.001 | <0.001 | <0.001 | 0.002 | 0.002 | *<0.004* [DL>LC] | *<0.004* [DL>LC] | *<0.004* [DL>LC] |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.11 - 1.7[c] | - | - | 0.17 | 0.17 | 0.2 | 0.23 | 0.35 | 0.38 | 0.074 | 8 | 0 | - | 13% | **0.35**[LC] | **0.35**[LC] | 0.16 | 0.24 | **0.34**[LC] | **0.38**[LC] | **0.27**[LC] | **0.16**[LC] | **0.25**[LC] | 0.19 | **0.36**[LC] | **0.63**[LC] | **0.39**[LC] | 0.19 | 0.32 | 0.97 | 0.37 |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.0014 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Barium | mg/L | - | - | 5 | 5 | 0.019 | 0.02 | 0.032 | 0.034 | 0.057 | 0.058 | 0.015 | 8 | 0 | - | - | 0.0057 | 0.017 | 0.027 | 0.035 | 0.019 | 0.027 | 0.018 | 0.021 | 0.034 | 0.054 | 0.043 | 0.047 | 0.021 | 0.037 | 0.032 | 0.036 | 0.024 |
| Total Beryllium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.006 | 0.0064 | 0.008 | 0.0078 | 0.009 | 0.009 | 0.001 | 8 | 0 | - | - | <0.05 | 0.008 | 0.006 | <0.005 | 0.006 | 0.007 | 0.005 | <0.005 | 0.006 | 0.008 | 0.008 | 0.01 | 0.007 | 0.009 | 0.007 | 0.006 | 0.006 |
| Total Cadmium | mg/L | 0.00014 - 0.00087 | 0.000037 - 0.000077 | 0.05 | 0.05 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 8 | 8 | - | - | 0.000019 | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>LC] | **0.0003**[LC] | *<0.0003* [DL>SA, DL>LC] |
| Total Chromium | mg/L | - | 0.005[c,d] | 0.05[d] | 1 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Cobalt | mg/L | - | 0.00078[d] | - | - | 0.001 | 0.001 | 0.001 | 0.031 | 0.16 | 0.24 | 0.085 | 8 | 7 | - | 13% | **0.0009**[LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] |
| Total Copper | mg/L | - | 0.0002 - 0.0083[d] | 0.3 | 0.3 | 0.001 | 0.001 | 0.001 | 0.0011 | 0.0017 | 0.002 | 0.00035 | 8 | 4 | - | 25% | *<0.002* [DL>LC] | *<0.001* [DL>LC] | <0.001 | <0.001 | *<0.001* [DL>LC] | **0.001**[LC] | **0.003**[LC] | *<0.001* [DL>LC] | **0.001**[LC] | **0.002**[LC] | **0.002**[LC] | **0.006**[LC] | **0.002**[LC] | 0.001 | **0.003**[LC] | **0.011**[LC] | 0.002 |
| Total Iron | mg/L | - | 0.1 - 0.8[d] | 10 | 10 | 0.59 | 0.64 | 0.81 | 0.86 | 1.2 | 1.3 | 0.21 | 8 | 0 | - | 75% | **5**[LC] | **0.57**[LC] | 0.72 | 0.55 | **0.82**[LC] | **0.95**[LC] | 0.52 | 0.25 | **0.64**[LC] | **0.77**[LC] | 0.31 | **0.51**[LC] | 0.52 | **0.73**[LC] | **0.8**[LC] | **0.75**[LC] | **0.79**[LC] |
| Total Lead | mg/L | - | 0.0022 - 0.011[d] | 0.2 | 0.2 | 0.0011 | 0.0012 | 0.0019 | 0.0023 | 0.0051 | 0.0066 | 0.0018 | 8 | 0 | - | - | 0.00076 | 0.0016 | 0.001 | 0.001 | 0.0023 | 0.0024 | 0.0018 | 0.0015 | 0.0025 | 0.0018 | 0.0033 | **0.0381**[LC] | 0.0056 | 0.0019 | 0.0076 | **0.047**[LC] | 0.004 |
| Total Manganese | mg/L | 2.0 - 3.1 | 0.2 - 0.38 | - | - | 0.07 | 0.072 | 0.14 | 0.16 | 0.28 | 0.32 | 0.081 | 8 | 0 | - | - | 0.2 | 0.061 | 0.099 | 0.12 | 0.071 | 0.13 | 0.062 | 0.082 | 0.11 | 0.32 | 0.097 | 0.3 | 0.073 | 0.21 | 0.17 | 0.13 | 0.085 |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 8 | 8 | - | - | <0.000013 | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.007 | 0.011 | 0.029 | 0.034 | 0.011 | 8 | 3 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 | <0.002 | 0.008 | 0.002 | 0.013 | 0.004 | 0.01 | 0.007 |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 8 | 8 | - | - | *<0.001* [DL>LC] | *<0.001* [DL>LC] | 0.001 | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 8 | 8 | - | - | <0.0001 | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] |
| Total Strontium | mg/L | - | 2.5[e] | - | - | 0.014 | 0.015 | 0.028 | 0.032 | 0.058 | 0.058 | 0.018 | 8 | 0 | - | - | 0.01 | 0.012 | 0.025 | 0.024 | 0.015 | 0.019 | 0.013 | 0.019 | 0.032 | 0.058 | 0.045 | 0.038 | 0.017 | 0.037 | 0.035 | 0.022 | 0.019 |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 8 | 8 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 6 | - | - | 0.0024 | 0.003 | <0.002 | 0.002 | 0.004 | 0.003 | 0.003 | <0.002 | 0.002 | <0.002 | 0.002 | 0.006 | 0.003 | <0.002 | 0.003 | 0.015 | 0.004 |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0005 | 0.00054 | 0.0014 | 0.0016 | 0.0028 | 0.003 | 0.00097 | 8 | 0 | - | - | 0.00018 | 0.0005 | 0.0009 | 0.0009 | 0.0006 | 0.0009 | 0.0004 | 0.0005 | 0.0011 | 0.003 | 0.0014 | 0.0027 | 0.0007 | 0.0019 | 0.0013 | 0.0015 | 0.0008 |
| Total Vanadium | mg/L | - | 0.12[d] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Zinc | mg/L | 0.021 - 0.051 | 0.0046 - 0.029 | 0.5 | 0.5 | 0.005 | 0.005 | 0.007 | 0.0096 | 0.02 | 0.022 | 0.0062 | 8 | 2 | - | - | 0.0054 | 0.007 | <0.005 | 0.006 | 0.009 | 0.022 | 0.006 | 0.007 | 0.007 | 0.007 | 0.017 | **0.068**[SA, LC] | 0.011 | 0.01 | **0.015**[LC] | **0.074**[SA, LC] | **0.009**[LC] |

**Table A.1-4: Water Quality Summary for WS-10, 2015 to 2025**

| Parameter | Units | Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 | WS-10 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | 1-Sep-20 | 1-Dec-20 | 30-Mar-21 | 2-Jun-21 | 1-Sep-21 | 29-Nov-21 | 29-Mar-22 | 7-Jun-22 | 7-Sep-22 | 14-Dec-22 | 15-Aug-23 | 24-Oct-23 | 6-Dec-23 | 9-Apr-24 | 4-Jun-24 | 10-Sep-24 | 3-Dec-24 | 23-Mar-25 | 3-Jun-25 | 16-Sep-25 |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.5 | 7.5 | 7.0 | 7.2 | 7.2 | 7.2 | 6.9 | 7.5 | 7.1 | 7.3 | 7.1 | 6.6 | 7.1 | 7.1 | 7.3 | 7.5 | 7.8 | 8.0 | 7.8 | 7.9 |
| Field specific conductivity | µS/cm | - | - | - | - | 95 | 99 | 68 | 151 | 148 | 129 | 99 | 359 | 180 | 92 | 97 | 64 | 87 | 73 | 68 | 50 | 107 | 86 | 7.5 | 113 |
| Temperature | C | - | - | - | - | 22 | 8.3 | 2.8 | 18 | 20 | 9.0 | 5.4 | 19 | 19 | 6.7 | 21 | 9.5 | 2.6 | 4.9 | 13 | 22 | 3.7 | 2.3 | 16 | 17 |
| Field dissolved oxygen | mg/L | - | - | - | - | 13 | 15 | 19 | 11 | 11 | 15 | 13 | 8.1 | 7.8 | 0.6 | - | - | - | - | 7.6 | 6.0 | 16 | - | 9.5 | 8.4 |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 0 | 0 | 5.0 | - | 2.0 | 0 | 1.0 | 0 | 0 | 0 | 1.0 | 0 | 1.0 | 2.0 | 0 | 0 | 5.0 | 0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.2 | 6.8 | **6.29**[b,C] | 7.5 | 7.5 | 7.4 | 7.1 | 8.2 | 7.2 | 6.7 | 6.5 | **6.22**[b,C] | **6.16**[b,C] | **6.32**[b,C] | **6.24**[b,C] | 6.9 | 7.4 | 6.8 | 6.5 | - |
| Conductivity | µS/cm | - | - | - | - | 79 | 93 | 62 | 151 | 152 | 111 | 117 | 355 | 175 | 88 | 91 | 59 | 81 | 66 | 76 | 55 | 124 | 98 | 85 | - |
| Hardness | mg/L | - | - | - | - | 9.7 | 16 | 9.0 | 30 | 26 | 18 | 14 | 28 | 31 | 13 | 27 | 12 | 18 | 16 | 18 | 13 | 23 | 20 | 21 | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 20 | 13 | <5.0 | 33 | 37 | 29 | 15 | 114 | 47 | 11 | 16 | 7.0 | 13 | 10.0 | 12 | 10.0 | 28 | 16 | 16 | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 35 | 39 | 25 | 76 | 71 | 66 | 57 | 181 | 83 | 39 | 44 | 24 | 34 | 32 | 37 | 25 | 65 | 46 | 43 | - |
| Total suspended solids | mg/L | - | - | - | - | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 11 | <5.0 | <5.0 | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 15 | 4.9 | 6.4 | 7.6 | 11 | 8.0 | 3.4 | 5.7 | 8.2 | 5.2 | 12 | 11 | 5.8 | 4.6 | 10.0 | 14 | 7.8 | 3.0 | 4.9 | - |
| Colour | TCU | - | - | - | - | 165 | 49 | 37 | 45 | 74 | 90 | 25 | 49 | 79 | 51 | 109 | 137 | 80 | 46 | 97 | 161 | 92 | 26 | 52 | - |
| Reactive Silica | mg/L | - | - | - | - | 1.9 | 3.6 | 2.1 | 4.6 | 5.1 | 4.9 | 1.8 | 3.2 | 2.8 | 3.0 | 3.3 | 3.0 | 4.1 | 2.5 | 2.0 | 2.4 | 3.0 | 2.3 | 2.2 | - |
| Turbidity | NTU | - | - | - | - | 2.1 | 2.8 | 2.5 | 2.8 | 1.7 | 1.5 | <0.5 | 0.9 | 1.4 | 3.3 | 0.6 | 3.1 | 2.2 | 1.6 | 1.7 | 2.4 | 5.4 | 2.8 | 2.4 | - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 20 | 13 | <5.0 | 33 | 37 | 29 | 15 | 114 | 47 | 11 | 16 | 7.0 | 13 | 10.0 | 12 | 10.0 | 28 | 16 | 16 | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | - |
| Total Calcium | mg/L | - | - | - | - | 2.9 | 4.8 | 2.3 | 9.9 | 8.5 | 5.0 | 3.8 | 9.2 | 9.8 | 3.5 | 8.6 | 3.5 | 5.4 | 5.1 | 5.9 | 3.6 | 7.2 | 6.3 | 7.0 | - |
| Chloride | mg/L | 640 | 120 | - | - | 8.0 | 13 | 11 | 17 | 14 | 14 | 19 | 19 | 15 | 16 | 12 | 8.0 | 9.0 | 10.0 | 8.0 | 7.0 | 8.0 | 12 | 12 | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.6 | 0.9 | 0.8 | 1.3 | 1.1 | 1.3 | 1.2 | 1.2 | 1.5 | 0.96 | 1.3 | 0.8 | 1.0 | 0.8 | 0.9 | 0.9 | 1.2 | 1.0 | 0.9 | - |
| Total Potassium | mg/L | - | - | - | - | 0.8 | 0.5 | 0.4 | 1.2 | 1.3 | 1.6 | 1.1 | 5.1 | 1.8 | 0.37 | 0.4 | 0.5 | 0.4 | 0.4 | 0.8 | 0.4 | 1.9 | 1.1 | 0.5 | - |
| Total Sodium | mg/L | - | - | - | - | 9.2 | 8.2 | 7.3 | 20 | 19 | 22 | 17 | 66 | 19 | 7.8 | 10.0 | 5.8 | 7.6 | 7.1 | 8.7 | 5.9 | 19 | 12 | 8.5 | - |
| Sulphate | mg/L | - | - | - | - | <2.0 | 3.0 | 2.0 | 5.0 | 4.0 | 4.0 | 5.0 | 11 | 7.0 | 3.0 | <2.0 | <2.0 | 2.0 | 2.0 | 5.0 | <2.0 | 9.0 | 3.0 | 3.0 | - |
| Sulphide | mg/L | - | - | 0.5 | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.1 | <0.05 | <0.05 | <0.01 | <0.01 | - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.56 - 168 | 2 | 2 | 0.09 | <0.03 | <0.03 | 0.04 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | <0.05 | 0.08 | 0.07 | 0.18 | <0.05 | 0.09 | 0.08 | 0.1 | <0.05 | 0.06 | 0.13 | <0.05 | 0.08 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.14 | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | <0.05 | 0.08 | 0.07 | 0.18 | <0.05 | 0.09 | 0.08 | 0.1 | <0.05 | 0.06 | 0.13 | <0.05 | 0.08 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.14 | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.02 | <0.01 | <0.01 | 0.01 | <0.01 | 0.13 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | - |
| Total phosphorus | mg-P/L | - | - | - | - | <0.1 | 0.03 | <0.02 | <0.02 | <0.02 | <0.1 | <0.02 | <0.02 | 0.02 | 0.38 | 1.1 | 0.85 | 0.94 | 0.83 | 0.69 | 0.76 | 1.0 | 0.76 | 0.68 | - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.003 | 0.004 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.11 - 1.7[c] | - | - | 0.21 | 0.22 | 0.25 | 0.25 | 0.17 | 0.26 | 0.21 | 0.2 | 0.17 | 0.15 | 0.24 | 0.3 | 0.26 | 0.24 | 0.28 | 0.24 | 0.37 | 0.21 | 0.2 | - |
| Total Antimony | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | 0.009 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | 0.004 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.019 | 0.024 | 0.017 | 0.037 | 0.036 | 0.025 | 0.021 | 0.05 | 0.058 | 0.016 | 0.039 | 0.022 | 0.028 | 0.024 | 0.025 | 0.021 | 0.029 | 0.021 | 0.026 | - |
| Total Beryllium | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Bismuth | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.007 | <0.005 | <0.005 | 0.008 | 0.008 | <0.01 | <0.005 | 0.017 | 0.009 | <0.005 | <0.012 | 0.006 | <0.005 | 0.015 | <0.005 | 0.008 | 0.011 | 0.008 | <0.005 | - |
| Total Cadmium | mg/L | 0.00014 - 0.00087 | 0.000037 - 0.000077 | 0.05 | 0.05 | *<0.0003* [DL-SA, DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-SA, DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-LC] | *<0.0001* [DL-LC] | *<0.0003* [DL-SA, DL-LC] | **0.0004**[b,C] | *<0.0003* [DL-LC] | *<0.0003* [DL-SA, DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-SA, DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-SA, DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-LC] | *<0.0003* [DL-LC] | - |
| Total Chromium | mg/L | - | 0.005[c,d] | 0.05[d] | 1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.004 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Cobalt | mg/L | - | 0.00078[c] | - | - | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | <0.0005 | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.002* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | **0.241**[b,C] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | - |
| Total Copper | mg/L | - | 0.0002 - 0.0083[c] | 0.3 | 0.3 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | *<0.002* [DL-LC] | **0.002**[b,C] | 0.001 | 0.001 | <0.001 | <0.002 | *<0.001* [DL-LC] | <0.001 | <0.001 | **0.003**[b,C] | <0.001 | **0.005**[b,C] | <0.001 | <0.001 | - |
| Total Iron | mg/L | - | 0.1 - 0.8[c] | 10 | 10 | 0.75 | **0.52**[b,C] | 0.27 | 0.63 | **0.93**[b,C] | 0.55 | 0.2 | 0.35 | **0.84**[b,C] | 0.47 | **0.86**[b,C] | 0.59 | 0.47 | 0.36 | 0.51 | **1.28**[b,C] | **0.86**[b,C] | 0.28 | **0.61**[b,C] | - |
| Total Lead | mg/L | - | 0.0022 - 0.011[c] | 0.2 | 0.2 | 0.0014 | 0.0031 | 0.0018 | 0.0036 | 0.0015 | 0.0015 | 0.001 | 0.001 | 0.0011 | <0.0005 | <0.0021 | 0.0066 | 0.0009 | 0.0017 | 0.0012 | 0.0019 | 0.0065 | 0.0017 | 0.002 | - |
| Total Manganese | mg/L | 2.0 - 3.1 | 0.2 - 0.38 | - | - | 0.07 | 0.11 | 0.067 | 0.13 | 0.18 | 0.08 | 0.053 | 0.08 | 0.15 | 0.073 | 0.16 | 0.076 | 0.12 | 0.1 | 0.07 | 0.12 | 0.14 | 0.1 | 0.14 | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | *<0.000026* [DL-LC] | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.011 | 0.002 | <0.002 | 0.018 | 0.019 | 0.024 | 0.014 | **0.089**[b,C] | 0.034 | <0.002 | 0.002 | <0.002 | <0.002 | 0.003 | 0.002 | <0.002 | 0.006 | 0.005 | <0.002 | - |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.009 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.002 | 0.002 | <0.002 | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | **0.002**[b,C] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | *<0.001* [DL-LC] | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | <0.0001 | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00049* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | *<0.00025* [DL-LC] | - |
| Total Strontium | mg/L | - | 2.5[e] | - | - | 0.014 | 0.021 | 0.008 | 0.039 | 0.038 | 0.023 | 0.016 | 0.045 | 0.058 | 0.017 | 0.039 | 0.017 | 0.025 | 0.022 | 0.023 | 0.017 | 0.026 | 0.024 | 0.03 | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | - |
| Total Tin | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Titanium | mg/L | - | - | - | - | 0.002 | <0.002 | 0.003 | <0.002 | <0.002 | <0.01 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.006 | <0.002 | <0.002 | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0009 | 0.0007 | 0.0003 | 0.0019 | 0.0025 | 0.0022 | 0.0014 | 0.0091 | 0.0023 | 0.0004 | 0.0014 | 0.0006 | 0.001 | 0.0009 | 0.0007 | 0.0005 | 0.0017 | 0.0007 | 0.0009 | - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Zinc | mg/L | 0.021 - 0.051 | 0.0046 - 0.029 | 0.5 | 0.5 | <0.005 | 0.007 | 0.006 | 0.01 | 0.005 | *<0.02* [DL-LC] | 0.005 | <0.005 | <0.005 | <0.005 | <0.007 | 0.016 | 0.008 | 0.007 | **0.014**[b,C] | 0.007 | **0.128**[SA, LC] | **0.016**[b,C] | 0.005 | - |

**Table A.1-5: Water Quality Summary for WQ-STA-26, 2020 to 2025**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Full Dataset (2020 to 2025) | | | | | | | | | | | Winter (Nov-Mar) | | | | | | | | | | | Spring (Apr-May) | | | | | | | | | | | Summer (Jun-Aug) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | | SA | LC | | | | | | | | | | SA | LC | | | | | | | | | | SA | LC | | | | | | | | | SA | LC |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.5 | 6.6 | 7.3 | 7.2 | 7.9 | 8.2 | 0.43 | 22 | 0 | - | - | 6.6 | 6.7 | 7.2 | 7.3 | 8.0 | 8.2 | 0.47 | 8 | 0 | - | - | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 0 | 2 | 0 | - | - | 6.5 | 6.5 | 7.2 | 7.2 | 7.9 | 7.9 | 0.59 | 6 | 0 | - | - |
| Field specific conductivity | µS/cm | - | - | - | - | 124 | 131 | 199 | 200 | 259 | 271 | 46 | 22 | 0 | - | - | 149 | 149 | 181 | 186 | 233 | 235 | 33 | 8 | 0 | - | - | 190 | 191 | 192 | 192 | 194 | 194 | 2.8 | 2 | 0 | - | - | 124 | 126 | 228 | 204 | 258 | 258 | 62 | 6 | 0 | - | - |
| Temperature | C | - | - | - | - | 3.3 | 3.9 | 11 | 11 | 18 | 20 | 5.3 | 22 | 0 | - | - | 3.3 | 3.8 | 6.3 | 6.6 | 9.8 | 10 | 2.4 | 8 | 0 | - | - | 3.8 | 4.1 | 6.4 | 6.4 | 8.7 | 9.0 | 3.7 | 2 | 0 | - | - | 12 | 12 | 14 | 15 | 19 | 20 | 3.1 | 6 | 0 | - | - |
| Field dissolved oxygen | mg/L | - | - | - | - | 1.2 | 5.4 | 10 | 10 | 15 | 18 | 3.9 | 17 | 0 | - | - | 1.2 | 3.1 | 14 | 12 | 17 | 18 | 6.0 | 6 | 0 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | - | 1 | 0 | - | - | 7.9 | 8.0 | 9.8 | 10.0 | 12 | 13 | 2.0 | 5 | 0 | - | - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 0 | 1.4 | 4.0 | 16 | 3.5 | 21 | 0 | - | - | 0 | 0 | 0 | 0.57 | 1.7 | 2.0 | 0.79 | 7 | 0 | - | - | 0 | 0.05 | 0.5 | 0.5 | 0.95 | 1.0 | 0.71 | 2 | 0 | - | - | 0 | 0 | 0.5 | 1.0 | 3.3 | 4.0 | 1.5 | 6 | 0 | - | - |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.6 | 6.6 | 7.3 | 7.3 | 7.8 | 7.8 | 0.4 | 21 | 0 | - | - | 6.6 | 6.7 | 7.3 | 7.3 | 7.6 | 7.6 | 0.33 | 8 | 0 | - | - | 6.7 | 6.7 | 7.1 | 7.1 | 7.5 | 7.5 | 0.59 | 2 | 0 | - | - | 6.6 | 6.6 | 7.2 | 7.2 | 7.8 | 7.8 | 0.49 | 6 | 0 | - | - |
| Conductivity | µS/cm | - | - | - | - | 114 | 145 | 176 | 191 | 252 | 260 | 40 | 21 | 0 | - | - | 145 | 153 | 175 | 181 | 208 | 211 | 21 | 8 | 0 | - | - | 169 | 169 | 170 | 170 | 171 | 171 | 1.4 | 2 | 0 | - | - | 114 | 124 | 230 | 202 | 247 | 250 | 55 | 6 | 0 | - | - |
| Hardness | mg/L | - | - | - | - | 38 | 40 | 67 | 66 | 85 | 92 | 15 | 21 | 0 | - | - | 38 | 39 | 66 | 61 | 76 | 76 | 15 | 8 | 0 | - | - | 61 | 61 | 62 | 62 | 63 | 63 | 1.5 | 2 | 0 | - | - | 47 | 49 | 75 | 72 | 90 | 92 | 17 | 6 | 0 | - | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 23 | 33 | 50 | 55 | 80 | 84 | 16 | 21 | 0 | - | - | 33 | 34 | 50 | 48 | 58 | 59 | 9.1 | 8 | 0 | - | - | 43 | 44 | 49 | 49 | 54 | 55 | 8.5 | 2 | 0 | - | - | 23 | 30 | 70 | 60 | 76 | 78 | 21 | 6 | 0 | - | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 63 | 70 | 88 | 93 | 124 | 126 | 18 | 21 | 0 | - | - | 74 | 74 | 89 | 87 | 98 | 99 | 10.0 | 8 | 0 | - | - | 86 | 86 | 87 | 87 | 88 | 88 | 1.4 | 2 | 0 | - | - | 63 | 68 | 113 | 102 | 124 | 126 | 24 | 6 | 0 | - | - |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 21 | 21 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 8 | 8 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 6 | 6 | - | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 2.9 | 2.9 | 4.3 | 5.3 | 10 | 10 | 2.2 | 21 | 0 | - | - | 2.9 | 2.9 | 4.0 | 4.1 | 5.5 | 5.7 | 1.0 | 8 | 0 | - | - | 3.9 | 3.9 | 4.1 | 4.1 | 4.3 | 4.3 | 0.28 | 2 | 0 | - | - | 3.1 | 3.1 | 5.5 | 5.9 | 9.6 | 10 | 2.9 | 6 | 0 | - | - |
| Colour | TCU | - | - | - | - | 5.0 | 11 | 35 | 46 | 104 | 132 | 33 | 21 | 1 | - | - | 19 | 19 | 34 | 33 | 53 | 56 | 13 | 8 | 0 | - | - | 28 | 30 | 43 | 43 | 56 | 57 | 20 | 2 | 0 | - | - | 11 | 13 | 23 | 45 | 115 | 132 | 47 | 6 | 0 | - | - |
| Reactive Silica | mg/L | - | - | - | - | 2.9 | 3.0 | 5.2 | 5.4 | 8.0 | 8.8 | 1.6 | 21 | 0 | - | - | 3.1 | 3.3 | 4.9 | 5.0 | 7.0 | 7.3 | 1.4 | 8 | 0 | - | - | 3.9 | 4.0 | 4.5 | 4.5 | 5.0 | 5.1 | 0.85 | 2 | 0 | - | - | 2.9 | 2.9 | 6.3 | 5.6 | 7.8 | 8.0 | 2.2 | 6 | 0 | - | - |
| Turbidity | NTU | - | - | - | - | 0.7 | 0.8 | 2.4 | 2.5 | 5.4 | 5.5 | 1.3 | 21 | 0 | - | - | 1.6 | 1.7 | 2.5 | 2.9 | 5.0 | 5.4 | 1.3 | 8 | 0 | - | - | 1.9 | 2.0 | 2.6 | 2.6 | 3.2 | 3.3 | 0.99 | 2 | 0 | - | - | 0.7 | 0.98 | 2.2 | 2.5 | 4.8 | 5.5 | 1.6 | 6 | 0 | - | - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 23 | 33 | 50 | 55 | 80 | 84 | 16 | 21 | 0 | - | - | 33 | 34 | 50 | 48 | 58 | 59 | 9.1 | 8 | 0 | - | - | 43 | 44 | 49 | 49 | 54 | 55 | 8.5 | 2 | 0 | - | - | 23 | 30 | 70 | 60 | 76 | 78 | 21 | 6 | 0 | - | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 21 | 21 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 8 | 8 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 2 | 2 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 6 | 6 | - | - |
| Total Calcium | mg/L | - | - | - | - | 13 | 14 | 25 | 24 | 31 | 34 | 5.8 | 21 | 0 | - | - | 13 | 13 | 24 | 22 | 28 | 28 | 6.0 | 8 | 0 | - | - | 23 | 23 | 23 | 23 | 23 | 23 | 0.35 | 2 | 0 | - | - | 17 | 18 | 28 | 26 | 33 | 34 | 6.5 | 6 | 0 | - | - |
| Chloride | mg/L | 640 | 120 | - | - | 12 | 12 | 17 | 18 | 24 | 30 | 4.5 | 21 | 0 | - | - | 12 | 13 | 18 | 18 | 23 | 24 | 3.7 | 8 | 0 | - | - | 15 | 15 | 17 | 17 | 19 | 19 | 2.8 | 2 | 0 | - | - | 14 | 14 | 19 | 19 | 28 | 30 | 6.0 | 6 | 0 | - | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.0 | 1.1 | 1.4 | 1.4 | 1.7 | 1.7 | 0.21 | 21 | 0 | - | - | 1.2 | 1.2 | 1.4 | 1.4 | 1.6 | 1.6 | 0.17 | 8 | 0 | - | - | 1.1 | 1.1 | 1.2 | 1.2 | 1.3 | 1.3 | 0.14 | 2 | 0 | - | - | 1.2 | 1.2 | 1.5 | 1.5 | 1.7 | 1.7 | 0.21 | 6 | 0 | - | - |
| Total Potassium | mg/L | - | - | - | - | 0.54 | 0.6 | 0.8 | 0.79 | 0.9 | 1.2 | 0.13 | 21 | 1 | - | - | 0.54 | 0.56 | 0.75 | 0.77 | 1.1 | 1.2 | 0.19 | 8 | 1 | - | - | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0 | 2 | 0 | - | - | 0.7 | 0.7 | 0.8 | 0.8 | 0.9 | 0.9 | 0.089 | 6 | 0 | - | - |
| Total Sodium | mg/L | - | - | - | - | 8.8 | 8.9 | 11 | 11 | 14 | 14 | 1.7 | 21 | 0 | - | - | 8.9 | 8.9 | 11 | 11 | 12 | 12 | 1.3 | 8 | 0 | - | - | 10 | 10 | 11 | 11 | 11 | 11 | 0.64 | 2 | 0 | - | - | 9.8 | 10 | 13 | 13 | 14 | 14 | 1.6 | 6 | 0 | - | - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 3.0 | 3.2 | 4.0 | 4.0 | 0.62 | 21 | 0 | - | - | 3.0 | 3.0 | 3.5 | 3.5 | 4.0 | 4.0 | 0.53 | 8 | 0 | - | - | 3.0 | 3.1 | 3.5 | 3.5 | 4.0 | 4.0 | 0.71 | 2 | 0 | - | - | 2.0 | 2.3 | 3.0 | 3.0 | 3.8 | 4.0 | 0.63 | 6 | 0 | - | - |
| Sulphide | mg/L | - | - | 0.5 | - | 0.01 | 0.01 | 0.05 | 0.046 | 0.05 | 0.05 | 0.012 | 21 | 21 | - | - | 0.01 | 0.024 | 0.05 | 0.045 | 0.05 | 0.05 | 0.014 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.01 | 0.02 | 0.05 | 0.043 | 0.05 | 0.05 | 0.016 | 6 | 6 | - | - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.68 - 32 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.06 | 0.1 | 0.45 | 0.092 | 21 | 15 | - | - | 0.03 | 0.03 | 0.03 | 0.04 | 0.079 | 0.1 | 0.024 | 8 | 6 | - | - | 0.03 | 0.051 | 0.24 | 0.24 | 0.43 | 0.45 | 0.3 | 2 | 1 | - | - | 0.03 | 0.03 | 0.03 | 0.042 | 0.073 | 0.08 | 0.02 | 6 | 4 | - | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.06 | 0.15 | 0.15 | 0.22 | 0.27 | 0.058 | 21 | 1 | - | - | 0.13 | 0.13 | 0.19 | 0.19 | 0.25 | 0.27 | 0.048 | 8 | 0 | - | - | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0 | 2 | 0 | - | - | 0.07 | 0.078 | 0.15 | 0.15 | 0.21 | 0.21 | 0.056 | 6 | 0 | - | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 21 | 21 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 6 | 6 | - | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.06 | 0.15 | 0.15 | 0.22 | 0.27 | 0.058 | 21 | 1 | - | - | 0.13 | 0.13 | 0.19 | 0.19 | 0.25 | 0.27 | 0.048 | 8 | 0 | - | - | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0 | 2 | 0 | - | - | 0.07 | 0.078 | 0.15 | 0.15 | 0.21 | 0.21 | 0.056 | 6 | 0 | - | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.0022 | 21 | 19 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 8 | 8 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 2 | 2 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 6 | 5 | - | - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.1 | 0.79 | 2.0 | 2.1 | 0.84 | 21 | 7 | - | - | 0.02 | 0.02 | 0.47 | 0.78 | 1.9 | 2.0 | 0.86 | 8 | 4 | - | - | 0.03 | 0.11 | 0.79 | 0.79 | 1.5 | 1.5 | 1.1 | 2 | 0 | - | - | 0.02 | 0.02 | 0.78 | 0.89 | 2.0 | 2.1 | 0.96 | 6 | 1 | - | - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0016 | 0.004 | 0.004 | 0.00098 | 21 | 13 | - | - | 0.001 | 0.001 | 0.001 | 0.0014 | 0.0027 | 0.003 | 0.00074 | 8 | 6 | - | - | 0.001 | 0.0012 | 0.0025 | 0.0025 | 0.0039 | 0.004 | 0.0021 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0017 | 0.0035 | 0.004 | 0.0012 | 6 | 3 | - | - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.23 - 1.4[c] | - | - | 0.09 | 0.09 | 0.28 | 0.28 | 0.49 | 0.61 | 0.13 | 21 | 0 | - | 10% | 0.11 | 0.15 | 0.35 | 0.31 | 0.46 | 0.49 | 0.12 | 8 | 0 | - | 25% | 0.25 | 0.25 | 0.29 | 0.29 | 0.33 | 0.33 | 0.057 | 2 | 0 | - | - | 0.14 | 0.14 | 0.21 | 0.28 | 0.55 | 0.61 | 0.18 | 6 | 0 | - | - |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.082 | 0.086 | 0.13 | 0.14 | 0.24 | 0.27 | 0.049 | 21 | 0 | - | - | 0.082 | 0.087 | 0.13 | 0.12 | 0.15 | 0.16 | 0.026 | 8 | 0 | - | - | 0.11 | 0.11 | 0.12 | 0.12 | 0.13 | 0.13 | 0.012 | 2 | 0 | - | - | 0.086 | 0.093 | 0.17 | 0.16 | 0.22 | 0.24 | 0.054 | 6 | 0 | - | - |
| Total Beryllium | mg/L | - | - | - | - | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.00022 | 21 | 21 | - | - | 0.001 | 0.0014 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.005 | 0.005 | 0.008 | 0.0083 | 0.017 | 0.017 | 0.0036 | 21 | 8 | - | - | 0.005 | 0.005 | 0.0055 | 0.0074 | 0.015 | 0.017 | 0.0042 | 8 | 5 | - | - | 0.007 | 0.0075 | 0.012 | 0.012 | 0.017 | 0.017 | 0.0071 | 2 | 0 | - | - | 0.005 | 0.005 | 0.008 | 0.008 | 0.012 | 0.012 | 0.0028 | 6 | 3 | - | - |
| Total Cadmium | mg/L | 0.00078 - 0.0019 | 0.000071 - 0.00015 | 0.05 | 0.05 | 0.0001 | 0.0003 | 0.0003 | 0.0011 | 0.0003 | 0.018 | 0.0039 | 21 | 20 | 5% | 5% | 0.0003 | 0.0003 | 0.0003 | 0.0025 | 0.012 | 0.018 | 0.0063 | 8 | 7 | 13% | 13% | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 2 | 2 | - | - | 0.0001 | 0.00015 | 0.0003 | 0.00027 | 0.0003 | 0.0003 | 0.000082 | 6 | 6 | - | - |
| Total Chromium | mg/L | - | 0.001[c,d] | 0.05[d] | 1 | 0.002 | 0.002 | 0.002 | 0.0021 | 0.003 | 0.004 | 0.00048 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.0035 | 0.004 | 0.00082 | 6 | 6 | - | - |
| Total Cobalt | mg/L | - | 0.00078 - 0.00098[c] | - | - | 0.0005 | 0.001 | 0.001 | 0.018 | 0.002 | 0.35 | 0.076 | 21 | 20 | - | 5% | 0.0005 | 0.00068 | 0.001 | 0.00094 | 0.001 | 0.001 | 0.00018 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0012 | 0.0018 | 0.002 | 0.00041 | 6 | 6 | - | - |
| Total Copper | mg/L | - | 0.00022 - 0.0055[c] | 0.3 | 0.3 | 0.001 | 0.001 | 0.002 | 0.0019 | 0.003 | 0.004 | 0.00089 | 21 | 7 | - | 38% | 0.001 | 0.001 | 0.002 | 0.0018 | 0.0027 | 0.003 | 0.00071 | 8 | 3 | - | 38% | 0.001 | 0.0011 | 0.002 | 0.002 | 0.0029 | 0.003 | 0.0014 | 2 | 1 | - | 50% | 0.001 | 0.0013 | 0.002 | 0.0022 | 0.0035 | 0.004 | 0.00098 | 6 | 2 | - | 33% |
| Total Iron | mg/L | - | 0.32 - 0.76[c] | 10 | 10 | 0.24 | 0.27 | 0.45 | 0.49 | 0.86 | 0.86 | 0.17 | 21 | 0 | - | 52% | 0.24 | 0.25 | 0.45 | 0.47 | 0.78 | 0.86 | 0.2 | 8 | 0 | - | 63% | 0.28 | 0.29 | 0.36 | 0.36 | 0.42 | 0.43 | 0.11 | 2 | 0 | - | 50% | 0.34 | 0.36 | 0.49 | 0.51 | 0.69 | 0.72 | 0.14 | 6 | 0 | - | 50% |
| Total Lead | mg/L | - | 0.0064 - 0.012[c] | 0.2 | 0.2 | 0.0013 | 0.0015 | 0.0035 | 0.0049 | 0.011 | 0.017 | 0.0039 | 21 | 1 | - | 14% | 0.0018 | 0.0022 | 0.0041 | 0.006 | 0.014 | 0.017 | 0.005 | 8 | 0 | - | 25% | 0.0022 | 0.0025 | 0.0052 | 0.0052 | 0.0079 | 0.0082 | 0.0042 | 2 | 0 | - | 50% | 0.0013 | 0.0015 | 0.0038 | 0.0048 | 0.0099 | 0.011 | 0.0035 | 6 | 1 | - | - |
| Total Manganese | mg/L | 2.8 - 6.2 | 0.22 - 0.59 | - | - | 0.22 | 0.23 | 0.64 | 0.62 | 0.98 | 1.1 | 0.24 | 21 | 0 | - | 76% | 0.23 | 0.26 | 0.63 | 0.58 | 0.91 | 0.98 | 0.26 | 8 | 0 | - | 63% | 0.38 | 0.39 | 0.53 | 0.53 | 0.68 | 0.69 | 0.22 | 2 | 0 | - | 50% | 0.22 | 0.29 | 0.7 | 0.65 | 0.92 | 0.94 | 0.26 | 6 | 0 | - | 83% |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 21 | 21 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 8 | 8 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 2 | 2 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 6 | 6 | - | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 17 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 5 | - | - |
| Total Nickel | mg/L | - | 0.025 - 0.09 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.0024 | 0.003 | 0.009 | 0.0015 | 21 | 19 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0032 | 0.0073 | 0.009 | 0.0029 | 6 | 6 | - | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 21 | 21 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 6 | 6 | - | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.0001 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00049 | 0.000063 | 21 | 21 | - | - | 0.0001 | 0.00015 | 0.00025 | 0.00023 | 0.00025 | 0.00025 | 0.000053 | 8 | 8 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 2 | 2 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00029 | 0.00043 | 0.00049 | 0.000098 | 6 | 6 | - | - |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.037 | 0.051 | 0.084 | 0.089 | 0.14 | 0.14 | 0.03 | 21 | 0 | - | - | 0.037 | 0.042 | 0.081 | 0.074 | 0.1 | 0.1 | 0.024 | 8 | 0 | - | - | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.042 | 2 | 0 | - | - | 0.051 | 0.057 | 0.12 | 0.1 | 0.13 | 0.13 | 0.032 | 6 | 0 | - | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00012 | 0.0003 | 0.0003 | 0.00006 | 21 | 21 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00023 | 0.0003 | 0.000071 | 8 | 8 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 2 | 2 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00025 | 0.0003 | 0.000082 | 6 | 6 | - | - |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0027 | 0.006 | 0.01 | 0.0019 | 21 | 18 | - | - | 0.002 | 0.002 | 0.002 | 0.0031 | 0.0076 | 0.01 | 0.0028 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0028 | 0.0053 | 0.006 | 0.0016 | 6 | 5 | - | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0011 | 0.0014 | 0.0021 | 0.0022 | 0.0034 | 0.0035 | 0.00069 | 21 | 0 | - | - | 0.0011 | 0.0012 | 0.002 | 0.0018 | 0.0022 | 0.0022 | 0.00042 | 8 | 0 | - | - | 0.002 | 0.002 | 0.0023 | 0.0023 | 0.0025 | 0.0025 | 0.00035 | 2 | 0 | - | - | 0.0017 | 0.0017 | 0.0025 | 0.0025 | 0.0033 | 0.0033 | 0.00071 | 6 | 0 | - | - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Zinc | mg/L | 0.047 - 0.1 | 0.012 - 0.054 | 0.5 | 0.5 | 0.011 | 0.013 | 0.019 | 0.021 | 0.031 | 0.063 | 0.011 | 21 | 0 | - | 14% | 0.011 | 0.014 | 0.022 | 0.026 | 0.049 | 0.063 | 0.016 | 8 | 0 | - | 25% | 0.018 | 0.018 | 0.019 | 0.019 | 0.019 | 0.019 | 0.00071 | 2 | 0 | - | - | 0.013 | 0.013 | 0.017 | 0.017 | 0.021 | 0.021 | 0.0038 | 6 | 0 | - | 17% |

Notes:

(a) Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines (FEQGs; ECCC 2024) or Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG. Guidelines are ECCC unless otherwise indicated. Shaded values indicate guideline is calculated based on ETMFs (e.g., hardness, pH, temperature, and/or dissolved organic carbon). Guidelines were calculated based on ETMFs for each individual sample. The range of guidelines calucalted for for the sample set is shown. Underlined values indicate aquatic life guideline is for dissolved fraction but was compared to results for total fraction.

(b) Effluent discharge criteria are the Newfoundland and Labrador Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003) and CFI Certificate of Approval (COA) No. AA22-085691 Effluent Discharge Criteria (NL 2022). Effluent discharge criteria were compared to both total and dissolved metal fractions.

(c) Guideline is an FEQG (ECCC 2024).

(d) Guideline is for hexavalent chromium.

Values that are <DL were transformed to DL prior to calculating summary statistics (i.e., minimum, P5, median, mean, P95, maximum, and standard deviation).

**Bolded** values identify concentrations above the guideline, and *italicized* values identify DLs above or equal to the guideline, as indicated by the following flag superscripts:

SA = Concentration is above the short-term acute aquatic life guideline.

LC = Concentration is above the long-term chronic aquatic life guideline.

DL>LC = Detection limit is above or equal to the long-term chronic aquatic life guideline.

No concentrations were above the ECWSR or CFI COA effluent discharge criteria.

CCME = Canadian Council of Ministers of the Environment; ECCC = Environment and Climate Change Canada; FEQG = Federal Environmental Quality Guideline; ECWSR = Newfoundland and Labrador Environmental Control Water and Sewage Regulations; CFI COA = Canada Fluorspar Inc. Certificate of Approval Effluent Discharge Critieria; P5 = 5th percentile; P95 = 95th percentile; sd = standard deviation; ND = count of non-detectable values; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; DL = detection limit; ETMF = exposure and toxicity modifying factor; - = not applicable.

**Table A.1-5: Water Quality Summary for WQ-STA-26, 2020 to 2025**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Fall (Sep-Oct) | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | | SA | LC | 7-May-20 | 2-Jun-20 | 1-Sep-20 | 1-Dec-20 | 30-Mar-21 | 2-Jun-21 | 01-Sep-21 | 29-Nov-21 | 29-Mar-22 | 07-Jun-22 | 07-Sep-22 | 14-Dec-22 | 15-Aug-23 | 24-Oct-23 | 06-Dec-23 | 09-Apr-24 |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.8 | 6.9 | 7.2 | 7.2 | 7.6 | 7.6 | 0.29 | 6 | 0 | - | - | 7.4 | 7.7 | 7.5 | 7.1 | 6.9 | 7.5 | 7.2 | 7.3 | 6.6 | 6.5 | 6.8 | 7.1 | 6.9 | 7.1 | 7.3 | 7.4 |
| Field specific conductivity | µS/cm | - | - | - | - | 131 | 143 | 225 | 215 | 268 | 271 | 53 | 6 | 0 | - | - | 194 | 132 | 215 | 235 | 150 | 258 | 271 | 228 | 184 | 257 | 259 | 162 | 247 | 180 | 204 | 190 |
| Temperature | C | - | - | - | - | 7.6 | 9.5 | 16 | 15 | 18 | 18 | 4.1 | 6 | 0 | - | - | 9.0 | 12 | 18 | 7.7 | 3.3 | 13 | 18 | 9.5 | 4.9 | 18 | 15 | 10.0 | 20 | 7.6 | 4.8 | 3.8 |
| Field dissolved oxygen | mg/L | - | - | - | - | 6.4 | 6.7 | 9.1 | 9.5 | 13 | 13 | 2.7 | 5 | 0 | - | - | 10 | 13 | 13 | 15 | 18 | 12 | 11 | 13 | 14 | 8.2 | 7.8 | 1.2 | - | - | - | - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 0.5 | 3.2 | 13 | 16 | 6.3 | 6 | 0 | - | - | 0 | 1.0 | 0 | 0 | 0 | 0 | 16 | - | 1.0 | 0 | 0 | 1.0 | 0 | 1.0 | 0 | 1.0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.7 | 6.9 | 7.5 | 7.4 | 7.8 | 7.8 | 0.43 | 5 | 0 | - | - | 7.5 | 7.3 | 7.7 | 7.6 | 7.3 | 7.7 | 7.8 | 7.6 | 7.3 | 7.8 | 7.4 | 7.1 | 6.9 | 6.7 | 6.6 | 6.7 |
| Conductivity | µS/cm | - | - | - | - | 145 | 150 | 186 | 202 | 258 | 260 | 51 | 5 | 0 | - | - | 171 | 114 | 186 | 211 | 145 | 230 | 252 | 174 | 176 | 250 | 260 | 169 | 229 | 168 | 195 | 169 |
| Hardness | mg/L | - | - | - | - | 48 | 50 | 67 | 68 | 84 | 85 | 15 | 5 | 0 | - | - | 61 | 47 | 67 | 74 | 52 | 75 | 81 | 64 | 38 | 85 | 85 | 40 | 92 | 60 | 69 | 63 |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 43 | 44 | 54 | 62 | 83 | 84 | 19 | 5 | 0 | - | - | 43 | 23 | 50 | 57 | 33 | 69 | 80 | 49 | 36 | 71 | 84 | 48 | 71 | 54 | 59 | 55 |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 70 | 73 | 86 | 96 | 123 | 124 | 24 | 5 | 0 | - | - | 86 | 63 | 86 | 99 | 74 | 110 | 118 | 88 | 75 | 116 | 124 | 78 | 115 | 83 | 94 | 88 |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 5 | 5 | - | - | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Dissolved organic carbon | mg/L | - | - | - | - | 3.0 | 3.6 | 7.1 | 6.7 | 9.5 | 10 | 2.5 | 5 | 0 | - | - | 4.3 | 10.0 | 7.1 | 2.9 | 5.1 | 6.9 | 6.1 | 5.0 | 3.5 | 3.2 | 3.0 | 4.0 | 4.1 | 7.3 | 3.9 | 3.9 |
| Colour | TCU | - | - | - | - | 5.0 | 17 | 75 | 67 | 100 | 104 | 37 | 5 | 1 | - | - | 57 | 132 | 85 | 19 | 37 | 11 | <5.0 | 47 | 23 | 19 | 67 | 33 | 20 | 75 | 35 | 28 |
| Reactive Silica | mg/L | - | - | - | - | 5.1 | 5.1 | 5.4 | 6.2 | 8.3 | 8.8 | 1.6 | 5 | 0 | - | - | 3.9 | 2.9 | 5.4 | 6.4 | 4.3 | 8.0 | 8.8 | 3.1 | 3.8 | 6.8 | 5.2 | 4.7 | 7.1 | 6.4 | 7.3 | 5.1 |
| Turbidity | NTU | - | - | - | - | 0.8 | 0.86 | 1.5 | 1.7 | 2.5 | 2.5 | 0.76 | 5 | 0 | - | - | 3.3 | 5.5 | 2.4 | 1.9 | 5.4 | 1.8 | 1.1 | 2.4 | 1.6 | 2.6 | 0.8 | 1.9 | 0.7 | 1.5 | 4.2 | 1.9 |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 43 | 44 | 54 | 62 | 83 | 84 | 19 | 5 | 0 | - | - | 43 | 23 | 50 | 57 | 33 | 69 | 80 | 49 | 36 | 71 | 84 | 48 | 71 | 54 | 59 | 55 |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 5 | 5 | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 |
| Total Calcium | mg/L | - | - | - | - | 17 | 18 | 25 | 25 | 31 | 31 | 5.8 | 5 | 0 | - | - | 23 | 17 | 25 | 28 | 19 | 27 | 30 | 23 | 13 | 31 | 31 | 14 | 34 | 22 | 25 | 23 |
| Chloride | mg/L | 640 | 120 | - | - | 12 | 12 | 15 | 16 | 22 | 22 | 4.6 | 5 | 0 | - | - | 19 | 14 | 15 | 19 | 17 | 20 | 20 | 16 | 24 | 21 | 22 | 19 | 17 | 12 | 15 | 15 |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.0 | 1.1 | 1.3 | 1.4 | 1.7 | 1.7 | 0.28 | 5 | 0 | - | - | 1.1 | 1.2 | 1.0 | 1.3 | 1.2 | 1.6 | 1.6 | 1.6 | 1.4 | 1.7 | 1.7 | 1.2 | 1.7 | 1.3 | 1.4 | 1.3 |
| Total Potassium | mg/L | - | - | - | - | 0.8 | 0.8 | 0.8 | 0.82 | 0.88 | 0.9 | 0.045 | 5 | 0 | - | - | 0.7 | 0.8 | 0.8 | 0.6 | 0.7 | 0.8 | 0.8 | <1.2 | 0.7 | 0.9 | 0.9 | 0.54 | 0.9 | 0.8 | 0.8 | 0.7 |
| Total Sodium | mg/L | - | - | - | - | 8.8 | 8.9 | 9.7 | 11 | 13 | 13 | 1.7 | 5 | 0 | - | - | 11 | 12 | 9.7 | 9.8 | 11 | 13 | 12 | 11 | 9.0 | 14 | 13 | 8.9 | 14 | 9.4 | 11 | 10 |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.2 | 3.0 | 3.0 | 3.8 | 4.0 | 0.71 | 5 | 0 | - | - | 4.0 | 2.0 | 3.0 | 4.0 | 3.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 3.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Sulphide | mg/L | - | - | 0.5 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.68 - 32 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.044 | 0.086 | 0.1 | 0.031 | 5 | 4 | - | - | 0.45 | 0.08 | 0.1 | <0.03 | 0.04 | 0.05 | <0.03 | 0.1 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.052 | 0.09 | 0.09 | 0.14 | 0.15 | 0.039 | 5 | 1 | - | - | 0.15 | 0.2 | 0.09 | 0.22 | 0.27 | 0.17 | 0.1 | 0.16 | 0.19 | 0.1 | <0.05 | 0.13 | 0.07 | 0.15 | 0.22 | 0.15 |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.052 | 0.09 | 0.09 | 0.14 | 0.15 | 0.039 | 5 | 1 | - | - | 0.15 | 0.2 | 0.09 | 0.22 | 0.27 | 0.17 | 0.1 | 0.16 | 0.19 | 0.1 | <0.05 | 0.13 | 0.07 | 0.15 | 0.22 | 0.15 |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.012 | 0.018 | 0.02 | 0.0045 | 5 | 4 | - | - | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.022 | 0.1 | 0.69 | 1.7 | 1.8 | 0.88 | 5 | 2 | - | - | 0.03 | 0.06 | <0.1 | <0.02 | <0.02 | <0.02 | <0.02 | <0.1 | <0.02 | 0.02 | 0.03 | 0.85 | 2.1 | 1.8 | 1.7 | 1.5 |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0014 | 0.002 | 0.002 | 0.00055 | 5 | 2 | - | - | *<0.004* [DL>LC] | *<0.004* [DL>LC] | 0.002 | 0.002 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.001 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.23 - 1.4[c] | - | - | 0.09 | 0.09 | 0.28 | 0.22 | 0.35 | 0.36 | 0.12 | 5 | 0 | - | - | 0.33 | 0.61 | 0.28 | 0.21 | **0.49**[LC] | 0.2 | 0.09 | 0.35 | **0.39**[LC] | 0.22 | 0.09 | 0.11 | 0.15 | 0.36 | 0.25 | 0.25 |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Barium | mg/L | - | - | 5 | 5 | 0.11 | 0.11 | 0.14 | 0.17 | 0.26 | 0.27 | 0.068 | 5 | 0 | - | - | 0.11 | 0.086 | 0.14 | 0.12 | 0.096 | 0.17 | 0.19 | 0.13 | 0.11 | 0.24 | 0.27 | 0.082 | 0.19 | 0.12 | 0.14 | 0.13 |
| Total Beryllium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.008 | 0.008 | 0.008 | 0.0088 | 0.01 | 0.01 | 0.0011 | 5 | 0 | - | - | 0.007 | 0.008 | 0.01 | 0.006 | <0.005 | 0.008 | 0.008 | <0.01 | <0.005 | 0.01 | 0.008 | <0.005 | <0.012 | 0.008 | <0.005 | 0.017 |
| Total Cadmium | mg/L | 0.00078 - 0.0019 | 0.000071 - 0.00015 | 0.05 | 0.05 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 5 | 5 | - | - | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | **0.018**[SA, LC] | *<0.0003* [DL>LC] | <0.0001 | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] | *<0.0003* [DL>LC] |
| Total Chromium | mg/L | - | 0.001[C,D] | 0.05[B] | 1 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.004 | <0.002 | <0.002 | <0.002 |
| Total Cobalt | mg/L | - | 0.00078 - 0.00098[C] | - | - | 0.001 | 0.001 | 0.001 | 0.071 | 0.28 | 0.35 | 0.16 | 5 | 4 | - | 20% | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | <0.0005 | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.002* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] |
| Total Copper | mg/L | - | 0.00022 - 0.0055[C] | 0.3 | 0.3 | 0.001 | 0.001 | 0.001 | 0.0018 | 0.003 | 0.003 | 0.0011 | 5 | 1 | - | 40% | **0.003**[LC] | 0.004 | 0.003 | **0.002**[LC] | **0.003**[LC] | 0.002 | <0.001 | *<0.002* [DL>LC] | **0.002**[LC] | **0.002**[LC] | **0.001**[LC] | *<0.001* [DL>LC] | *<0.002* [DL>LC] | **0.003**[LC] | 0.001 | <0.001 |
| Total Iron | mg/L | - | 0.32 - 0.76[C] | 10 | 10 | 0.41 | 0.41 | 0.45 | 0.54 | 0.79 | 0.86 | 0.19 | 5 | 0 | - | 40% | 0.28 | 0.72 | 0.45 | **0.35**[LC] | 0.24 | 0.4 | 0.43 | **0.518**[LC] | 0.27 | **0.34**[LC] | **0.41**[LC] | 0.4 | **0.48**[LC] | 0.53 | **0.49**[LC] | **0.43**[LC] |
| Total Lead | mg/L | - | 0.0064 - 0.012[C] | 0.2 | 0.2 | 0.0015 | 0.0015 | 0.0025 | 0.0033 | 0.006 | 0.0065 | 0.0021 | 5 | 0 | - | - | **0.0082**[LC] | 0.011 | 0.0065 | 0.0051 | **0.0169**[LC] | 0.0035 | 0.0017 | 0.0048 | **0.0099**[LC] | 0.0041 | 0.0015 | 0.0018 | <0.0021 | 0.0041 | 0.0029 | 0.0022 |
| Total Manganese | mg/L | 2.8 - 6.2 | 0.22 - 0.59 | - | - | 0.43 | 0.44 | 0.59 | 0.68 | 1.0 | 1.1 | 0.26 | 5 | 0 | - | 100% | 0.38 | 0.22 | **0.431**[LC] | **0.642**[LC] | 0.23 | **0.722**[LC] | **0.831**[LC] | **0.617**[LC] | 0.3 | **0.68**[LC] | **1.07**[LC] | 0.38 | **0.843**[LC] | **0.586**[LC] | **0.741**[LC] | **0.691**[LC] |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 5 | 5 | - | - | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 2 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.002 | <0.002 | <0.002 | 0.002 | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Nickel | mg/L | - | 0.025 - 0.09 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 4 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | 0.002 | <0.002 | <0.009 | <0.002 | <0.002 | <0.002 |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 5 | 5 | - | - | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 5 | 5 | - | - | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | <0.0001 | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00049* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] |
| Total Strontium | mg/L | - | 2.5[C] | - | - | 0.063 | 0.065 | 0.075 | 0.098 | 0.14 | 0.14 | 0.038 | 5 | 0 | - | - | 0.084 | 0.051 | 0.074 | 0.079 | 0.037 | 0.11 | 0.14 | 0.083 | 0.052 | 0.13 | 0.14 | 0.053 | 0.13 | 0.075 | 0.089 | 0.084 |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 5 | 5 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 4 | - | - | <0.002 | 0.006 | 0.002 | <0.002 | 0.003 | <0.002 | <0.002 | <0.01 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0015 | 0.0016 | 0.0027 | 0.0026 | 0.0035 | 0.0035 | 0.00091 | 5 | 0 | - | - | 0.0025 | 0.0017 | 0.0027 | 0.0022 | 0.0014 | 0.0032 | 0.0035 | 0.0021 | 0.0015 | 0.0033 | 0.0034 | 0.0011 | 0.0027 | 0.0018 | 0.0021 | 0.002 |
| Total Vanadium | mg/L | - | 0.12[C] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Zinc | mg/L | 0.047 - 0.1 | 0.012 - 0.054 | 0.5 | 0.5 | 0.013 | 0.013 | 0.017 | 0.019 | 0.028 | 0.031 | 0.0071 | 5 | 0 | - | - | 0.019 | **0.021**[LC] | 0.018 | 0.022 | 0.024 | 0.021 | 0.017 | 0.022 | 0.022 | 0.019 | 0.015 | 0.011 | 0.013 | 0.031 | 0.019 | 0.018 |

**Table A.1-5: Water Quality Summary for WQ-STA-26, 2020 to 2025**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 | WQ-STA-26 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | 04-Jun-24 | 10-Sep-24 | 03-Dec-24 | 25-Mar-25 | 03-Jun-25 | 16-Sep-25 |
| **Field Measured** | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.6 | 7.2 | 7.5 | 8.2 | 7.9 | 7.6 |
| Field specific conductivity | µS/cm | - | - | - | - | 124 | 131 | 149 | 179 | 209 | 235 |
| Temperature | C | - | - | - | - | 13 | 18 | 5.4 | 7.1 | 15 | 15 |
| Field dissolved oxygen | mg/L | - | - | - | - | 7.9 | 6.4 | 8.8 | - | 9.8 | 9.1 |
| Field total suspended solids | mg/L | - | - | 30 | - | 1.0 | 0 | 2.0 | 0 | 4.0 | 2.0 |
| **Conventional Parameters** | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.6 | 7.5 | 7.5 | 7.2 | 7.0 | - |
| Conductivity | µS/cm | - | - | - | - | 155 | 145 | 174 | 201 | 236 | - |
| Hardness | mg/L | - | - | - | - | 57 | 48 | 76 | 71 | 75 | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 49 | 43 | 50 | 50 | 78 | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 81 | 70 | 90 | 97 | 126 | - |
| Total suspended solids | mg/L | - | - | - | - | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 8.3 | 10.0 | 5.7 | 2.9 | 3.1 | - |
| Colour | TCU | - | - | - | - | 66 | 104 | 56 | 19 | 25 | - |
| Reactive Silica | mg/L | - | - | - | - | 3.0 | 5.1 | 5.6 | 5.1 | 5.8 | - |
| Turbidity | NTU | - | - | - | - | 2.4 | 2.5 | 2.6 | 3.1 | 2.0 | - |
| **Major Ions** | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 49 | 43 | 50 | 50 | 78 | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | - |
| Total Calcium | mg/L | - | - | - | - | 21 | 17 | 28 | 26 | 28 | - |
| Chloride | mg/L | 640 | 120 | - | - | 14 | 12 | 12 | 21 | 30 | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 1.3 | 1.3 | 1.6 | 1.4 | 1.4 | - |
| Total Potassium | mg/L | - | - | - | - | 0.7 | 0.8 | 0.9 | 0.8 | 0.7 | - |
| Total Sodium | mg/L | - | - | - | - | 9.8 | 8.8 | 12 | 12 | 14 | - |
| Sulphate | mg/L | - | - | - | - | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | - |
| Sulphide | mg/L | - | - | 0.5 | - | <0.05 | <0.05 | <0.05 | <0.01 | <0.01 | - |
| **Nutrients** | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.68 - 32 | 2 | 2 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.13 | 0.06 | 0.13 | 0.18 | 0.21 | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.13 | 0.06 | 0.13 | 0.18 | 0.21 | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | - |
| Total phosphorus | mg-P/L | - | - | - | - | 1.5 | 1.5 | 2.0 | 1.5 | 1.7 | - |
| **Organics** | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | <0.001 | 0.002 | 0.003 | <0.001 | <0.001 | - |
| **Total Metals** | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.23 - 1.4[c] | - | - | 0.38 | 0.29 | 0.36 | 0.35 | 0.14 | - |
| Total Antimony | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.11 | 0.11 | 0.16 | 0.14 | 0.18 | - |
| Total Beryllium | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Bismuth | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | <0.005 | 0.01 | 0.017 | 0.006 | <0.005 | - |
| Total Cadmium | mg/L | 0.00078 - 0.0019 | 0.000071 - 0.00015 | 0.05 | 0.05 | *<0.0003 [DL>LC]* | *<0.0003 [DL>LC]* | *<0.0003 [DL>LC]* | *<0.0003 [DL>LC]* | *<0.0003 [DL>LC]* | - |
| Total Chromium | mg/L | - | 0.001[c,d] | 0.05[d] | 1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Cobalt | mg/L | - | 0.00078 - 0.00098[c] | - | - | *<0.001 [DL>LC]* | **0.35[LC]** | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | - |
| Total Copper | mg/L | - | 0.00022 - 0.0055[c] | 0.3 | 0.3 | **0.002[LC]** | 0.001 | 0.002 | <0.001 | <0.001 | - |
| Total Iron | mg/L | - | 0.32 - 0.76[c] | 10 | 10 | 0.61 | **0.86[LC]** | **0.86[LC]** | **0.63[LC]** | **0.49[LC]** | - |
| Total Lead | mg/L | - | 0.0064 - 0.012[c] | 0.2 | 0.2 | 0.007 | 0.0025 | 0.0033 | 0.0034 | 0.0013 | - |
| Total Manganese | mg/L | 2.8 - 6.2 | 0.22 - 0.59 | - | - | **0.505[LC]** | **0.495[LC]** | **0.98[LC]** | **0.774[LC]** | **0.939[LC]** | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | *<0.000026 [DL>LC]* | *<0.000026 [DL>LC]* | *<0.000026 [DL>LC]* | *<0.000026 [DL>LC]* | *<0.000026 [DL>LC]* | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | <0.002 | 0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Nickel | mg/L | - | 0.025 - 0.09 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | 0.002 | <0.002 | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | *<0.001 [DL>LC]* | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | *<0.00025 [DL>LC]* | *<0.00025 [DL>LC]* | *<0.00025 [DL>LC]* | *<0.00025 [DL>LC]* | *<0.00025 [DL>LC]* | - |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.074 | 0.063 | 0.1 | 0.096 | 0.12 | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | - |
| Total Tin | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Titanium | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0017 | 0.0015 | 0.0022 | 0.0018 | 0.0022 | - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Zinc | mg/L | 0.047 - 0.1 | 0.012 - 0.054 | 0.5 | 0.5 | 0.015 | 0.013 | **0.063[LC]** | **0.022[LC]** | 0.013 | - |

**Table A.1-6: Water Quality Summary for WQ-STA-27, 2020 to 2025**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Full Dataset (2020 to 2025) | | | | | | | | | | | Winter (Nov-Mar) | | | | | | | | | | | Spring (Apr-May) | | | | | | | | | | | Summer (Jun-Aug) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | | SA | LC | | | | | | | | | | SA | LC | | | | | | | | | | SA | LC | | | | | | | | | SA | LC |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.7 | 6.9 | 7.4 | 7.4 | 8.1 | 8.2 | 0.42 | 22 | 0 | - | - | 6.7 | 6.8 | 7.5 | 7.5 | 8.2 | 8.2 | 0.53 | 8 | 0 | - | - | 7.3 | 7.3 | 7.7 | 7.7 | 8.1 | 8.1 | 0.57 | 2 | 0 | - | - | 7.0 | 7.0 | 7.4 | 7.4 | 7.8 | 7.8 | 0.34 | 6 | 0 | - | - |
| Field specific conductivity | µS/cm | - | - | - | - | 13 | 15 | 54 | 51 | 72 | 81 | 17 | 22 | 0 | - | - | 13 | 25 | 63 | 55 | 71 | 72 | 19 | 8 | 0 | - | - | 14 | 16 | 30 | 30 | 44 | 46 | 22 | 2 | 0 | - | - | 32 | 35 | 54 | 54 | 75 | 81 | 16 | 6 | 0 | - | - |
| Temperature | C | - | - | - | - | 3.2 | 3.3 | 11 | 12 | 20 | 21 | 6.3 | 22 | 0 | - | - | 3.2 | 3.2 | 4.7 | 5.8 | 9.4 | 9.9 | 2.7 | 8 | 0 | - | - | 3.4 | 3.7 | 6.0 | 6.0 | 8.2 | 8.5 | 3.6 | 2 | 0 | - | - | 12 | 12 | 16 | 16 | 21 | 21 | 3.4 | 6 | 0 | - | - |
| Field dissolved oxygen | mg/L | - | - | - | - | 0.8 | 5.1 | 12 | 11 | 17 | 19 | 4.3 | 17 | 0 | - | - | 0.8 | 4.0 | 15 | 13 | 18 | 19 | 6.3 | 6 | 0 | - | - | 13 | 13 | 13 | 13 | 13 | 13 | - | 1 | 0 | - | - | 7.9 | 7.9 | 9.8 | 10 | 13 | 14 | 2.5 | 5 | 0 | - | - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 1.0 | 1.5 | 5.0 | 14 | 3.1 | 21 | 0 | - | - | 0 | 0 | 1.0 | 0.57 | 1.0 | 1.0 | 0.53 | 7 | 0 | - | - | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0 | 2 | 0 | - | - | 0 | 0 | 0.5 | 1.2 | 4.0 | 5.0 | 1.9 | 6 | 0 | - | - |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 5.6 | 5.6 | 6.1 | 6.1 | 6.6 | 6.6 | 0.31 | 21 | 0 | - | 81% | 5.6 | 5.6 | 5.9 | 5.9 | 6.2 | 6.2 | 0.25 | 8 | 0 | - | 100% | 5.8 | 5.8 | 5.9 | 5.9 | 6.0 | 6.0 | 0.11 | 2 | 0 | - | 100% | 5.9 | 6.0 | 6.3 | 6.3 | 6.5 | 6.6 | 0.23 | 6 | 0 | - | 83% |
| Conductivity | µS/cm | - | - | - | - | 30 | 30 | 45 | 45 | 62 | 65 | 10 | 21 | 0 | - | - | 31 | 35 | 46 | 50 | 64 | 65 | 11 | 8 | 0 | - | - | 30 | 30 | 30 | 30 | 30 | 30 | 0 | 2 | 0 | - | - | 36 | 38 | 45 | 46 | 56 | 58 | 7.5 | 6 | 0 | - | - |
| Hardness | mg/L | - | - | - | - | 3.9 | 4.7 | 7.0 | 7.1 | 9.0 | 9.4 | 1.5 | 21 | 0 | - | - | 4.7 | 5.3 | 7.1 | 7.0 | 8.5 | 8.9 | 1.2 | 8 | 0 | - | - | 3.9 | 3.9 | 4.4 | 4.4 | 4.8 | 4.8 | 0.64 | 2 | 0 | - | - | 6.2 | 6.2 | 7.7 | 7.5 | 8.9 | 9.0 | 1.2 | 6 | 0 | - | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.2 | 6.0 | 7.0 | 0.51 | 21 | 17 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 8 | 8 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - | - | 5.0 | 5.0 | 5.0 | 5.3 | 6.0 | 6.0 | 0.52 | 6 | 3 | - | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 12 | 13 | 19 | 18 | 24 | 28 | 4.1 | 21 | 0 | - | - | 14 | 15 | 19 | 20 | 27 | 28 | 4.7 | 8 | 0 | - | - | 12 | 12 | 13 | 13 | 13 | 13 | 0.71 | 2 | 0 | - | - | 18 | 18 | 20 | 20 | 23 | 23 | 1.8 | 6 | 0 | - | - |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.1 | 5.0 | 8.0 | 0.65 | 21 | 20 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 8 | 8 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - | - | 5.0 | 5.0 | 5.0 | 5.5 | 7.3 | 8.0 | 1.2 | 6 | 5 | - | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 2.3 | 3.1 | 5.8 | 8.1 | 16 | 18 | 4.4 | 21 | 0 | - | - | 2.3 | 2.6 | 4.7 | 5.2 | 8.8 | 9.2 | 2.4 | 8 | 0 | - | - | 4.4 | 4.4 | 4.7 | 4.7 | 4.9 | 4.9 | 0.35 | 2 | 0 | - | - | 5.4 | 5.5 | 6.9 | 8.9 | 16 | 18 | 4.7 | 6 | 0 | - | - |
| Colour | TCU | - | - | - | - | 10 | 14 | 60 | 74 | 179 | 181 | 55 | 21 | 0 | - | - | 14 | 17 | 39 | 47 | 95 | 110 | 31 | 8 | 0 | - | - | 43 | 45 | 56 | 56 | 67 | 68 | 17 | 2 | 0 | - | - | 41 | 45 | 73 | 89 | 163 | 181 | 50 | 6 | 0 | - | - |
| Reactive Silica | mg/L | - | - | - | - | 0.5 | 0.7 | 1.6 | 2.1 | 6.8 | 7.6 | 1.8 | 21 | 0 | - | - | 1.0 | 1.1 | 1.9 | 2.4 | 5.4 | 6.8 | 1.8 | 8 | 0 | - | - | 0.7 | 0.75 | 1.2 | 1.2 | 1.6 | 1.6 | 0.64 | 2 | 0 | - | - | 0.5 | 0.58 | 1.0 | 1.4 | 2.5 | 2.6 | 0.87 | 6 | 0 | - | - |
| Turbidity | NTU | - | - | - | - | 0.5 | 1.4 | 2.3 | 2.2 | 3.4 | 3.4 | 0.79 | 21 | 0 | - | - | 1.4 | 1.5 | 2.7 | 2.5 | 3.4 | 3.4 | 0.83 | 8 | 0 | - | - | 1.8 | 1.8 | 2.2 | 2.2 | 2.5 | 2.5 | 0.49 | 2 | 0 | - | - | 0.5 | 0.75 | 2.0 | 2.0 | 3.2 | 3.4 | 0.99 | 6 | 0 | - | - |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.2 | 6.0 | 7.0 | 0.51 | 21 | 17 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 8 | 8 | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 2 | 2 | - | - | 5.0 | 5.0 | 5.0 | 5.3 | 6.0 | 6.0 | 0.52 | 6 | 3 | - | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 21 | 21 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 8 | 8 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 2 | 2 | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 6 | 6 | - | - |
| Total Calcium | mg/L | - | - | - | - | 0.9 | 0.9 | 1.6 | 1.7 | 2.3 | 2.3 | 0.41 | 21 | 0 | - | - | 0.9 | 1.1 | 1.6 | 1.5 | 1.7 | 1.7 | 0.26 | 8 | 0 | - | - | 0.9 | 0.91 | 1.0 | 1.0 | 1.1 | 1.1 | 0.14 | 2 | 0 | - | - | 1.5 | 1.5 | 1.9 | 1.9 | 2.3 | 2.3 | 0.33 | 6 | 0 | - | - |
| Chloride | mg/L | 640 | 120 | - | - | 5.0 | 5.0 | 8.0 | 8.0 | 13 | 16 | 2.9 | 21 | 0 | - | - | 5.0 | 6.1 | 9.0 | 9.9 | 15 | 16 | 3.4 | 8 | 0 | - | - | 5.0 | 5.1 | 5.5 | 5.5 | 6.0 | 6.0 | 0.71 | 2 | 0 | - | - | 6.0 | 6.0 | 8.0 | 8.0 | 11 | 11 | 1.9 | 6 | 0 | - | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.4 | 0.5 | 0.78 | 0.72 | 0.9 | 1.2 | 0.18 | 21 | 0 | - | - | 0.6 | 0.6 | 0.79 | 0.8 | 1.1 | 1.2 | 0.19 | 8 | 0 | - | - | 0.4 | 0.41 | 0.45 | 0.45 | 0.5 | 0.5 | 0.071 | 2 | 0 | - | - | 0.6 | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.11 | 6 | 0 | - | - |
| Total Potassium | mg/L | - | - | - | - | 0.2 | 0.2 | 0.3 | 0.34 | 0.5 | 0.83 | 0.14 | 21 | 0 | - | - | 0.27 | 0.28 | 0.4 | 0.42 | 0.71 | 0.83 | 0.18 | 8 | 0 | - | - | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0 | 2 | 0 | - | - | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.089 | 6 | 0 | - | - |
| Total Sodium | mg/L | - | - | - | - | 4.1 | 4.3 | 5.6 | 5.7 | 7.5 | 7.7 | 1.0 | 21 | 0 | - | - | 4.8 | 5.0 | 6.0 | 5.9 | 6.9 | 6.9 | 0.71 | 8 | 0 | - | - | 4.3 | 4.3 | 4.5 | 4.5 | 4.6 | 4.6 | 0.21 | 2 | 0 | - | - | 5.2 | 5.2 | 6.0 | 6.3 | 7.7 | 7.7 | 1.1 | 6 | 0 | - | - |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 21 | 19 | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 8 | 6 | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 2 | 2 | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 6 | 6 | - | - |
| Sulphide | mg/L | - | - | 0.5 | - | 0.01 | 0.01 | 0.05 | 0.046 | 0.05 | 0.05 | 0.012 | 21 | 21 | - | - | 0.01 | 0.024 | 0.05 | 0.045 | 0.05 | 0.05 | 0.014 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.01 | 0.02 | 0.05 | 0.043 | 0.05 | 0.05 | 0.016 | 6 | 6 | - | - |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.77 - 25 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.044 | 0.11 | 0.11 | 0.027 | 21 | 15 | - | - | 0.03 | 0.03 | 0.03 | 0.035 | 0.053 | 0.06 | 0.011 | 8 | 6 | - | - | 0.03 | 0.034 | 0.07 | 0.07 | 0.11 | 0.11 | 0.057 | 2 | 1 | - | - | 0.03 | 0.03 | 0.03 | 0.045 | 0.088 | 0.1 | 0.028 | 6 | 4 | - | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.05 | 0.054 | 0.05 | 0.14 | 0.02 | 21 | 20 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.05 | 0.05 | 0.05 | 0.065 | 0.12 | 0.14 | 0.037 | 6 | 5 | - | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 21 | 21 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 6 | 6 | - | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.05 | 0.054 | 0.05 | 0.14 | 0.02 | 21 | 20 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 8 | 8 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 2 | 2 | - | - | 0.05 | 0.05 | 0.05 | 0.065 | 0.12 | 0.14 | 0.037 | 6 | 5 | - | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - | - | - | - | - | - | - | - | 0 | 0 | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.0022 | 21 | 18 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 8 | 8 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 2 | 1 | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 6 | 5 | - | - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.1 | 0.26 | 0.7 | 0.81 | 0.28 | 21 | 8 | - | - | 0.02 | 0.02 | 0.13 | 0.29 | 0.77 | 0.81 | 0.33 | 8 | 4 | - | - | 0.03 | 0.053 | 0.26 | 0.26 | 0.46 | 0.48 | 0.32 | 2 | 0 | - | - | 0.02 | 0.02 | 0.2 | 0.23 | 0.5 | 0.54 | 0.22 | 6 | 2 | - | - |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.004 | 0.004 | 0.00098 | 21 | 15 | - | - | 0.001 | 0.001 | 0.001 | 0.0013 | 0.002 | 0.002 | 0.00046 | 8 | 4 | - | - | 0.001 | 0.0012 | 0.0025 | 0.0025 | 0.0039 | 0.004 | 0.0021 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0015 | 0.0033 | 0.004 | 0.0012 | 6 | 6 | - | - |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.12 - 2.0[d] | - | - | 0.071 | 0.11 | 0.17 | 0.17 | 0.21 | 0.26 | 0.043 | 21 | 0 | - | 5% | 0.071 | 0.085 | 0.14 | 0.15 | 0.23 | 0.26 | 0.055 | 8 | 0 | - | 13% | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.15 | 0.0071 | 2 | 0 | - | - | 0.12 | 0.13 | 0.2 | 0.18 | 0.21 | 0.21 | 0.036 | 6 | 0 | - | - |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.00022 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.005 | 0.006 | 0.011 | 0.01 | 0.015 | 0.016 | 0.0029 | 21 | 1 | - | - | 0.006 | 0.0064 | 0.011 | 0.01 | 0.014 | 0.014 | 0.0028 | 8 | 0 | - | - | 0.007 | 0.007 | 0.007 | 0.007 | 0.007 | 0.007 | 0 | 2 | 0 | - | - | 0.005 | 0.006 | 0.011 | 0.01 | 0.015 | 0.016 | 0.0036 | 6 | 1 | - | - |
| Total Beryllium | mg/L | - | - | - | - | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.00022 | 21 | 21 | - | - | 0.001 | 0.0014 | 0.002 | 0.0019 | 0.002 | 0.002 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.005 | 0.005 | 0.006 | 0.0073 | 0.016 | 0.016 | 0.0035 | 21 | 10 | - | - | 0.005 | 0.005 | 0.005 | 0.0066 | 0.012 | 0.013 | 0.0031 | 8 | 7 | - | - | 0.005 | 0.0056 | 0.011 | 0.011 | 0.015 | 0.016 | 0.0078 | 2 | 1 | - | - | 0.005 | 0.005 | 0.0055 | 0.0075 | 0.014 | 0.016 | 0.0043 | 6 | 2 | - | - |
| Total Cadmium | mg/L | 0.000078 - 0.00019 | 0.00004 | 0.05 | 0.05 | 0.0001 | 0.0003 | 0.0003 | 0.0012 | 0.0003 | 0.019 | 0.0041 | 21 | 20 | 5% | 5% | 0.0003 | 0.0003 | 0.0003 | 0.0026 | 0.012 | 0.019 | 0.0066 | 8 | 7 | 13% | 13% | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 2 | 2 | - | - | 0.0001 | 0.00015 | 0.0003 | 0.00027 | 0.0003 | 0.0003 | 0.00008 | 6 | 6 | - | - |
| Total Chromium | mg/L | - | 0.005[c,d] | 0.05[d] | 1 | 0.002 | 0.002 | 0.002 | 0.0021 | 0.003 | 0.004 | 0.00048 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0023 | 0.0035 | 0.004 | 0.00082 | 6 | 6 | - | - |
| Total Cobalt | mg/L | - | 0.00078[c,d] | - | - | 0.0005 | 0.001 | 0.001 | 0.0075 | 0.002 | 0.14 | 0.03 | 21 | 20 | - | 5% | 0.0005 | 0.00068 | 0.001 | 0.00094 | 0.001 | 0.001 | 0.00018 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0012 | 0.0018 | 0.002 | 0.00041 | 6 | 6 | - | - |
| Total Copper | mg/L | - | 0.0002 - 0.0083[c] | 0.3 | 0.3 | 0.001 | 0.001 | 0.001 | 0.0011 | 0.002 | 0.002 | 0.0003 | 21 | 21 | - | - | 0.001 | 0.001 | 0.001 | 0.0011 | 0.0017 | 0.002 | 0.00035 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.0012 | 0.0018 | 0.002 | 0.00041 | 6 | 6 | - | - |
| Total Iron | mg/L | - | 0.26 - 0.8[c] | 10 | 10 | 0.21 | 0.25 | 0.65 | 0.75 | 1.5 | 1.6 | 0.4 | 21 | 0 | - | 57% | 0.21 | 0.22 | 0.59 | 0.52 | 0.83 | 0.91 | 0.25 | 8 | 0 | - | 50% | 0.33 | 0.33 | 0.36 | 0.36 | 0.38 | 0.38 | 0.035 | 2 | 0 | - | - | 0.55 | 0.56 | 0.7 | 0.76 | 1.1 | 1.2 | 0.24 | 6 | 0 | - | 67% |
| Total Lead | mg/L | - | 0.0038 - 0.011[c] | 0.2 | 0.2 | 0.0005 | 0.0005 | 0.0006 | 0.00077 | 0.0011 | 0.0021 | 0.00037 | 21 | 7 | - | - | 0.0005 | 0.0005 | 0.0005 | 0.00061 | 0.00093 | 0.001 | 0.00019 | 8 | 5 | - | - | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0 | 2 | 1 | - | - | 0.0005 | 0.00053 | 0.0008 | 0.00095 | 0.0018 | 0.0021 | 0.00058 | 6 | 1 | - | - |
| Total Manganese | mg/L | 2.0 | 0.2 - 0.38 | - | - | 0.024 | 0.027 | 0.042 | 0.046 | 0.078 | 0.089 | 0.018 | 21 | 0 | - | - | 0.034 | 0.034 | 0.042 | 0.042 | 0.052 | 0.054 | 0.0074 | 8 | 0 | - | - | 0.027 | 0.027 | 0.028 | 0.028 | 0.028 | 0.028 | 0.00071 | 2 | 0 | - | - | 0.024 | 0.025 | 0.042 | 0.039 | 0.051 | 0.051 | 0.011 | 6 | 0 | - | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 21 | 21 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 8 | 8 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 2 | 2 | - | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 6 | 6 | - | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.0026 | 0.006 | 0.009 | 0.0017 | 21 | 19 | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.0027 | 0.003 | 0.00035 | 8 | 7 | - | - | 0.002 | 0.0022 | 0.004 | 0.004 | 0.0058 | 0.006 | 0.0028 | 2 | 1 | - | - | 0.002 | 0.002 | 0.002 | 0.0032 | 0.0073 | 0.009 | 0.0029 | 6 | 6 | - | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 21 | 21 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 8 | 8 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 2 | 2 | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 6 | 6 | - | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.0002 | 0.00025 | 0.00025 | 0.00026 | 0.00025 | 0.00049 | 0.000054 | 21 | 20 | - | - | 0.0002 | 0.00022 | 0.00025 | 0.00024 | 0.00025 | 0.00025 | 0.000018 | 8 | 7 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 2 | 2 | - | - | 0.00025 | 0.00025 | 0.00025 | 0.00029 | 0.00043 | 0.00049 | 0.000098 | 6 | 6 | - | - |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.005 | 0.005 | 0.008 | 0.0081 | 0.011 | 0.012 | 0.002 | 21 | 3 | - | - | 0.005 | 0.0054 | 0.008 | 0.0076 | 0.0088 | 0.009 | 0.0013 | 8 | 1 | - | - | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0 | 2 | 1 | - | - | 0.007 | 0.007 | 0.008 | 0.0085 | 0.011 | 0.012 | 0.0019 | 6 | 1 | - | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00012 | 0.0003 | 0.0003 | 0.00006 | 21 | 21 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00023 | 0.0003 | 0.000071 | 8 | 8 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 2 | 2 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.00013 | 0.00025 | 0.0003 | 0.000082 | 6 | 6 | - | - |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0021 | 0.002 | 0.005 | 0.00065 | 21 | 20 | - | - | 0.002 | 0.002 | 0.002 | 0.0024 | 0.004 | 0.005 | 0.0011 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0025 | 0.003 | 0.01 | 0.0017 | 21 | 15 | - | - | 0.002 | 0.002 | 0.002 | 0.003 | 0.0072 | 0.01 | 0.0028 | 8 | 7 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.0022 | 0.0028 | 0.003 | 0.00041 | 6 | 4 | - | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0001 | 0.0001 | 0.0002 | 0.00024 | 0.0005 | 0.0011 | 0.00021 | 21 | 19 | - | - | 0.0001 | 0.00014 | 0.0002 | 0.00023 | 0.0004 | 0.0005 | 0.00012 | 8 | 8 | - | - | 0.0001 | 0.00011 | 0.00015 | 0.00015 | 0.0002 | 0.0002 | 0.000071 | 2 | 2 | - | - | 0.0001 | 0.00013 | 0.0002 | 0.00033 | 0.00088 | 0.0011 | 0.00038 | 6 | 5 | - | - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 21 | 21 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 8 | 8 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 2 | 2 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 6 | 6 | - | - |
| Total Zinc | mg/L | 0.018 - 0.03 | 0.0042 - 0.022 | 0.5 | 0.5 | 0.005 | 0.005 | 0.005 | 0.007 | 0.02 | 0.023 | 0.005 | 21 | 17 | - | 5% | 0.005 | 0.005 | 0.005 | 0.0096 | 0.022 | 0.023 | 0.0075 | 8 | 6 | - | 13% | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0 | 2 | 2 | - | - | 0.005 | 0.005 | 0.005 | 0.0057 | 0.008 | 0.009 | 0.0016 | 6 | 5 | - | - |

Notes:

(a) Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines (FEQGs; ECCC 2024) or Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG. Guidelines are ECCC unless otherwise indicated. Shaded values indicate guideline is calculated based on ETMFs (e.g., hardness, pH, temperature, and/or dissolved organic carbon). Guidelines were calculated based on ETMFs for each individual sample. The range of guidelines calucalted for for the sample set is shown. Underlined values indicate aquatic life guideline is for dissolved fraction but was compared to results for total fraction.

(b) Effluent discharge criteria are the Newfoundland and Labrador Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003) and CFI Certificate of Approval (COA) No. AA22-085691 Effluent Discharge Criteria (NL 2022). Effluent discharge criteria were compared to both total and dissolved metal fractions.

(c) Guideline is an FEQG (ECCC 2024).

(d) Guideline is for hexavalent chromium.

Values that are <DL were transformed to DL prior to calculating summary statistics (i.e., minimum, P5, median, mean, P95, maximum, and standard deviation).

**Bolded** values identify concentrations above the guideline, and *italicized* values identify DLs above or equal to the guideline, as indicated by the following flag superscripts:

SA = Concentration is above the short-term acute aquatic life guideline.

LC = Concentration is above the long-term chronic aquatic life guideline.

DL>SA = Detection limit is above or equal to the short-term acute aquatic life guideline.

DL>LC = Detection limit is above or equal to the long-term chronic aquatic life guideline.

No concentrations were above the ECWSR or CFI COA effluent discharge criteria.

CCME = Canadian Council of Ministers of the Environment; ECCC = Environment and Climate Change Canada; FEQG = Federal Environmental Quality Guideline; ECWSR = Newfoundland and Labrador Environmental Control Water and Sewage Regulations; CFI COA = Canada Fluorspar Inc. Certificate of Approval Effluent Discharge Critieria; P5 = 5th percentile; P95 = 95th percentile; sd = standard deviation; ND = count of non-detectable values; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; DL = detection limit; ETMF = exposure and toxicity modifying factor; - = not applicable.

**Table A.1-6: Water Quality Summary for WQ-STA-27, 2020 to 2025**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Fall (Sep-Oct) | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | P5 | Median | Mean | P95 | Max | sd | Count | ND | Results Above Guideline | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | | | | | | | | | | SA LC | 7-May-20 | 2-Jun-20 | 1-Sep-20 | 1-Dec-20 | 30-Mar-21 | 2-Jun-21 | 1-Sep-21 | 29-Nov-21 | 29-Mar-22 | 7-Jun-22 | 7-Sep-22 | 14-Dec-22 | 15-Aug-23 | 24-Oct-23 | 6-Dec-23 | 9-Apr-24 |
| **Field Measured** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 6.9 | 7.0 | 7.3 | 7.3 | 7.8 | 7.8 | 0.34 | 6 | 0 | - - | 8.1 | 7.6 | 7.6 | 7.6 | 6.9 | 7.6 | 7.1 | 7.6 | 6.7 | 7.2 | 6.9 | 7.3 | 7.0 | 7.1 | 7.2 | 7.3 |
| Field specific conductivity | µS/cm | - | - | - | - | 40 | 41 | 50 | 50 | 59 | 59 | 8.3 | 6 | 0 | - - | 14 | 53 | 45 | 66 | 47 | 81 | 55 | 72 | 70 | 59 | 58 | 65 | 55 | 44 | 61 | 46 |
| Temperature | C | - | - | - | - | 8.1 | 10 | 18 | 16 | 20 | 20 | 4.3 | 6 | 0 | - - | 8.5 | 12 | 20 | 8.5 | 3.2 | 15 | 19 | 9.9 | 5.0 | 19 | 16 | 8.1 | 21 | 8.1 | 3.3 | 3.4 |
| Field dissolved oxygen | mg/L | - | - | - | - | 6.2 | 6.7 | 9.5 | 9.7 | 13 | 14 | 2.7 | 5 | 0 | - - | 13 | 14 | 14 | 16 | 19 | 12 | 10 | 14 | 16 | 8.1 | 8.8 | 0.8 | - | - | - | - |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 1.0 | 3.2 | 11 | 14 | 5.4 | 6 | 0 | - - | 1.0 | 0 | 0 | 0 | 0 | 0 | 14 | - | 1.0 | 1.0 | 1.0 | 1.0 | 0 | 1.0 | 1.0 | 1.0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 5.9 | 5.9 | 6.5 | 6.3 | 6.6 | 6.6 | 0.33 | 5 | 0 | - 40% | **5.83**[LC] | **6.14**[LC] | **6.03**[LC] | **5.88**[LC] | **5.55**[LC] | **6.4**[LC] | 6.5 | **5.85**[LC] | **5.55**[LC] | 6.6 | 6.6 | **6.17**[LC] | **6.36**[LC] | **5.9**[LC] | **5.86**[LC] | **5.99**[LC] |
| Conductivity | µS/cm | - | - | - | - | 36 | 36 | 40 | 42 | 50 | 50 | 6.7 | 5 | 0 | - - | 30 | 44 | 37 | 59 | 45 | 58 | 50 | 46 | 65 | 50 | 49 | 62 | 45 | 36 | 46 | 30 |
| Hardness | mg/L | - | - | - | - | 6.0 | 6.0 | 8.5 | 7.8 | 9.3 | 9.4 | 1.6 | 5 | 0 | - - | 3.9 | 6.2 | 6.1 | 7.7 | 4.7 | 9.0 | 9.0 | 7.5 | 8.9 | 8.3 | 9.4 | 6.8 | 8.5 | 6.0 | 7.0 | 4.8 |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.4 | 6.6 | 7.0 | 0.89 | 5 | 4 | - - | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 7.0 | <5.0 | 5.0 | <5.0 | <5.0 | <5.0 |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 13 | 13 | 15 | 16 | 21 | 21 | 3.4 | 5 | 0 | - - | 13 | 19 | 14 | 21 | 16 | 23 | 19 | 21 | 28 | 20 | 21 | 24 | 19 | 13 | 17 | 12 |
| Total suspended solids | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0 | 5 | 5 | - - | <5.0 | 8.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Dissolved organic carbon | mg/L | - | - | - | - | 11 | 11 | 13 | 13 | 15 | 16 | 1.8 | 5 | 0 | - - | 4.9 | 5.7 | 13 | 4.7 | 4.0 | 5.4 | 12 | 8.0 | 2.3 | 8.0 | 16 | 4.7 | 18 | 11 | 5.8 | 4.4 |
| Colour | TCU | - | - | - | - | 10 | 12 | 149 | 105 | 176 | 179 | 83 | 5 | 0 | - - | 68 | 64 | 179 | 46 | 30 | 41 | 10 | 57 | 14 | 82 | 20 | 31 | 181 | 149 | 69 | 43 |
| Reactive Silica | mg/L | - | - | - | - | 0.9 | 0.96 | 1.8 | 2.7 | 6.5 | 7.6 | 2.8 | 5 | 0 | - - | 0.7 | 0.5 | 1.2 | 2.4 | 1.6 | 2.3 | 0.9 | 6.8 | 1.0 | 1.1 | 7.6 | 1.8 | 2.6 | 2.1 | 2.7 | 1.6 |
| Turbidity | NTU | - | - | - | - | 1.4 | 1.5 | 1.8 | 2.0 | 2.5 | 2.6 | 0.47 | 5 | 0 | - - | 1.8 | 2.4 | 1.7 | 1.4 | 1.7 | 2.3 | 1.8 | 1.7 | 2.9 | 1.6 | 1.4 | 3.4 | 0.5 | 2.3 | 2.5 | 2.5 |
| **Major Ions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 5.0 | 5.0 | 5.0 | 5.4 | 6.6 | 7.0 | 0.89 | 5 | 4 | - - | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 7.0 | <5.0 | 5.0 | <5.0 | <5.0 | <5.0 |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 5 | 5 | - - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 |
| Total Calcium | mg/L | - | - | - | - | 1.4 | 1.4 | 2.1 | 1.9 | 2.3 | 2.3 | 0.42 | 5 | 0 | - - | 0.9 | 1.5 | 1.6 | 1.6 | 0.9 | 2.3 | 2.3 | 1.7 | 1.6 | 2.0 | 2.3 | 1.4 | 2.1 | 1.4 | 1.5 | 1.1 |
| Chloride | mg/L | 640 | 120 | - | - | 5.0 | 5.2 | 6.0 | 6.2 | 7.6 | 8.0 | 1.1 | 5 | 0 | - - | 6.0 | 9.0 | 6.0 | 11 | 8.0 | 11 | 8.0 | 10.0 | 16 | 8.0 | 6.0 | 13 | 6.0 | 6.0 | 8.0 | 5.0 |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - | - | 0 | 0 | - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.5 | 0.52 | 0.8 | 0.72 | 0.88 | 0.9 | 0.16 | 5 | 0 | - - | 0.4 | 0.6 | 0.5 | 0.9 | 0.6 | 0.8 | 0.8 | 0.83 | 1.2 | 0.8 | 0.9 | 0.78 | 0.8 | 0.6 | 0.8 | 0.5 |
| Total Potassium | mg/L | - | - | - | - | 0.2 | 0.2 | 0.3 | 0.28 | 0.38 | 0.4 | 0.084 | 5 | 0 | - - | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 | 0.2 | 0.83 | 0.5 | 0.3 | 0.2 | 0.27 | 0.2 | 0.4 | 0.4 | 0.3 |
| Total Sodium | mg/L | - | - | - | - | 4.1 | 4.2 | 5.1 | 5.1 | 6.0 | 6.0 | 0.83 | 5 | 0 | - - | 4.6 | 6.4 | 4.4 | 6.8 | 6.0 | 7.5 | 6.0 | 6.9 | 6.0 | 7.7 | 5.8 | 6.1 | 5.6 | 4.1 | 5.6 | 4.3 |
| Sulphate | mg/L | - | - | - | - | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0 | 5 | 5 | - - | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 2.0 | <2.0 | <2.0 | 2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Sulphide | mg/L | - | - | 0.5 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **Nutrients** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.77 - 25 | 2 | 2 | 0.03 | 0.03 | 0.03 | 0.046 | 0.094 | 0.11 | 0.036 | 5 | 4 | - - | 0.11 | 0.1 | 0.11 | <0.03 | <0.03 | 0.05 | <0.03 | 0.06 | <0.03 | <0.03 | <0.03 | 0.04 | <0.03 | <0.03 | <0.03 | <0.03 |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 5 | 5 | - - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 | - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.012 | 0.018 | 0.02 | 0.0045 | 5 | 4 | - - | 0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total phosphorus | mg-P/L | - | - | - | - | 0.02 | 0.02 | 0.1 | 0.28 | 0.65 | 0.67 | 0.32 | 5 | 2 | - - | 0.03 | 0.06 | <0.1 | <0.02 | <0.02 | <0.02 | <0.02 | <0.1 | <0.02 | <0.02 | 0.02 | 0.15 | 0.54 | 0.57 | 0.7 | 0.48 |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | 0.001 | 0.001 | 0.001 | 0.0014 | 0.0026 | 0.003 | 0.00089 | 5 | 3 | - - | *<0.004* [DL=LC] | *<0.004* [DL=LC] | 0.003 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.12 - 2.0[c] | - | - | 0.16 | 0.16 | 0.18 | 0.19 | 0.21 | 0.21 | 0.019 | 5 | 0 | - - | 0.14 | 0.18 | 0.18 | 0.14 | 0.13 | 0.17 | 0.16 | 0.17 | **0.14**[LC] | 0.21 | 0.21 | 0.071 | 0.21 | 0.2 | 0.17 | 0.15 |
| Total Antimony | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Barium | mg/L | - | - | 5 | 5 | 0.01 | 0.01 | 0.011 | 0.012 | 0.014 | 0.015 | 0.0019 | 5 | 0 | - - | 0.007 | 0.011 | 0.012 | 0.012 | 0.009 | 0.01 | 0.01 | 0.014 | 0.013 | 0.016 | 0.015 | 0.006 | 0.011 | 0.011 | 0.011 | 0.007 |
| Total Beryllium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Bismuth | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | 0.006 | 0.006 | 0.007 | 0.0068 | 0.0078 | 0.008 | 0.00084 | 5 | 0 | - - | <0.005 | 0.005 | 0.007 | <0.005 | <0.005 | 0.006 | 0.006 | <0.01 | <0.005 | 0.008 | 0.006 | <0.005 | 0.016 | 0.007 | <0.005 | 0.016 |
| Total Cadmium | mg/L | 0.000078 - 0.00019 | 0.00004 | 0.05 | 0.05 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0 | 5 | 5 | - - | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | **0.019**[BA, LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0001* [DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] | *<0.0003* [DL=SA, DL=LC] |
| Total Chromium | mg/L | - | 0.005[LcR] | 0.05[B] | 1 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.004 | <0.002 | <0.002 | <0.002 |
| Total Cobalt | mg/L | - | 0.00078[LR] | - | - | 0.001 | 0.001 | 0.001 | 0.028 | 0.11 | 0.14 | 0.061 | 5 | 4 | - 20% | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | <0.0005 | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.002* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] |
| Total Copper | mg/L | - | 0.0002 - 0.0083[R] | 0.3 | 0.3 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 5 | 5 | - - | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | *<0.001* [DL=LC] | <0.001 | <0.001 | <0.002 | *<0.001* [DL=LC] | <0.001 | <0.001 | <0.001 | <0.002 | <0.001 | <0.001 | <0.001 |
| Total Iron | mg/L | - | 0.26 - 0.8[R] | 10 | 10 | 0.75 | 0.84 | 1.4 | 1.3 | 1.6 | 1.6 | 0.33 | 5 | 0 | - 80% | 0.33 | **0.75**[LC] | **1.18**[LC] | **0.67**[LC] | 0.25 | **0.8**[LC] | **1.35**[LC] | 0.65 | 0.21 | 0.59 | **1.57**[LC] | **0.59**[LC] | **1.21**[LC] | 0.75 | **0.59**[LC] | 0.38 |
| Total Lead | mg/L | - | 0.0038 - 0.011[G] | 0.2 | 0.2 | 0.0005 | 0.00058 | 0.001 | 0.0009 | 0.0011 | 0.0011 | 0.00023 | 5 | 0 | - - | <0.0005 | 0.0009 | 0.0009 | <0.0005 | <0.0005 | 0.0008 | 0.001 | <0.001 | <0.0005 | 0.0008 | 0.0011 | 0.0005 | <0.0021 | 0.0005 | 0.0006 | 0.0005 |
| Total Manganese | mg/L | 2.0 | 0.2 - 0.38 | - | - | 0.037 | 0.043 | 0.073 | 0.069 | 0.087 | 0.089 | 0.02 | 5 | 0 | - - | 0.027 | 0.051 | 0.067 | 0.049 | 0.035 | 0.042 | 0.078 | 0.034 | 0.045 | 0.041 | 0.089 | 0.042 | 0.049 | 0.037 | 0.034 | 0.028 |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0 | 5 | 5 | - - | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] | *<0.000026* [DL=LC] |
| Total Molybdenum | mg/L | - | 0.073 | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 | <0.002 | <0.009 | <0.002 | <0.002 | <0.002 |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0 | 5 | 5 | - - | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] | *<0.001* [DL=LC] |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0 | 5 | 5 | - - | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | 0.0002 | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00049* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] | *<0.00025* [DL=LC] |
| Total Strontium | mg/L | - | 2.5[G] | - | - | 0.007 | 0.0072 | 0.011 | 0.0096 | 0.011 | 0.011 | 0.0019 | 5 | 0 | - - | <0.005 | 0.008 | 0.008 | 0.009 | <0.005 | 0.009 | 0.011 | 0.008 | 0.008 | 0.008 | 0.011 | 0.0085 | <0.012 | 0.007 | 0.008 | 0.005 |
| Total Thallium | mg/L | - | 0.0008 | - | - | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0 | 5 | 5 | - - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | <0.0001 | <0.0001 |
| Total Tin | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.005 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Titanium | mg/L | - | - | - | - | 0.002 | 0.002 | 0.002 | 0.0024 | 0.003 | 0.003 | 0.00055 | 5 | 2 | - - | <0.002 | 0.002 | 0.003 | <0.002 | <0.002 | 0.002 | 0.002 | <0.01 | <0.002 | <0.002 | 0.003 | <0.002 | <0.003 | <0.002 | <0.002 | <0.002 |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0001 | 0.00012 | 0.0002 | 0.00018 | 0.0002 | 0.0002 | 0.000045 | 5 | 4 | - - | <0.0001 | 0.0001 | 0.0001 | <0.0001 | <0.0002 | <0.0002 | <0.0002 | <0.0005 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0011 | <0.0002 | <0.0002 | <0.0002 |
| Total Vanadium | mg/L | - | 0.12[G] | - | - | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0 | 5 | 5 | - - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Zinc | mg/L | 0.018 - 0.03 | 0.0042 - 0.022 | 0.5 | 0.5 | 0.005 | 0.005 | 0.005 | 0.0052 | 0.0058 | 0.006 | 0.00045 | 5 | 4 | - - | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 | *<0.02* [DL=LC] | <0.005 | <0.005 | <0.005 | <0.005 | 0.009 | <0.005 | 0.009 | <0.005 |

**Table A.1-6: Water Quality Summary for WQ-STA-27, 2020 to 2025**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 | WQ-STA-27 |
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | 4-Jun-24 | 10-Sep-24 | 3-Dec-24 | 25-Mar-25 | 3-Jun-25 | 16-Sep-25 |
| **Field Measured** | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.0 | 7.4 | 8.1 | 8.2 | 7.8 | 7.8 |
| Field specific conductivity | µS/cm | - | - | - | - | 32 | 40 | 13 | 47 | 45 | 59 |
| Temperature | C | - | - | - | - | 14 | 20 | 3.8 | 4.3 | 16 | 17 |
| Field dissolved oxygen | mg/L | - | - | - | - | 7.9 | 6.2 | 13 | - | 9.8 | 9.5 |
| Field total suspended solids | mg/L | - | - | 30 | - | 1.0 | 3.0 | 1.0 | 0 | 5.0 | 0 |
| **Conventional Parameters** | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | **5.9**[a(C)] | 6.5 | **6.2**[a(C)] | **6.1**[a(C)] | **6.26**[a(C)] | - |
| Conductivity | µS/cm | - | - | - | - | 36 | 40 | 31 | 43 | 42 | - |
| Hardness | mg/L | - | - | - | - | 7.0 | 8.5 | 7.1 | 6.5 | 6.2 | - |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 6.0 | <5.0 | <5.0 | <5.0 | 6.0 | - |
| Total dissolved solids | mg/L | - | - | 1,000 | 1,000 | 18 | 15 | 14 | 16 | 21 | - |
| Total suspended solids | mg/L | - | - | - | - | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | - |
| Dissolved organic carbon | mg/L | - | - | - | - | 11 | 14 | 9.2 | 3.1 | 5.8 | - |
| Colour | TCU | - | - | - | - | 108 | 165 | 110 | 23 | 60 | - |
| Reactive Silica | mg/L | - | - | - | - | 0.9 | 1.8 | 1.9 | 1.3 | 0.8 | - |
| Turbidity | NTU | - | - | - | - | 1.5 | 2.6 | 3.3 | 3.4 | 3.4 | - |
| **Major Ions** | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 6.0 | <5.0 | <5.0 | <5.0 | 6.0 | - |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | - |
| Total Calcium | mg/L | - | - | - | - | 1.8 | 2.1 | 1.7 | 1.6 | 1.5 | - |
| Chloride | mg/L | 640 | 120 | - | - | 6.0 | 5.0 | 5.0 | 8.0 | 8.0 | - |
| Fluoride | mg/L | - | 0.12 | - | - | - | - | - | - | - | - |
| Total Magnesium | mg/L | - | - | - | - | 0.6 | 0.8 | 0.7 | 0.6 | 0.6 | - |
| Total Potassium | mg/L | - | - | - | - | 0.3 | 0.3 | 0.4 | 0.4 | 0.2 | - |
| Total Sodium | mg/L | - | - | - | - | 5.2 | 5.1 | 4.8 | 5.3 | 5.3 | - |
| Sulphate | mg/L | - | - | - | - | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | - |
| Sulphide | mg/L | - | - | 0.5 | - | <0.05 | <0.05 | <0.05 | <0.01 | <0.01 | - |
| **Nutrients** | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.77 - 25 | 2 | 2 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | - |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | <0.05 | <0.05 | <0.05 | <0.05 | 0.14 | - |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | - |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | <0.05 | <0.05 | <0.05 | <0.05 | 0.14 | - |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | - | - | - | - | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | - |
| Total phosphorus | mg-P/L | - | - | - | - | 0.38 | 0.67 | 0.81 | 0.49 | 0.33 | - |
| **Organics** | | | | | | | | | | | |
| Phenols | mg/L | - | 0.004 | 0.1 | - | <0.001 | 0.001 | 0.002 | 0.001 | <0.001 | - |
| **Total Metals** | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.12 - 2.0[c] | - | - | 0.21 | 0.18 | 0.26 | 0.11 | 0.12 | - |
| Total Antimony | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Barium | mg/L | - | - | 5 | 5 | 0.009 | 0.011 | 0.011 | 0.007 | <0.005 | - |
| Total Beryllium | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Bismuth | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | <0.005 | 0.008 | 0.013 | <0.005 | <0.005 | - |
| Total Cadmium | mg/L | 0.000078 - 0.00019 | 0.00004 | 0.05 | 0.05 | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>SA, DL>LC] | *<0.0003* [DL>SA, DL>LC] | - |
| Total Chromium | mg/L | - | 0.005[d,e] | 0.05[d] | 1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Cobalt | mg/L | - | 0.00078[e] | - | - | *<0.001* [DL>LC] | **0.137**[a,Q] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | - |
| Total Copper | mg/L | - | 0.0002 - 0.0083[e] | 0.3 | 0.3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | - |
| Total Iron | mg/L | - | 0.26 - 0.8[e] | 10 | 10 | 0.65 | **1.51**[a,Q] | **0.91**[a,Q] | 0.26 | **0.55**[a,Q] | - |
| Total Lead | mg/L | - | 0.0038 - 0.011[e] | 0.2 | 0.2 | 0.0005 | 0.001 | 0.0008 | <0.0005 | 0.0006 | - |
| Total Manganese | mg/L | 2.0 | 0.2 - 0.38 | - | - | 0.024 | 0.073 | 0.054 | 0.042 | 0.028 | - |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | *<0.000026* [DL>LC] | - |
| Total Molybdenum | mg/L | - | 0.073 | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | <0.002 | <0.002 | <0.002 | 0.002 | <0.002 | - |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | *<0.001* [DL>LC] | - |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | *<0.00025* [DL>LC] | - |
| Total Strontium | mg/L | - | 2.5[c] | - | - | 0.007 | 0.011 | 0.008 | 0.006 | 0.007 | - |
| Total Thallium | mg/L | - | 0.0008 | - | - | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | - |
| Total Tin | mg/L | - | - | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Titanium | mg/L | - | - | - | - | <0.002 | <0.002 | 0.002 | <0.002 | <0.002 | - |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | - |
| Total Vanadium | mg/L | - | 0.12[c] | - | - | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | - |
| Total Zinc | mg/L | 0.018 - 0.03 | 0.0042 - 0.022 | 0.5 | 0.5 | <0.005 | <0.005 | **0.023**[a,Q] | *<0.005* [DL>LC] | <0.005 | - |

**Table A.1-7: Background Runoff Water Quality, 2026**

| Parameter | Units | FEQG & CCME Guidelines for the Protection of Aquatic Life[a] | | Effluent Discharge Criteria[b] | | Background Runoff-1 (BGR-1) | | | Background Runoff-2 (BGR-2) | | | Background Runoff-3 (BGR-3) | | | Background Runoff-4 (BGR-4) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short Term Acute | Long Term Chronic | ECWSR | CFI COA | 2026-01-13 | 2026-01-20 | 2026-03-10 | 2026-01-13 | 2026-01-20 | 2026-03-10 | 2026-01-13 | 2026-01-20 | 2026-03-10 | 2026-01-13 | 2026-01-20 | 2026-03-10 |
| **Field Measured** | | | | | | | | | | | | | | | | | |
| Field pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 8.0 | 8.0 | 8.5 | 7.2 | **6.4**[(LC)] | **6.2**[(LC)] | 7.9 | **6.4**[(LC)] | **6.1**[(LC)] | 8.8 | 6.5 | **6.1**[(LC)] |
| Field specific conductivity | µS/cm | - | - | - | - | 156 | 227 | 588 | 176 | 150 | 102 | 169 | 150 | 90 | 184 | 150 | 84 |
| Temperature | C | - | - | - | - | 3.1 | 4.5 | 5.0 | 1.8 | 3.3 | 5.5 | 2.3 | 1.6 | 5.4 | 2.1 | 1.8 | 3.1 |
| Field dissolved oxygen | mg/L | - | - | - | - | 13 | 12 | 11 | 12 | 11 | 11 | 14 | 12 | 12 | 14 | 14 | 12 |
| Field total suspended solids | mg/L | - | - | 30 | - | 0 | 0 | 7.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Conventional Parameters** | | | | | | | | | | | | | | | | | |
| pH | - | - | 6.5 to 9.0 | 5.5 to 9.0 | 5.5 to 9.0 | 7.3 | - | 7.3 | **6.04**[(LC)] | - | **5.95**[(LC)] | **6.39**[(LC)] | - | **6.41**[(LC)] | **6.43**[(LC)] | - | **6.38**[(LC)] |
| Conductivity | µS/cm | - | - | - | - | 158 | - | 134 | 115 | - | 108 | 119 | - | 111 | 119 | - | 114 |
| Hardness | mg/L | - | - | - | - | 38 | - | 46 | 12 | - | 20 | 16 | - | 26 | 19 | - | 24 |
| Total alkalinity, as CaCO3 | mg/L | - | - | - | - | 30 | - | 21 | 9.0 | - | <5.0 | 9.0 | - | 8.0 | 9.0 | - | 8.0 |
| Total dissolved solids | mg/L | - | - | 1000 | 1000 | 70 | - | 73 | 51 | - | 53 | 52 | - | 56 | 55 | - | 56 |
| Total suspended solids | mg/L | - | - | - | - | <5.0 | - | <5.0 | <5.0 | - | <5.0 | <5.0 | - | <5.0 | <5.0 | - | <5.0 |
| Dissolved organic carbon | mg/L | - | - | - | - | 4.1 | - | 4.2 | 5.6 | - | 5.8 | 6.1 | - | 5.2 | 5.9 | - | 5.6 |
| Total organic carbon | mg/L | - | - | - | - | - | - | 4.3 | - | - | 5.7 | - | - | 5.5 | - | - | 5.5 |
| Colour | TCU | - | - | - | - | 22 | - | 25 | 55 | - | 38 | 61 | - | 33 | 58 | - | 34 |
| Reactive Silica | mg/L | - | - | - | - | - | - | 4.0 | - | - | 3.7 | - | - | 2.8 | - | - | 2.8 |
| Turbidity | NTU | - | - | - | - | 4.2 | - | 3.2 | 3.4 | - | 1.9 | 3.5 | - | 3.0 | 3.8 | - | 2.7 |
| **Major Ions** | | | | | | | | | | | | | | | | | |
| Bicarbonate, as CaCO3 | mg/L | - | - | - | - | 30 | - | 21 | 9.0 | - | <5.0 | 9.0 | - | 8.0 | 9.0 | - | 8.0 |
| Carbonate, as CaCO3 | mg/L | - | - | - | - | <10.0 | - | <10.0 | <10.0 | - | <10.0 | <10.0 | - | <10.0 | <10.0 | - | <10.0 |
| Bromide | mg/L | - | - | - | - | 0.06 | - | 0.18 | 0.16 | - | 0.15 | 0.17 | - | 0.14 | 0.16 | - | 0.15 |
| Total Calcium | mg/L | - | - | - | - | 13 | - | 16 | 2.5 | - | 4.2 | 3.9 | - | 7.3 | 4.7 | - | 6.8 |
| Chloride | mg/L | 640 | 120 | - | - | 22 | - | 21 | 26 | - | 23 | 25 | - | 23 | 25 | - | 24 |
| Fluoride | mg/L | - | 0.12 | - | - | **2.08**[(LC)] | - | **2.06**[(LC)] | **0.73**[(LC)] | - | **0.88**[(LC)] | **0.79**[(LC)] | - | **1.02**[(LC)] | **0.76**[(LC)] | - | **1.05**[(LC)] |
| Total Magnesium | mg/L | - | - | - | - | 1.2 | - | 1.8 | 1.4 | - | 2.4 | 1.4 | - | 1.8 | 1.7 | - | 1.8 |
| Total Potassium | mg/L | - | - | - | - | 0.8 | - | 1.0 | 0.5 | - | 0.9 | 0.5 | - | 0.8 | 0.7 | - | 0.8 |
| Total Sodium | mg/L | - | - | - | - | 9.6 | - | 15 | 10 | - | 17 | 11 | - | 14 | 13 | - | 14 |
| Sulphate | mg/L | - | - | - | - | 3.0 | - | 3.0 | 4.0 | - | 3.0 | 3.0 | - | 3.0 | 3.0 | - | 3.0 |
| Sulphide | mg/L | - | - | 0.5 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Cyanides and Cyanates** | | | | | | | | | | | | | | | | | |
| Cyanide (WAD) | mg/L | - | 0.005 | 0.025 | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| **Nutrients** | | | | | | | | | | | | | | | | | |
| Total ammonia, as N | mg-N/L | - | 0.27 - 116 | 2 | 2 | <0.03 | - | <0.03 | <0.03 | - | <0.03 | <0.03 | - | <0.03 | <0.03 | - | <0.03 |
| Nitrate, as N | mg-N/L | 124 | 2.9 | 10 | 10 | 0.34 | - | 0.43 | 0.12 | - | 0.13 | 0.14 | - | 0.11 | 0.14 | - | 0.11 |
| Nitrite, as N | mg-N/L | - | 0.06 | - | - | <0.05 | - | <0.05 | <0.05 | - | <0.05 | <0.05 | - | <0.05 | <0.05 | - | <0.05 |
| Nitrogen (Nitrate and Nitrite) | mg-N/L | - | - | - | - | 0.34 | - | 0.43 | 0.12 | - | 0.13 | 0.14 | - | 0.11 | 0.14 | - | 0.11 |
| Total Kjeldahl nitrogen | mg-N/L | - | - | - | - | <0.4 | - | - | 0.4 | - | - | <0.4 | - | - | <0.4 | - | - |
| Ortho-phosphate | mg-P/L | - | - | - | - | - | - | <0.01 | - | - | <0.01 | - | - | <0.01 | - | - | <0.01 |
| Total phosphorus | mg-P/L | - | - | - | - | 0.7 | - | 1.6 | 0.75 | - | 1.5 | 0.43 | - | 1.0 | 0.55 | - | 0.86 |
| **Organics** | | | | | | | | | | | | | | | | | |
| Benzene | mg/L | 6[(c)] | 0.59[(c)] | - | - | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 |
| Ethylbenzene | mg/L | 1[(c)] | 0.07[(c)] | - | - | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 |
| F1 (C6 to C10) | mg/L | - | - | - | - | - | <0.025 | <0.025 | - | <0.025 | <0.025 | - | <0.025 | <0.025 | - | <0.025 | <0.025 |
| F1-BTEX | mg/L | - | - | - | - | - | <0.025 | <0.025 | - | <0.025 | <0.025 | - | <0.025 | <0.025 | - | <0.025 | <0.025 |
| F2 (C10 to C16) | mg/L | - | - | - | - | - | <0.049 | <0.1 | - | <0.049 | <0.1 | - | <0.049 | <0.1 | - | <0.049 | <0.1 |
| F3 (C16 to C34) | mg/L | - | - | - | - | - | <0.1 | <0.1 | - | <0.1 | <0.1 | - | <0.1 | <0.1 | - | <0.1 | <0.1 |
| F4 (C34 to C50) | mg/L | - | - | - | - | - | <0.1 | <0.1 | - | <0.1 | <0.1 | - | <0.1 | <0.1 | - | <0.1 | <0.1 |
| m&p-Xylene | mg/L | - | - | - | - | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 |
| o-Xylene | mg/L | - | - | - | - | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 |
| Toluene | mg/L | 3[(c)] | 0.03[(c)] | - | - | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 |
| Xylene | mg/L | 1[(c)] | 0.07[(c)] | - | - | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 | <0.0002 |
| **Total Metals** | | | | | | | | | | | | | | | | | |
| Total Aluminum | mg/L | - | 0.15 - 2.9[(c)] | - | - | 0.6 | - | 0.96 | **0.52**[(LC)] | - | **0.757**[(LC)] | 0.39 | - | **0.525**[(LC)] | 0.47 | - | **0.551**[(LC)] |
| Total Antimony | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Arsenic | mg/L | - | 0.005 | 0.5 | 0.5 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Barium | mg/L | - | - | 5 | 5 | 0.14 | - | 0.14 | 0.012 | - | 0.017 | 0.014 | - | 0.014 | 0.017 | - | 0.013 |
| Total Beryllium | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Bismuth | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Boron | mg/L | 29 | 1.5 | 5 | 5 | <0.05 | - | <0.05 | <0.05 | - | <0.05 | <0.05 | - | <0.05 | <0.05 | - | <0.05 |
| Total Cadmium | mg/L | 0.00024 - 0.00096 | 0.000039 - 0.000083 | 0.05 | 0.05 | *<0.0003 [(DL>LC)]* | - | **0.00013**[(LC)] | *<0.0003 [(DL>SA, DL>LC)]* | - | *<0.00009 [(DL>LC)]* | *<0.0003 [(DL>LC)]* | - | *<0.00009 [(DL>LC)]* | *<0.0003 [(DL>LC)]* | - | *<0.00009 [(DL>LC)]* |
| Total Chromium | mg/L | - | 0.005[(c,d)] | 0.05[(d)] | 1 | <0.002 | - | <0.001 | <0.002 | - | 0.001 | <0.002 | - | 0.002 | <0.002 | - | <0.001 |
| Total Cobalt | mg/L | - | 0.00078[(c)] | - | - | *<0.002 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* | *<0.002 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* | *<0.002 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* | *<0.002 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* |
| Total Copper | mg/L | - | 0.0002 - 0.0037[(c)] | 0.3 | 0.3 | 0.002 | - | 0.002 | <0.001 | - | *<0.001 [(DL>LC)]* | <0.001 | - | *<0.001 [(DL>LC)]* | <0.001 | - | *<0.001 [(DL>LC)]* |
| Total Iron | mg/L | - | 0.43 - 0.56[(c)] | 10 | 10 | 0.11 | - | 0.26 | 0.16 | - | 0.27 | 0.21 | - | 0.24 | 0.25 | - | 0.22 |
| Total Lead | mg/L | - | 0.0064 - 0.0074[(c)] | 0.2 | 0.2 | 0.0012 | - | 0.0023 | 0.0005 | - | **0.0391**[(LC)] | 0.0009 | - | 0.0026 | 0.001 | - | 0.0019 |
| Total Manganese | mg/L | 2.0 - 3.4 | 0.2 - 0.38 | - | - | 0.04 | - | 0.12 | 0.012 | - | 0.019 | **0.59**[(LC)] | - | 0.11 | **0.529**[(LC)] | - | 0.093 |
| Total Mercury | mg/L | - | 0.000026 | 0.005 | - | *<0.000026 [(DL>LC)]* | - | *<0.000026 [(DL>LC)]* | *<0.000026 [(DL>LC)]* | - | *<0.000026 [(DL>LC)]* | *<0.000026 [(DL>LC)]* | - | *<0.000026 [(DL>LC)]* | *<0.000026 [(DL>LC)]* | - | *<0.000026 [(DL>LC)]* |
| Total Molybdenum | mg/L | - | 0.073 | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Nickel | mg/L | - | 0.025 | 0.5 | 0.5 | <0.002 | - | 0.003 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Selenium | mg/L | - | 0.001 | 0.01 | 0.01 | *<0.001 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* | *<0.001 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* | *<0.001 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* | *<0.001 [(DL>LC)]* | - | *<0.001 [(DL>LC)]* |
| Total Silver | mg/L | - | 0.00025 | 0.05 | 0.05 | *<0.00025 [(DL>LC)]* | - | <0.0001 | *<0.00025 [(DL>LC)]* | - | <0.0001 | *<0.00025 [(DL>LC)]* | - | <0.0001 | *<0.00025 [(DL>LC)]* | - | <0.0001 |
| Total Strontium | mg/L | - | 2.5 | - | - | 0.018 | - | 0.02 | 0.014 | - | 0.019 | 0.014 | - | 0.018 | 0.018 | - | 0.016 |
| Total Thallium | mg/L | - | 0.0008 | - | - | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 |
| Total Tin | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | 0.033 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Titanium | mg/L | - | - | - | - | 0.002 | - | 0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | 0.003 | - | <0.002 |
| Total Uranium | mg/L | 0.033 | 0.015 | - | - | 0.0004 | - | 0.0003 | 0.0002 | - | 0.0003 | <0.0002 | - | <0.0002 | <0.0002 | - | <0.0002 |
| Total Vanadium | mg/L | - | 0.12 | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Total Zinc | mg/L | 0.023 - 0.058 | 0.0054 - 0.021 | 0.5 | 0.5 | **0.018**[(LC)] | - | **0.023**[(LC)] | <0.007 | - | 0.014 | **0.009**[(LC)] | - | 0.015 | **0.009**[(LC)] | - | 0.011 |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | |
| Dissolved Aluminum | mg/L | - | - | - | - | 0.52 | - | 0.6 | 0.54 | - | 0.51 | 0.34 | - | 0.39 | 0.37 | - | 0.4 |
| Dissolved Antimony | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Arsenic | mg/L | - | - | 0.5 | 0.5 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Barium | mg/L | - | - | 5 | 5 | 0.14 | - | 0.094 | 0.013 | - | 0.011 | 0.015 | - | 0.01 | 0.016 | - | 0.011 |
| Dissolved Beryllium | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Bismuth | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Boron | mg/L | - | - | 5 | 5 | <0.05 | - | <0.05 | <0.05 | - | <0.05 | <0.05 | - | <0.05 | <0.05 | - | <0.05 |
| Dissolved Cadmium | mg/L | - | - | 0.05 | 0.05 | 0.00012 | - | <0.00009 | 0.00009 | - | <0.00009 | <0.00009 | - | <0.00009 | <0.00009 | - | 0.0001 |
| Dissolved Chromium | mg/L | - | - | 0.05[(d)] | 1 | <0.002 | - | <0.001 | <0.002 | - | <0.001 | <0.002 | - | <0.001 | <0.002 | - | <0.001 |
| Dissolved Cobalt | mg/L | - | - | - | - | <0.001 | - | <0.001 | <0.001 | - | <0.001 | <0.001 | - | <0.001 | <0.001 | - | <0.001 |
| Dissolved Copper | mg/L | - | 0.0002 - 0.0037[(c)] | 0.3 | 0.3 | <0.002 | - | <0.002 | *<0.002 [(DL>LC)]* | - | *<0.002 [(DL>LC)]* | <0.002 | - | *<0.002 [(DL>LC)]* | <0.002 | - | *<0.002 [(DL>LC)]* |
| Dissolved Iron | mg/L | - | - | 10 | 10 | 0.07 | - | 0.11 | 0.1 | - | 0.12 | 0.15 | - | 0.098 | 0.14 | - | 0.11 |
| Dissolved Lead | mg/L | - | 0.0064 - 0.0074[(c)] | 0.2 | 0.2 | 0.0011 | - | 0.0008 | 0.0005 | - | <0.0005 | 0.0005 | - | 0.0007 | <0.0005 | - | 0.0009 |
| Dissolved Manganese | mg/L | 2.0 - 3.4 | 0.2 - 0.38 | - | - | 0.037 | - | 0.082 | 0.013 | - | 0.012 | **0.514**[(LC)] | - | 0.085 | **0.484**[(LC)] | - | 0.078 |
| Dissolved Mercury | mg/L | - | - | 0.005 | - | <0.000026 | - | <0.000026 | <0.000026 | - | <0.000026 | <0.000026 | - | <0.000026 | <0.000026 | - | <0.000026 |
| Dissolved Molybdenum | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Nickel | mg/L | - | - | 0.5 | 0.5 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Selenium | mg/L | - | - | 0.01 | 0.01 | <0.001 | - | <0.001 | <0.001 | - | <0.001 | <0.001 | - | <0.001 | <0.001 | - | <0.001 |
| Dissolved Silver | mg/L | - | - | 0.05 | 0.05 | <0.0001 | - | <0.0001 | <0.0001 | - | 0.0002 | 0.0002 | - | <0.0001 | 0.0001 | - | 0.0001 |
| Dissolved Strontium | mg/L | - | 2.5[(c)] | - | - | 0.016 | - | 0.014 | 0.015 | - | 0.013 | 0.015 | - | 0.014 | 0.016 | - | 0.014 |
| Dissolved Thallium | mg/L | - | - | - | - | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 |
| Dissolved Tin | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Titanium | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Uranium | mg/L | - | - | - | - | 0.0004 | - | 0.0002 | 0.0002 | - | 0.0002 | 0.0001 | - | <0.0001 | <0.0001 | - | <0.0001 |
| Dissolved Vanadium | mg/L | - | - | - | - | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 | <0.002 | - | <0.002 |
| Dissolved Zinc | mg/L | 0.023 - 0.058 | 0.0054 - 0.021 | 0.5 | 0.5 | **0.014**[(LC)] | - | **0.016**[(LC)] | 0.007 | - | 0.007 | <0.005 | - | 0.008 | **0.016**[(LC)] | - | 0.01 |

Notes:

(a) Environment and Climate Change Canada (ECCC) Federal Environmental Quality Guidelines (FEQGs; ECCC 2024) or Canadian Council of Ministers of the Environment (CCME) long-term chronic and short-term acute surface water quality guideline for the protection of aquatic life (CCME 1999) in the absence of an FEQG. Guidelines are ECCC unless otherwise indicated. Shaded values indicate guideline is calculated based on ETMFs (e.g., hardness, pH, temperature, and/or dissolved organic carbon). Guidelines were calculated based on ETMFs for each individual sample. The range of guidelines calucalted for for the sample set is shown. Underlined values indicate aquatic life guideline is for dissolved fraction but was compared to results for total fraction.

(b) Effluent discharge criteria are the Newfoundland and Labrador Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NL 2003) and CFI Certificate of Approval (COA) No. AA22-085691 Effluent Discharge Criteria (NL 2022). Effluent discharge criteria were compared to both total and dissolved metal fractions.

(c) Guideline is an FEQG (ECCC 2024).

(d) Guideline is for hexavalent chromium.

**Bolded** values identify concentrations above the guideline, and *italicized* values identify DLs above or equal to the guideline, as indicated by the following flag superscripts:

LC = Concentration is above the long-term chronic aquatic life guideline.

DL>SA = Detection limit is above or equal to the short-term acute aquatic life guideline.

DL>LC = Detection limit is above or equal to the long-term chronic aquatic life guideline.

No detectable concentrations were above the short-term acute aquatic life guidelines or the ECWSR or CFI COA effluent discharge criteria.

CCME = Canadian Council of Ministers of the Environment; ECCC = Environment and Climate Change Canada; FEQG = Federal Environmental Quality Guideline; ECWSR = Newfoundland and Labrador Environmental Control Water and Sewage Regulations; CFI COA = Canada Fluorspar Inc. Certificate of Approval Effluent Discharge Critieria; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; DL = detection limit; ETMF = exposure and toxicity modifying factor; - = not applicable.

# Appendix A.2 Existing Surface Water Temporal Plots

This appendix present temporal plots, and the following notes apply to all plots:

- Aquatic life water quality guidelines shown were calculated using median results for all samples (i.e., pH = 7.2, temperature = 11.3C, hardness = 37 mg/L, and dissolved organic carbon = 7.2 mg/L), as applicable
- Acute = short-term acute guidelines for the protection aquatic life (CCME 1999)
- Chronic = long-term chronic guidelines for the protection of aquatic life (ECCC 2024 or CCME 1999)
- CCME = Canadian Council of Ministers of the Environment
- ECCC = Environment and Climate Change Canada
- <DL = less than the detection limit

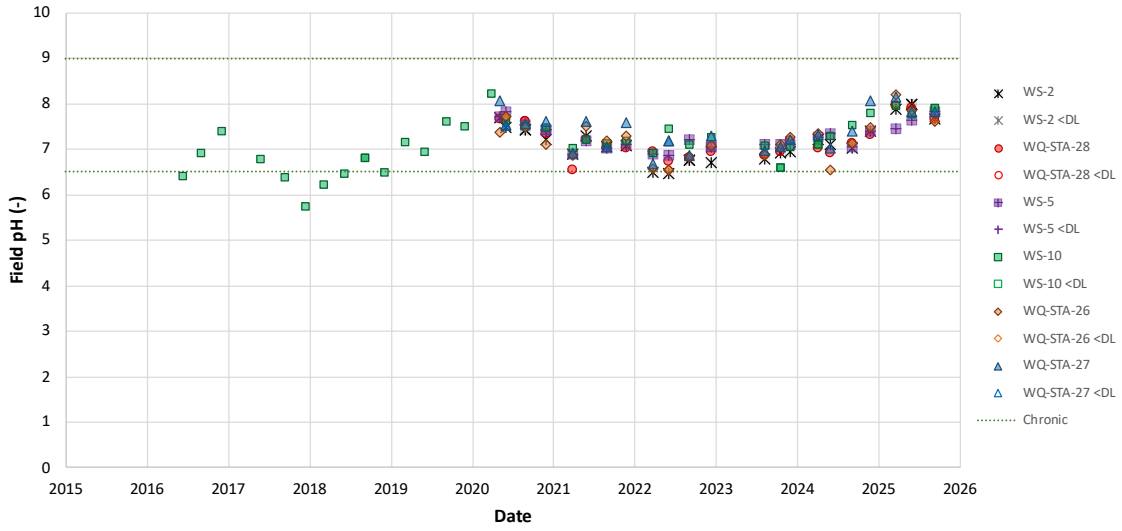


**Figure A.2-1: Field pH at Surface Water Quality Monitoring Locations, 2016 to 2025**

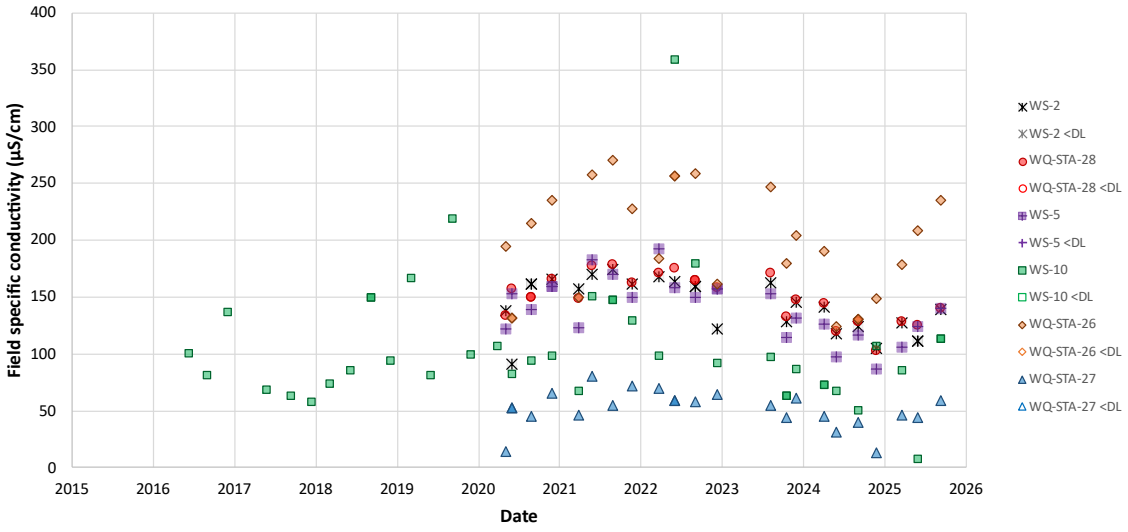


**Figure A.2-2: Field Specific Conductivity at Surface Water Quality Monitoring Locations, 2016 to 2025**

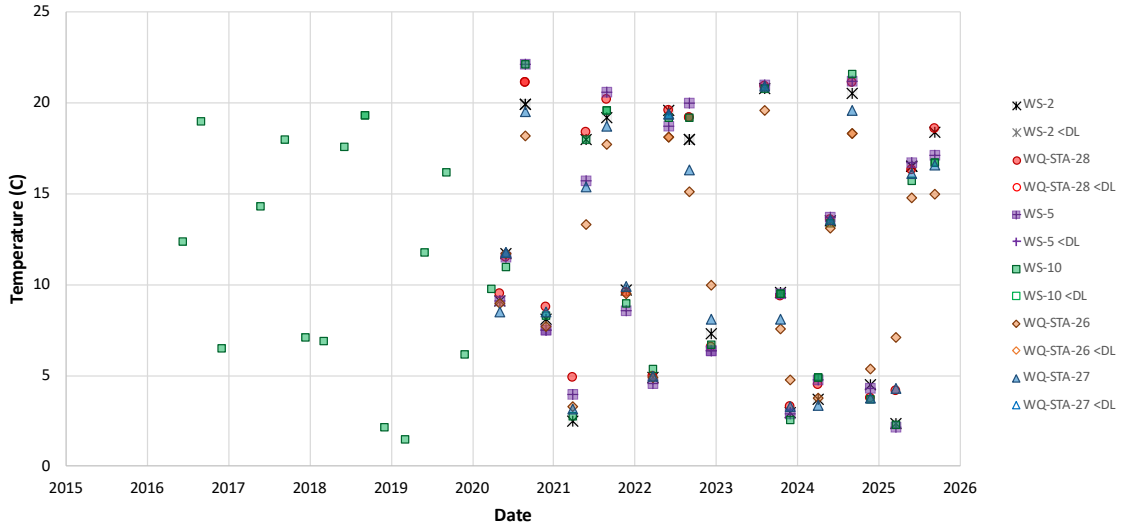


**Figure A.2-3: Temperature at Surface Water Quality Monitoring Locations, 2016 to 2025**

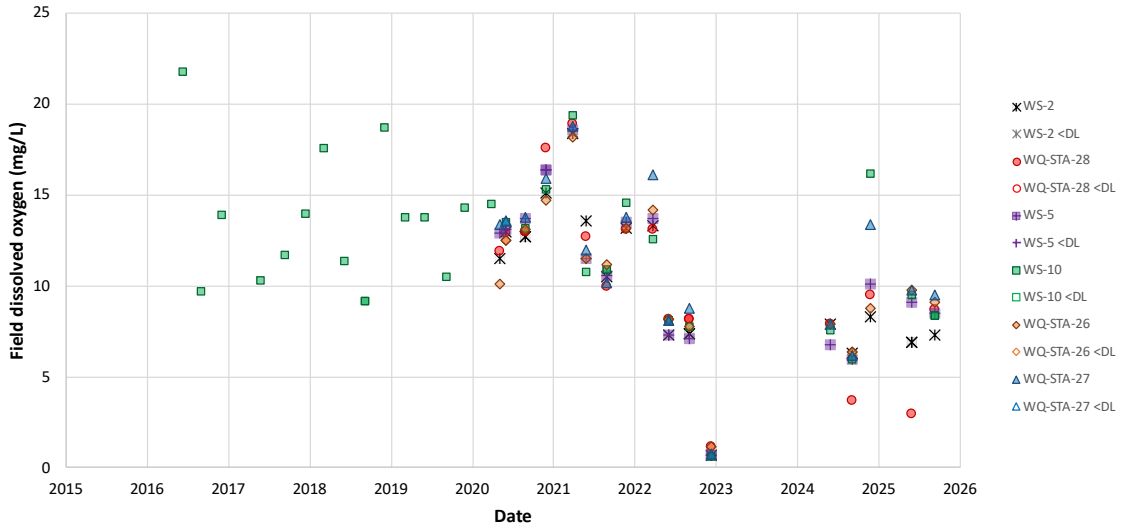


**Figure A.2-4: Field Dissolved Oxygen at Surface Water Quality Monitoring Locations, 2016 to 2025**

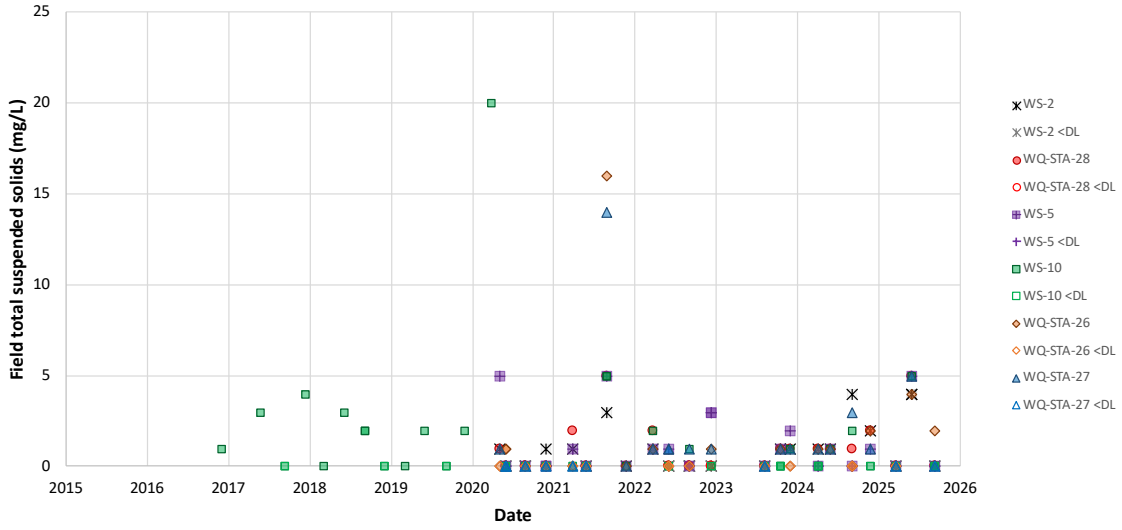


**Figure A.2-5: Field Total Suspended Solids at Surface Water Quality Monitoring Locations, 2016 to 2025**

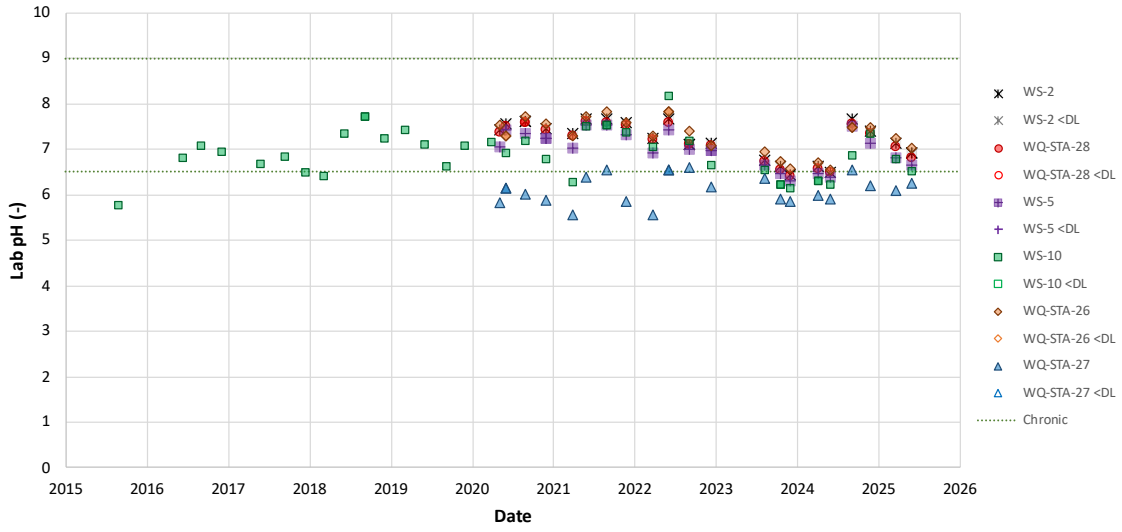


**Figure A.2-6: Lab pH at Surface Water Quality Monitoring Locations, 2015 to 2025**

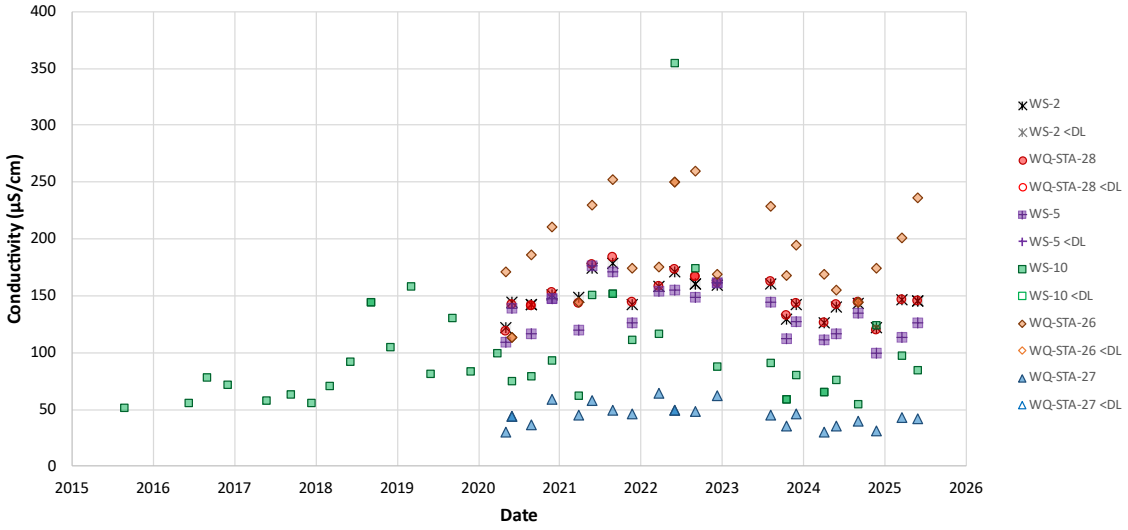


**Figure A.2-7: Conductivity at Surface Water Quality Monitoring Locations, 2015 to 2025**

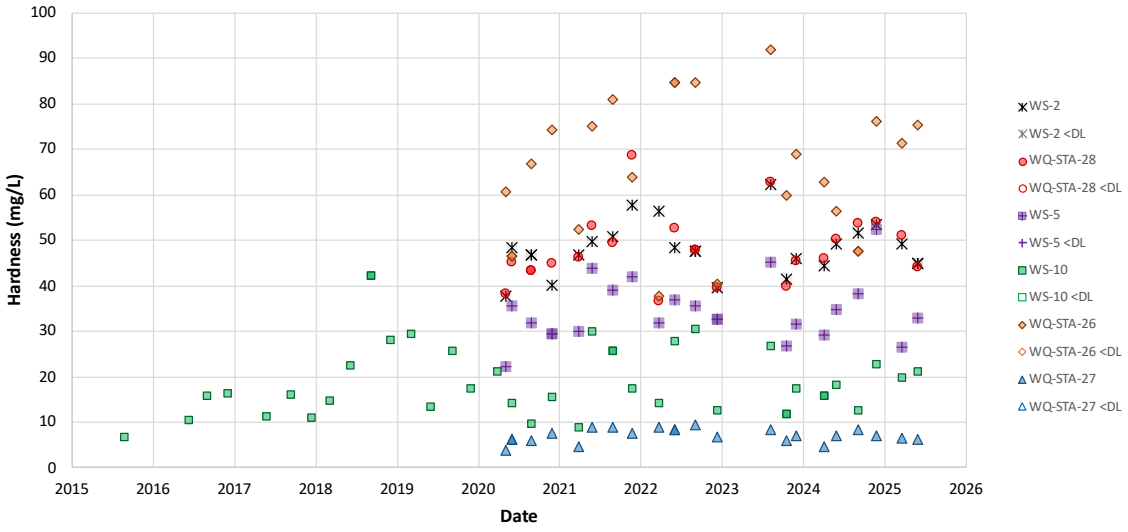


**Figure A.2-8: Hardness at Surface Water Quality Monitoring Locations, 2015 to 2025**

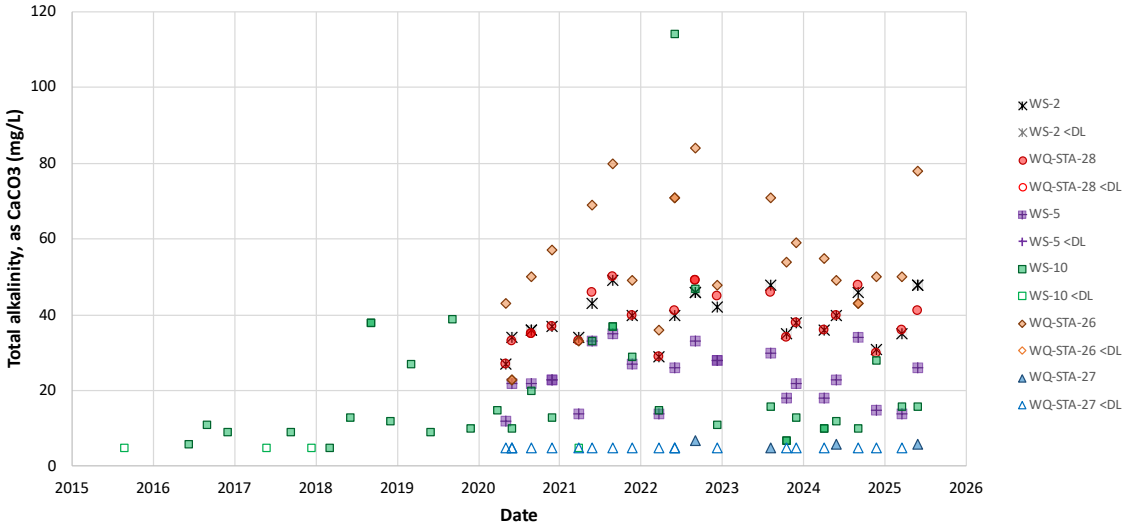


**Figure A.2-9: Total Alkalinity at Surface Water Quality Monitoring Locations, 2015 to 2025**

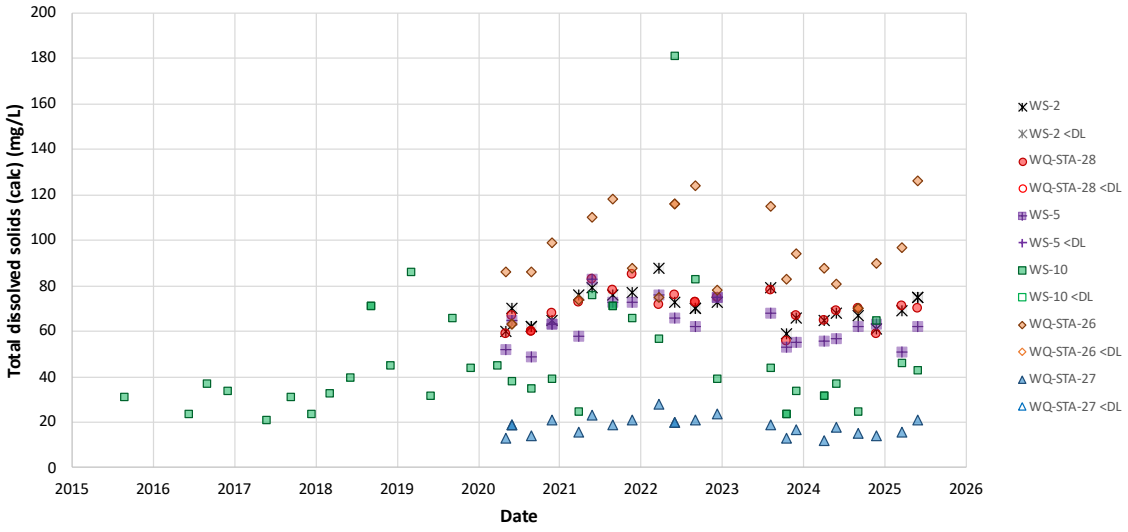


**Figure A.2-10: Total Dissolved Solids at Surface Water Quality Monitoring Locations, 2015 to 2025**

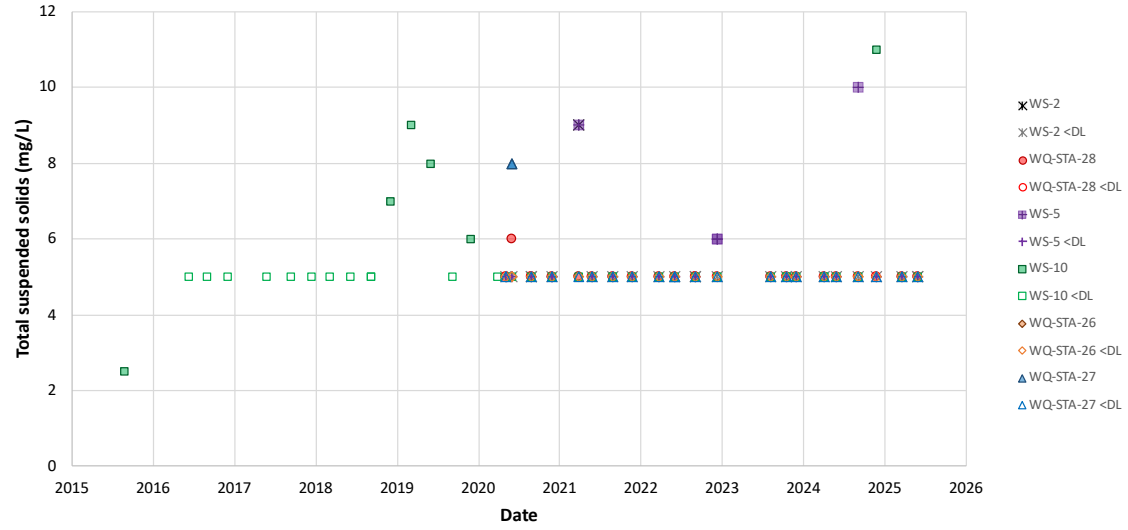


**Figure A.2-11: Total Suspended Solids at Surface Water Quality Monitoring Locations, 2015 to 2025**

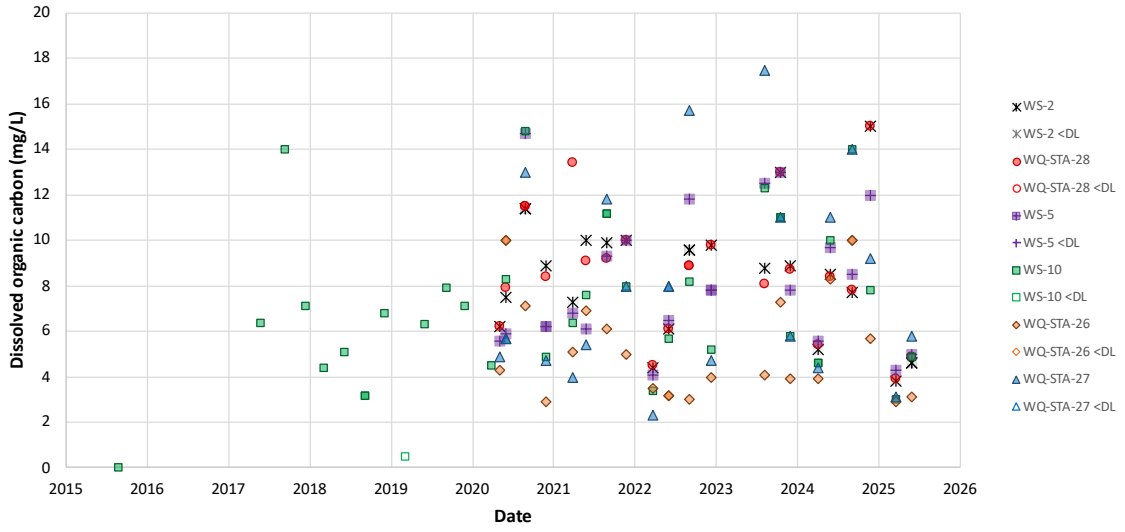


**Figure A.2-12: Dissolved Organic Carbon at Surface Water Quality Monitoring Locations, 2015 to 2025**

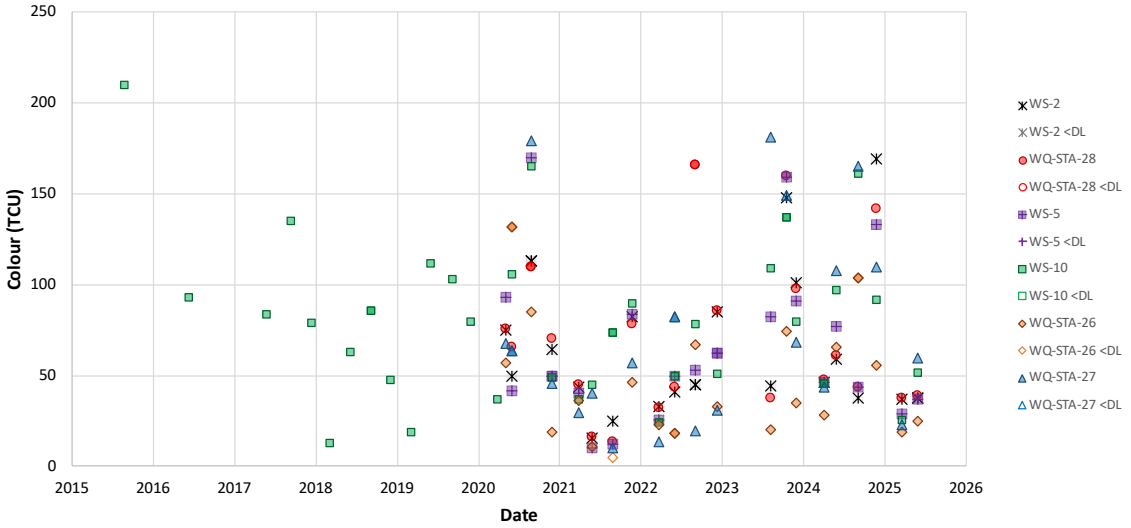


**Figure A.2-13: Colour at Surface Water Quality Monitoring Locations, 2015 to 2025**

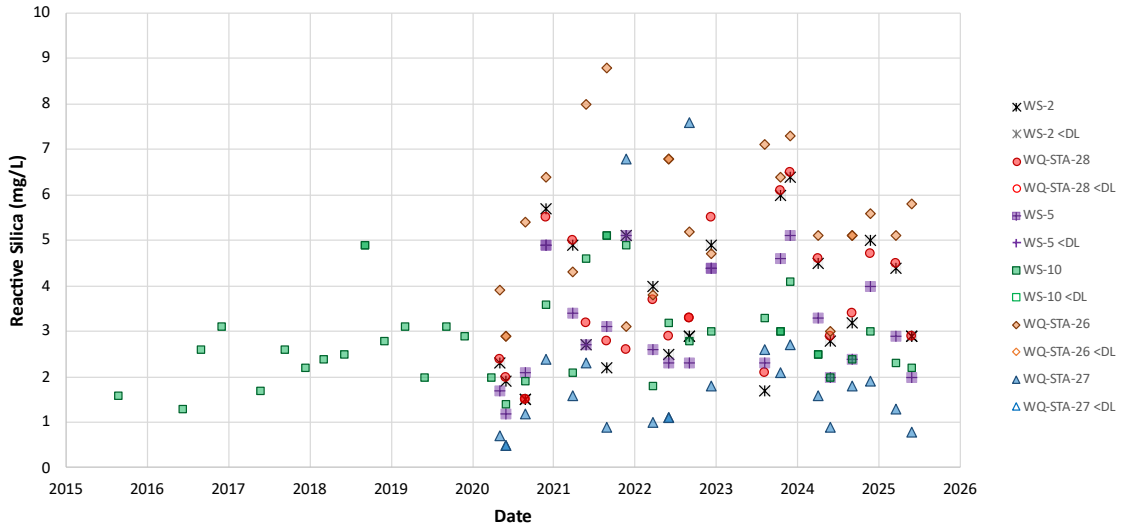


**Figure A.2-14: Reactive Silica at Surface Water Quality Monitoring Locations, 2015 to 2025**

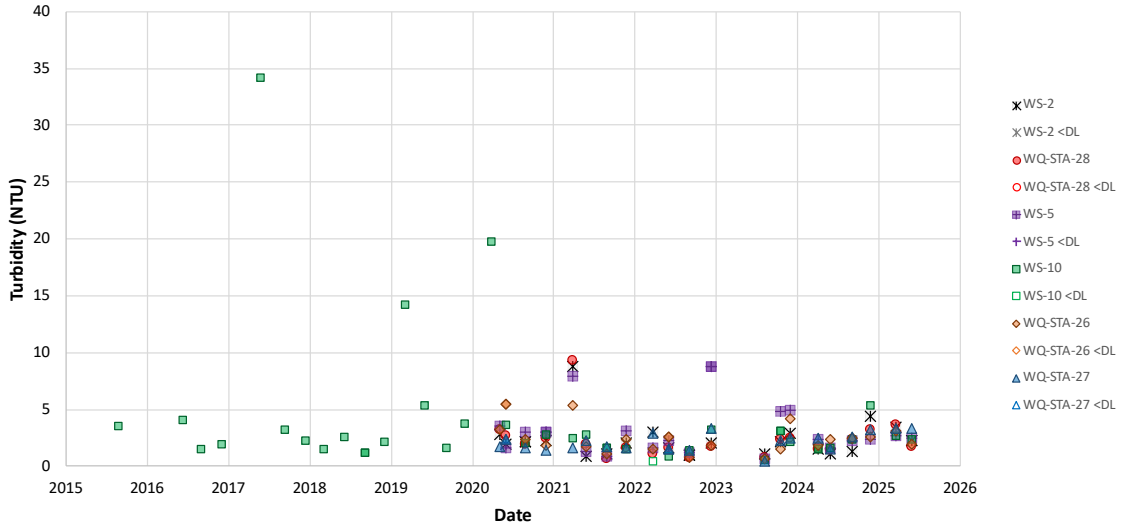


**Figure A.2-15: Turbidity at Surface Water Quality Monitoring Locations, 2015 to 2025**

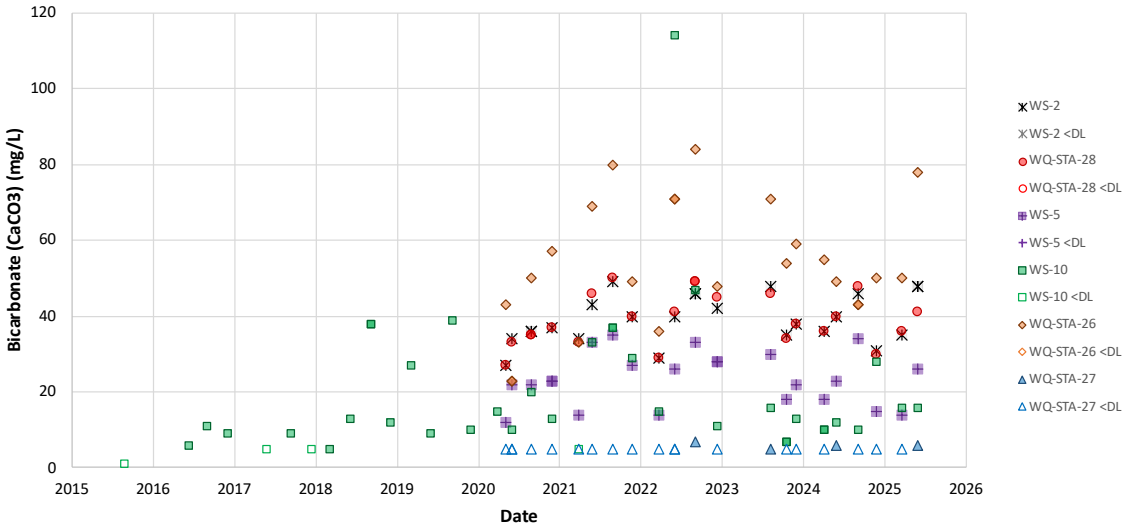


**Figure A.2-16: Bicarbonate at Surface Water Quality Monitoring Locations, 2015 to 2025**

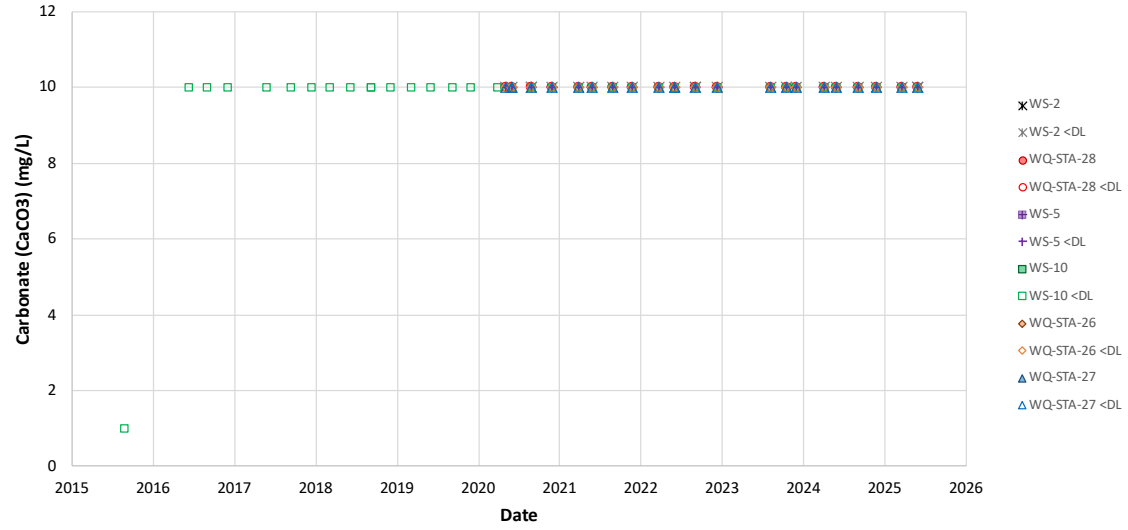


**Figure A.2-17: Carbonate at Surface Water Quality Monitoring Locations, 2015 to 2025**

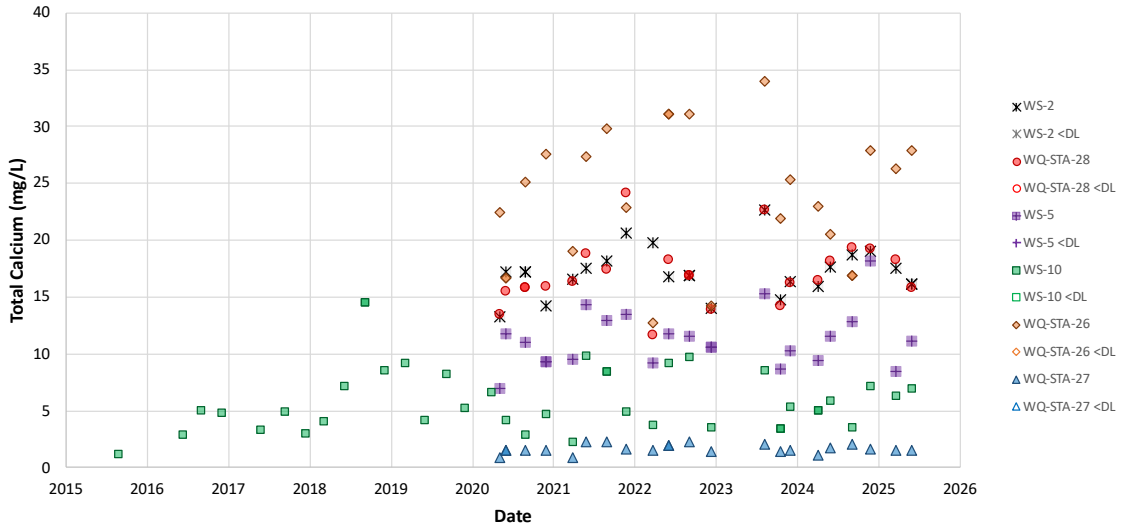


**Figure A.2-18: Total Calcium at Surface Water Quality Monitoring Locations, 2015 to 2025**

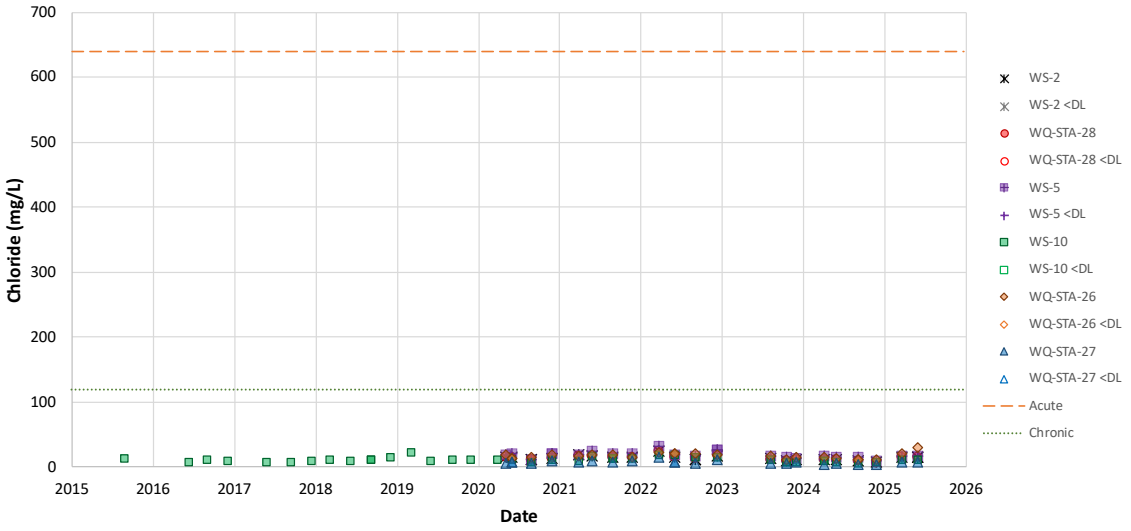


**Figure A.2-19: Chloride at Surface Water Quality Monitoring Locations, 2015 to 2025**

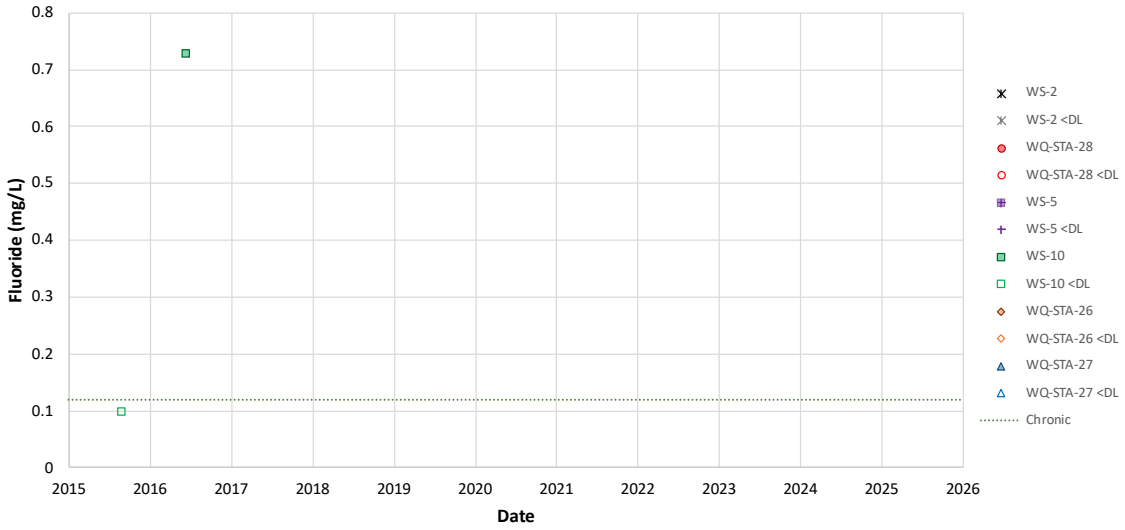


**Figure A.2-20: Fluoride at Surface Water Quality Monitoring Locations, 2015 to 2016**

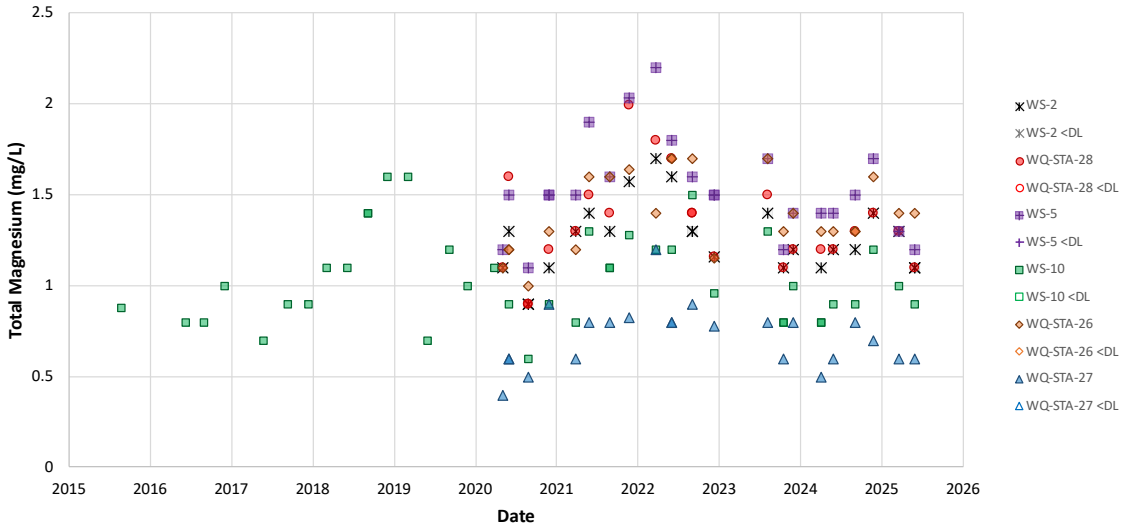


**Figure A.2-21: Total Magnesium at Surface Water Quality Monitoring Locations, 2015 to 2025**

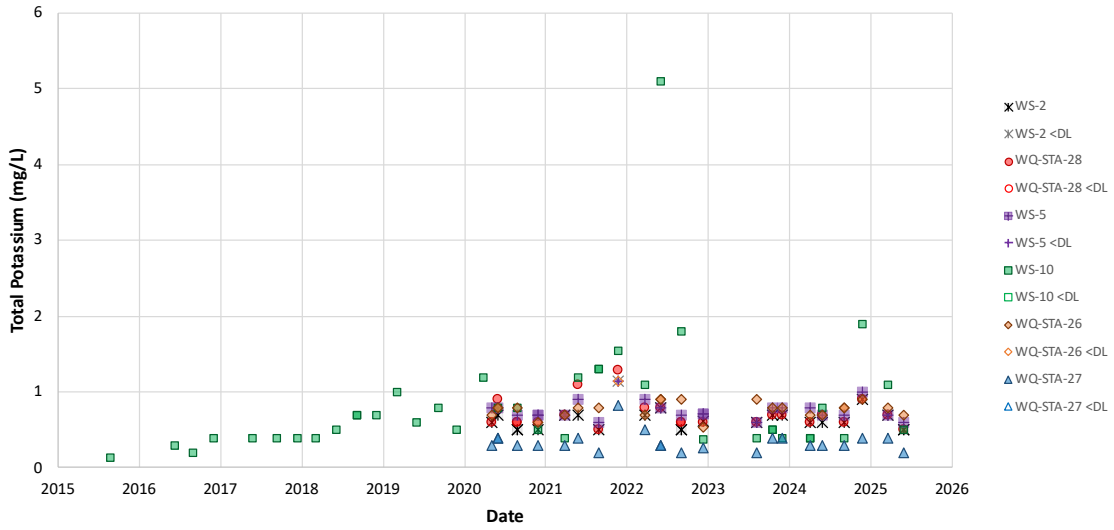


**Figure A.2-22: Total Potassium at Surface Water Quality Monitoring Locations, 2015 to 2025**

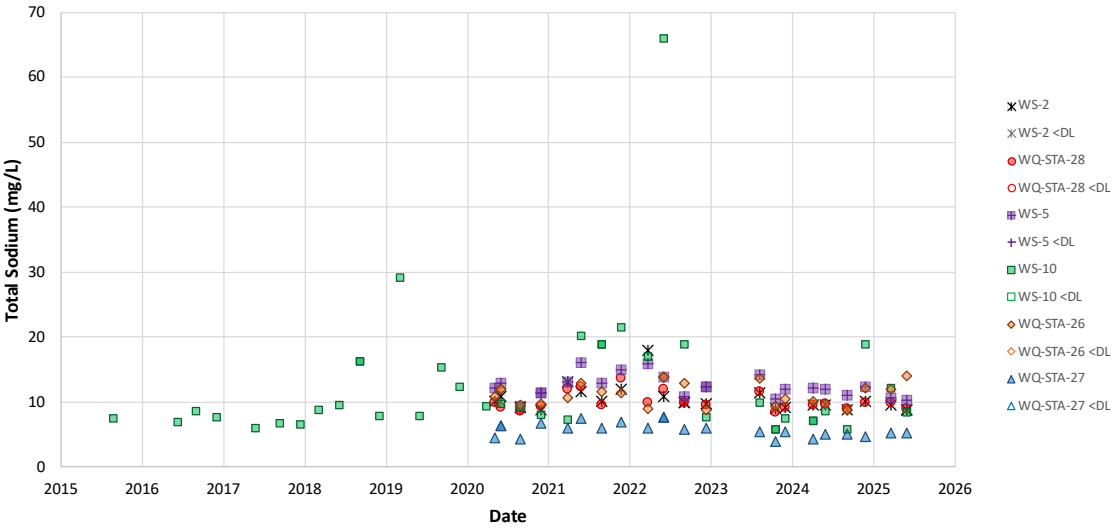


**Figure A.2-23: Total Sodium at Surface Water Quality Monitoring Locations, 2015 to 2025**

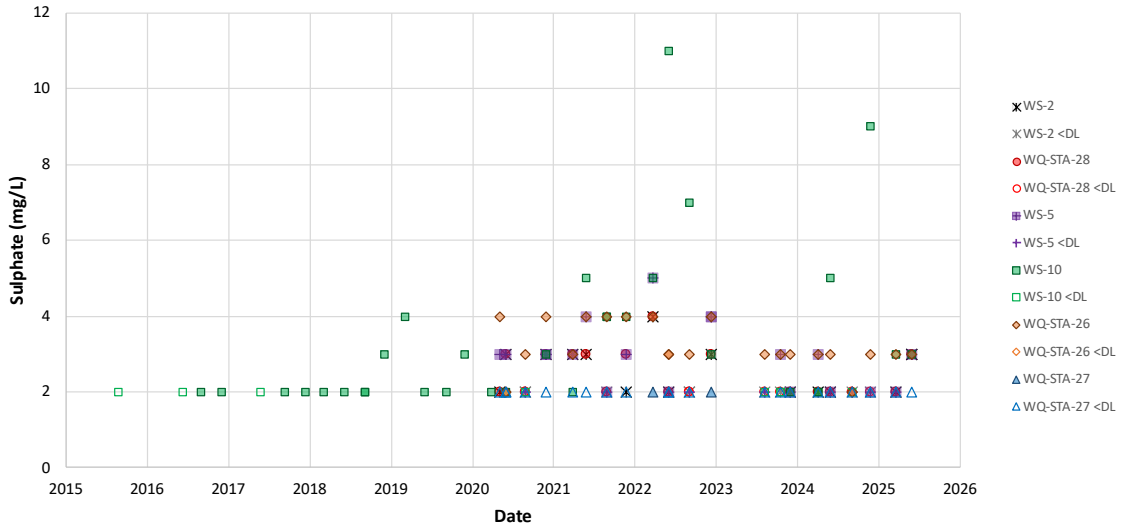


**Figure A.2-24: Sulphate at Surface Water Quality Monitoring Locations, 2015 to 2025**

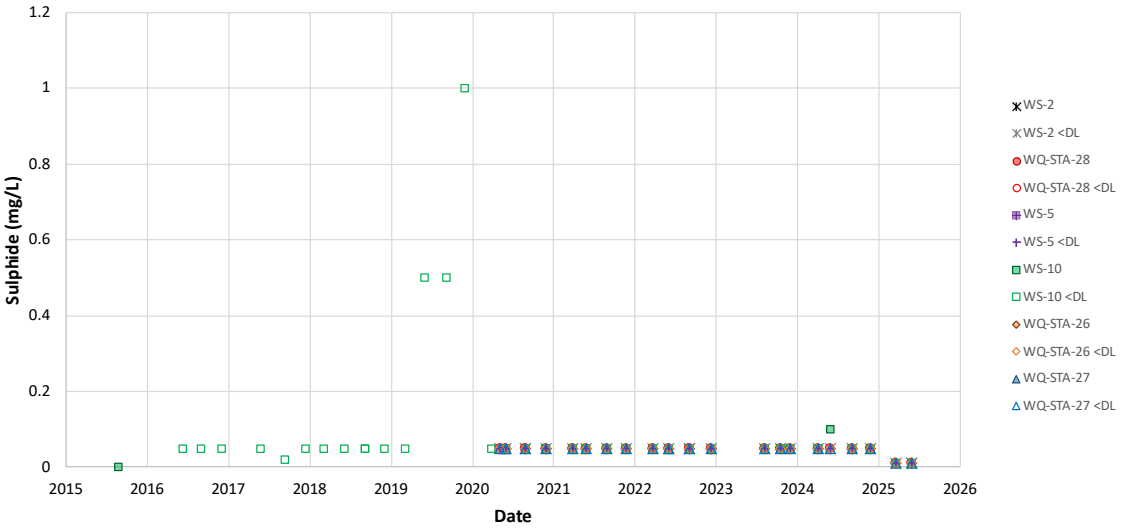


**Figure A.2-25: Sulphide at Surface Water Quality Monitoring Locations, 2015 to 2025**

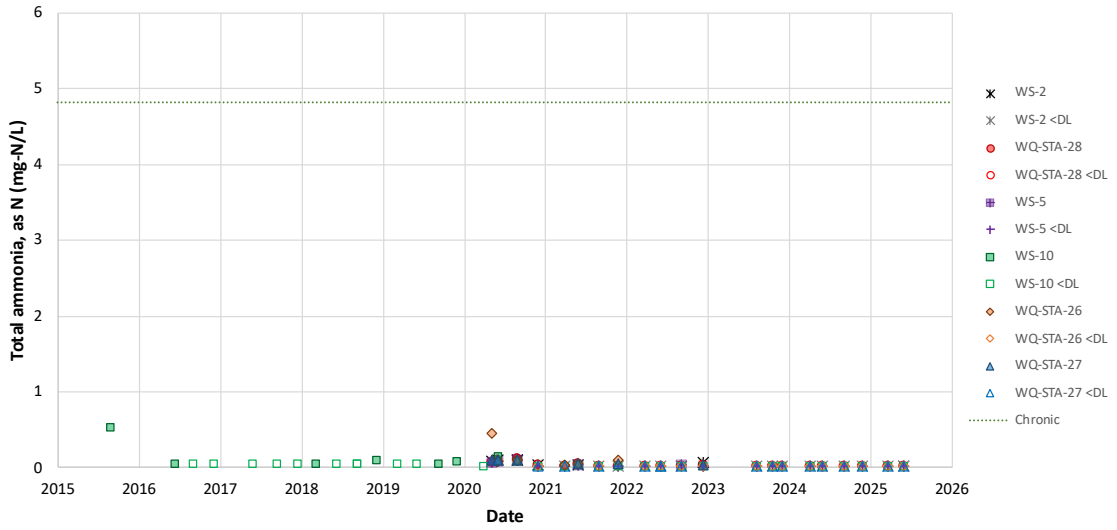


**Figure A.2-26: Total Ammonia at Surface Water Quality Monitoring Locations, 2015 to 2025**

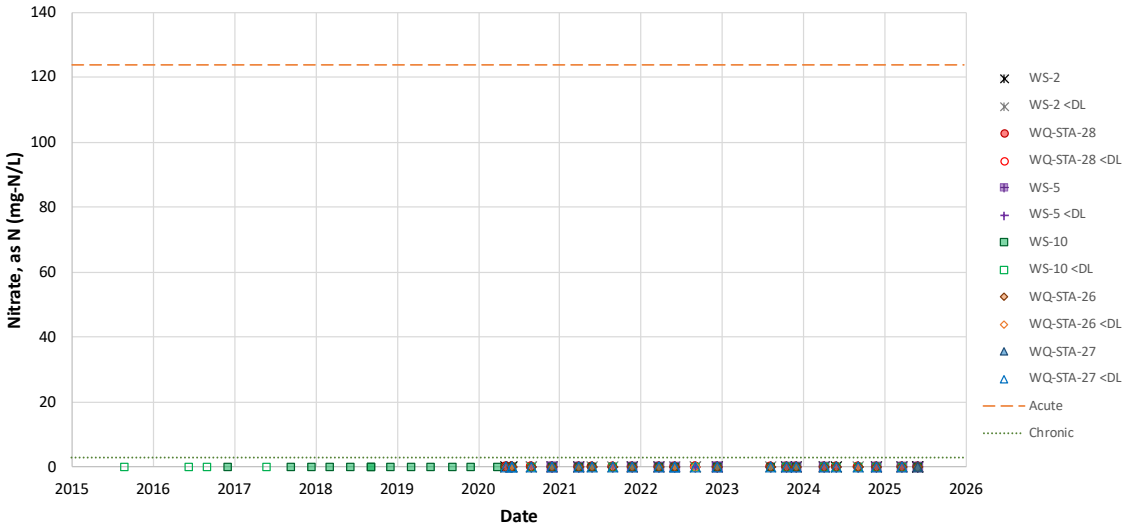


**Figure A.2-27: Nitrate at Surface Water Quality Monitoring Locations, 2015 to 2025**

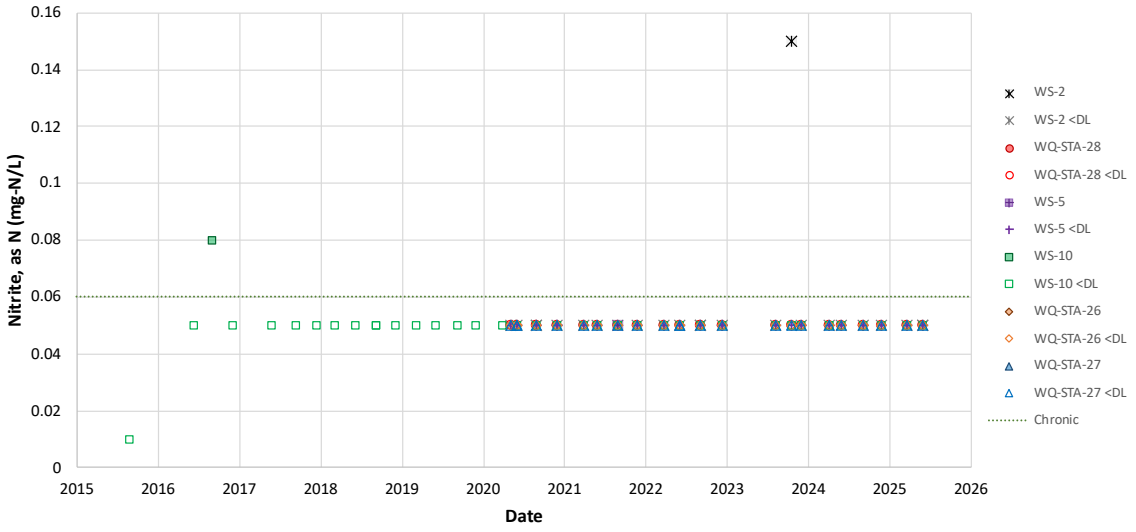


**Figure A.2-28: Nitrite at Surface Water Quality Monitoring Locations, 2015 to 2025**

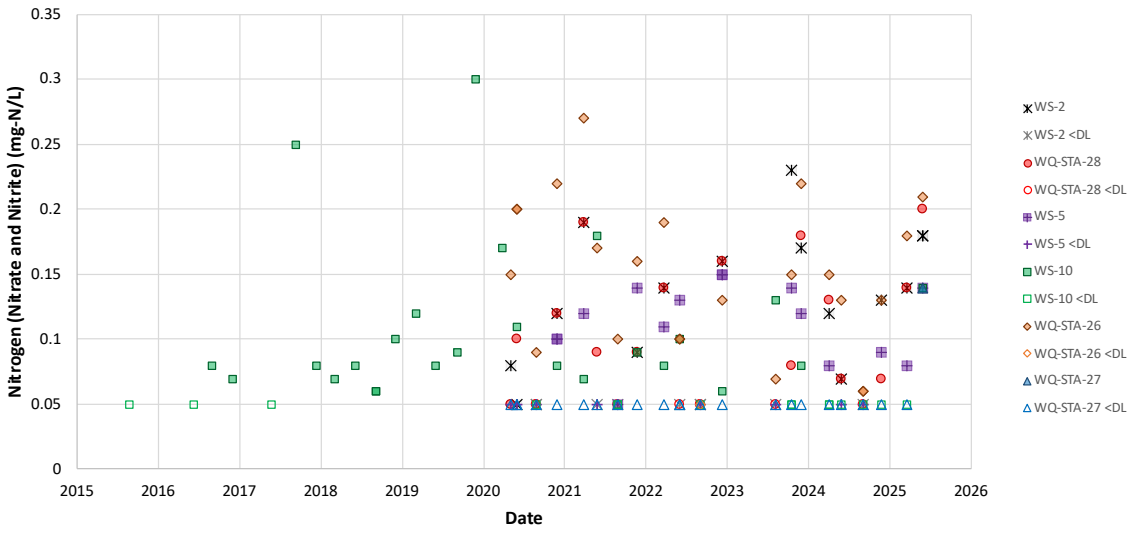


**Figure A.2-29: Nitrogen (Nitrate and Nitrite) at Surface Water Quality Monitoring Locations, 2015 to 2025**

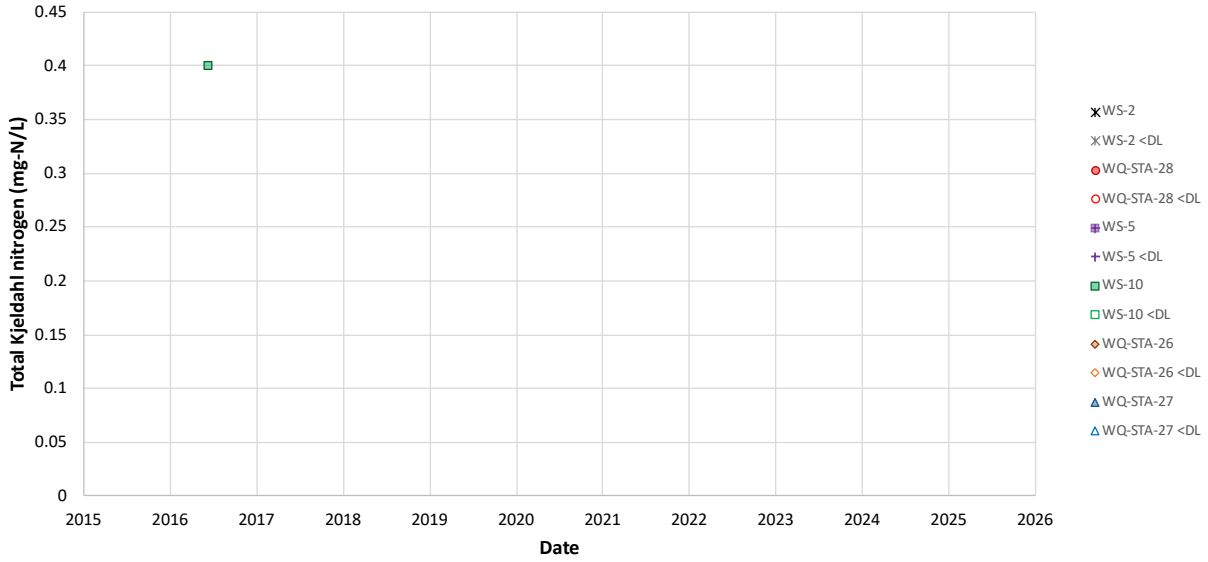


**Figure A.2-30: Total Kjeldahl Nitrogen at Surface Water Quality Monitoring Locations, 2016**

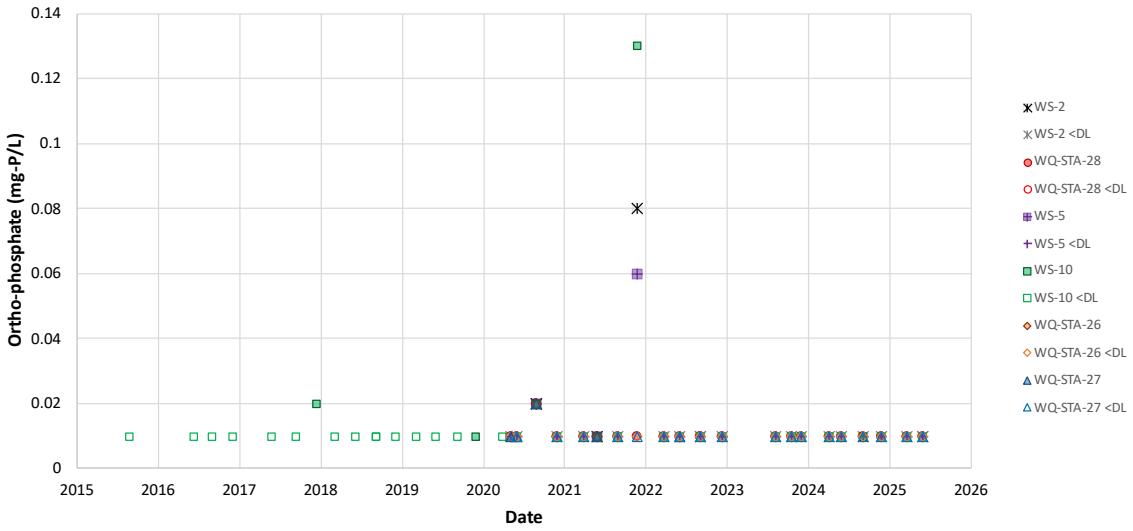


**Figure A.2-31: Orth-Phosphate at Surface Water Quality Monitoring Locations, 2015 to 2025**

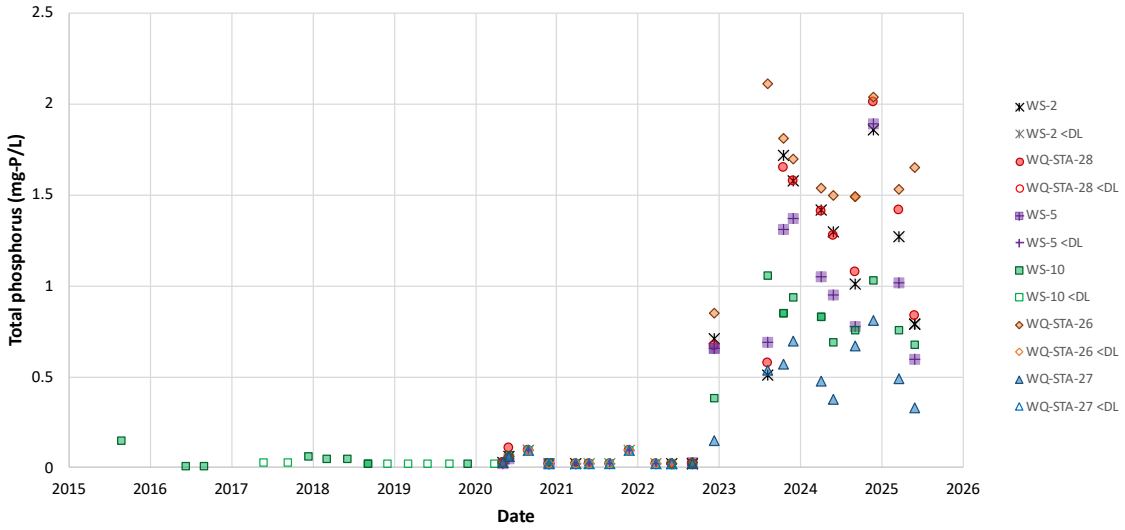


**Figure A.2-32: Total Phosphorus at Surface Water Quality Monitoring Locations, 2015 to 2025**

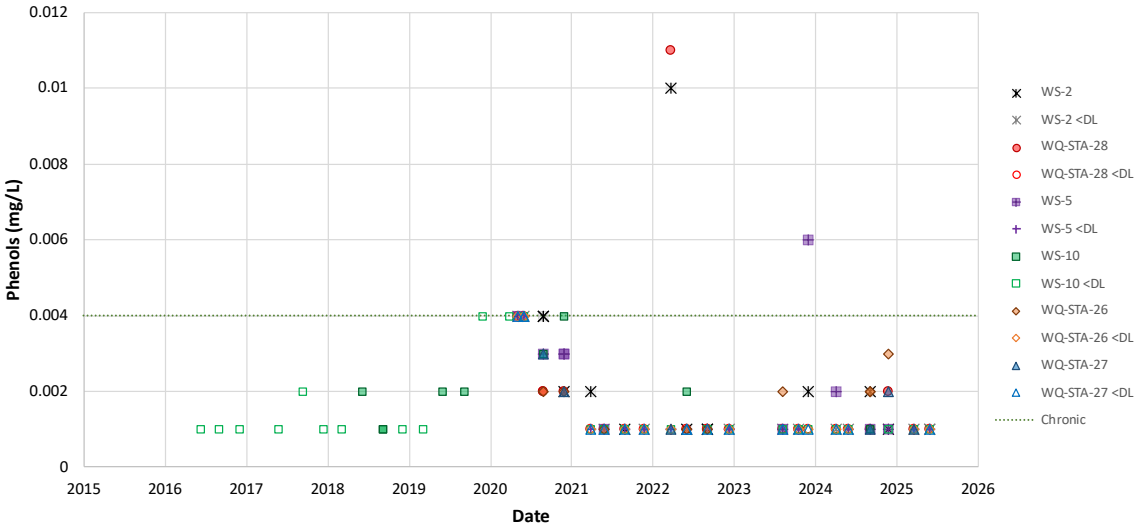


**Figure A.2-33: Phenols at Surface Water Quality Monitoring Locations, 2016 to 2025**

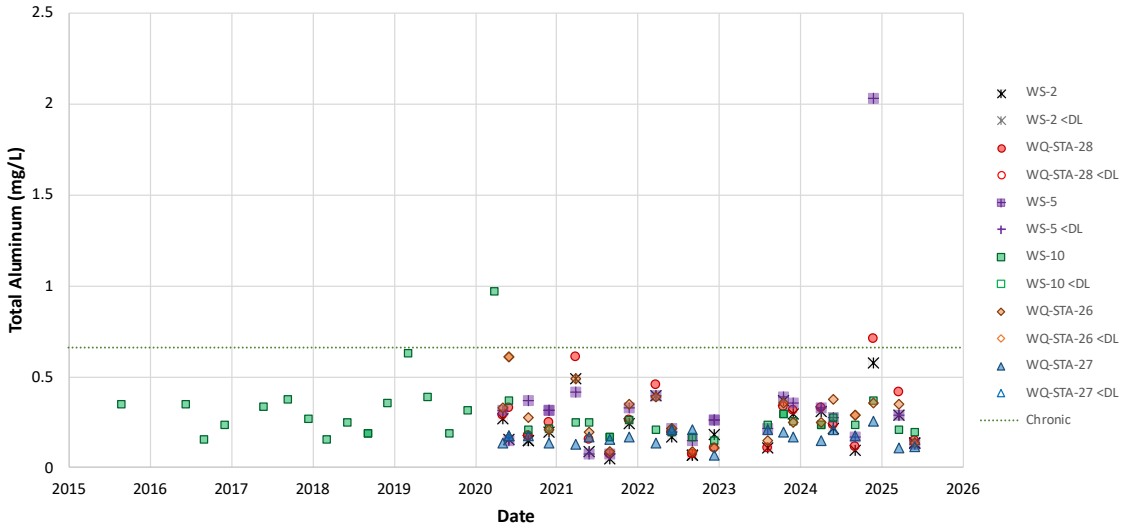


**Figure A.2-34: Total Aluminum at Surface Water Quality Monitoring Locations, 2015 to 2025**

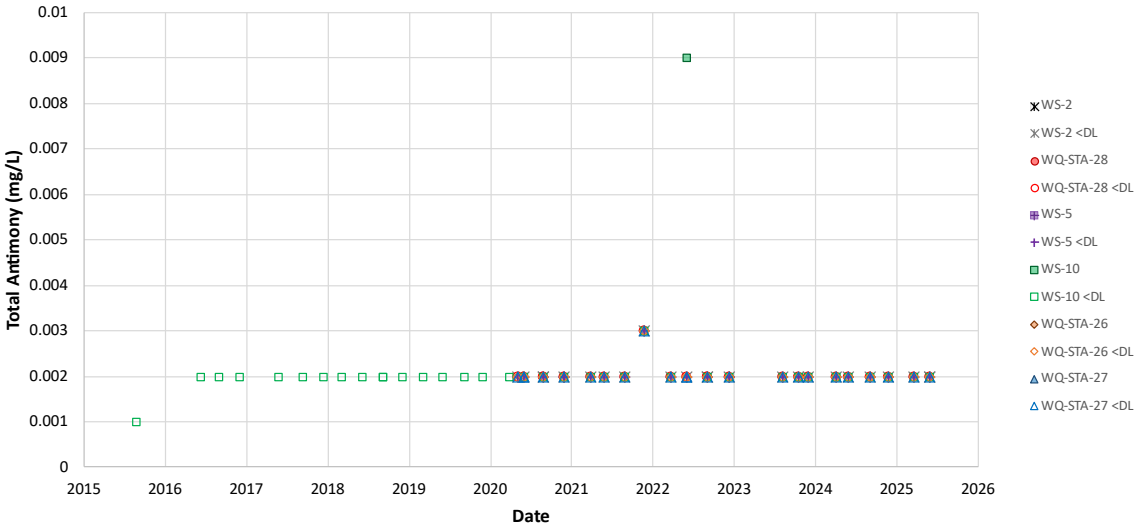


**Figure A.2-35: Total Antimony at Surface Water Quality Monitoring Locations, 2015 to 2025**

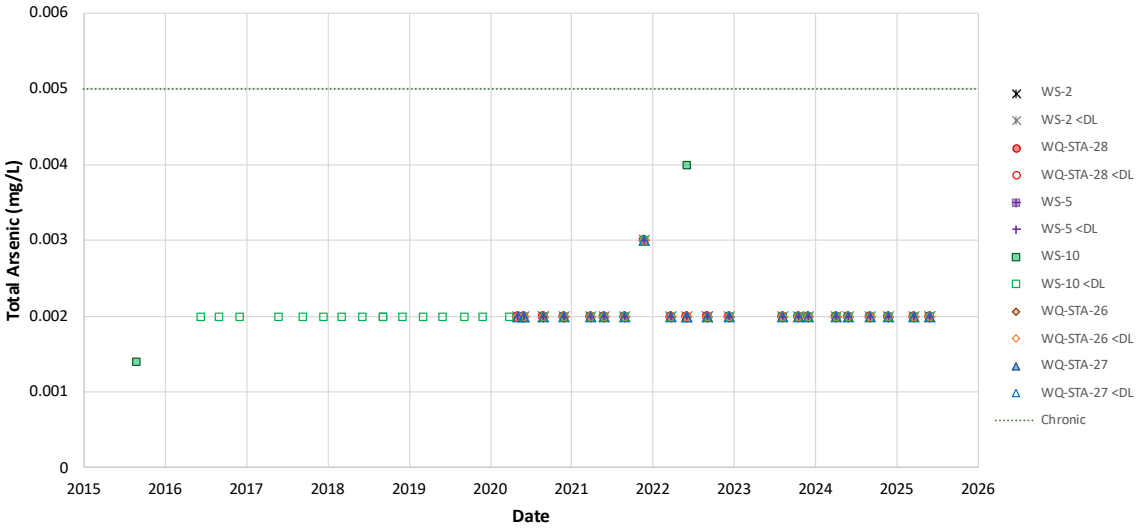


**Figure A.2-36: Total Arsenic at Surface Water Quality Monitoring Locations, 2015 to 2025**

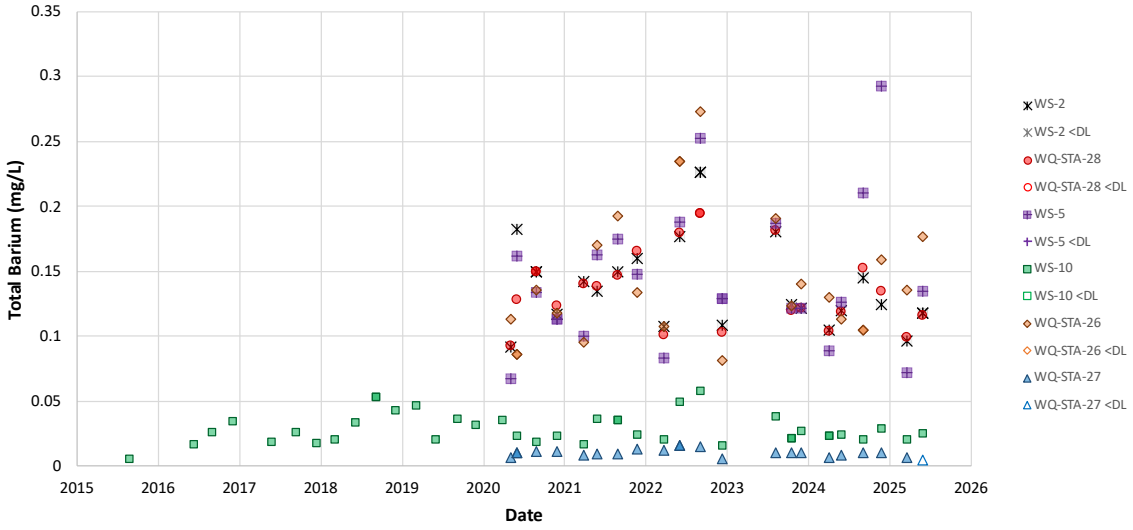


**Figure A.2-37: Total Barium at Surface Water Quality Monitoring Locations, 2015 to 2025**

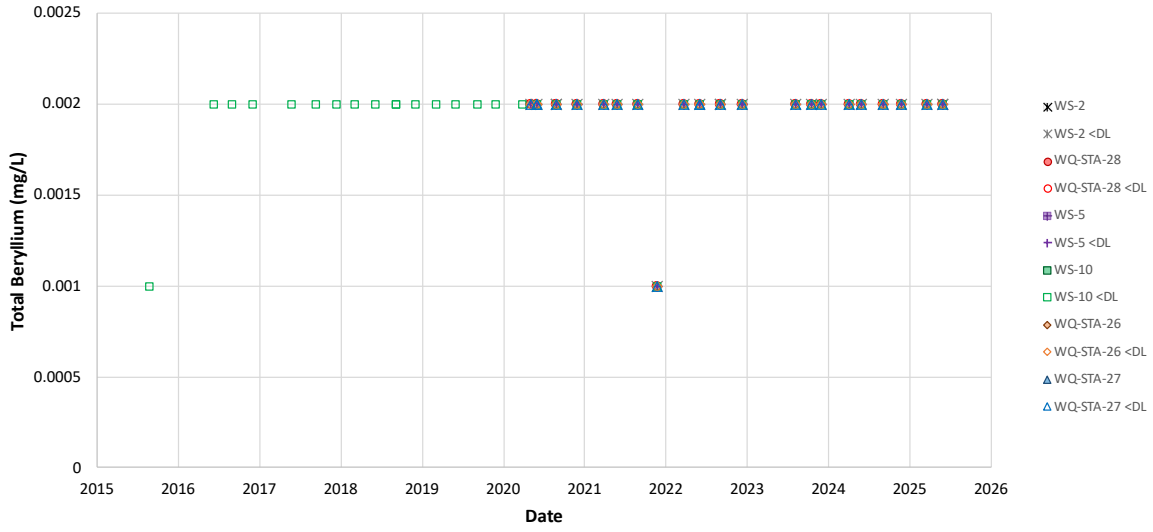


**Figure A.2-38: Total Beryllium at Surface Water Quality Monitoring Locations, 2015 to 2025**

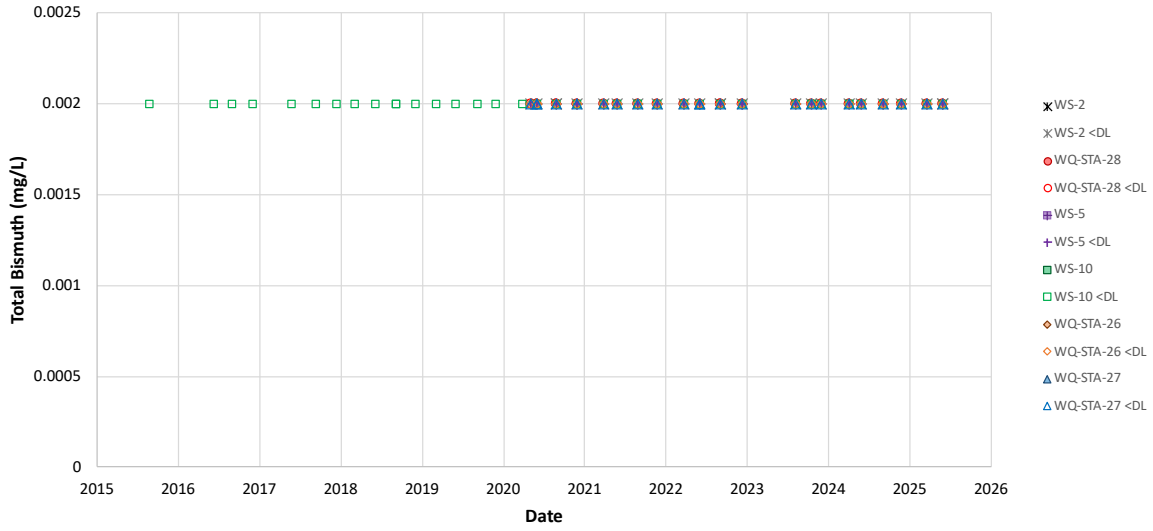


**Figure A.2-39: Total Bismuth at Surface Water Quality Monitoring Locations, 2015 to 2025**

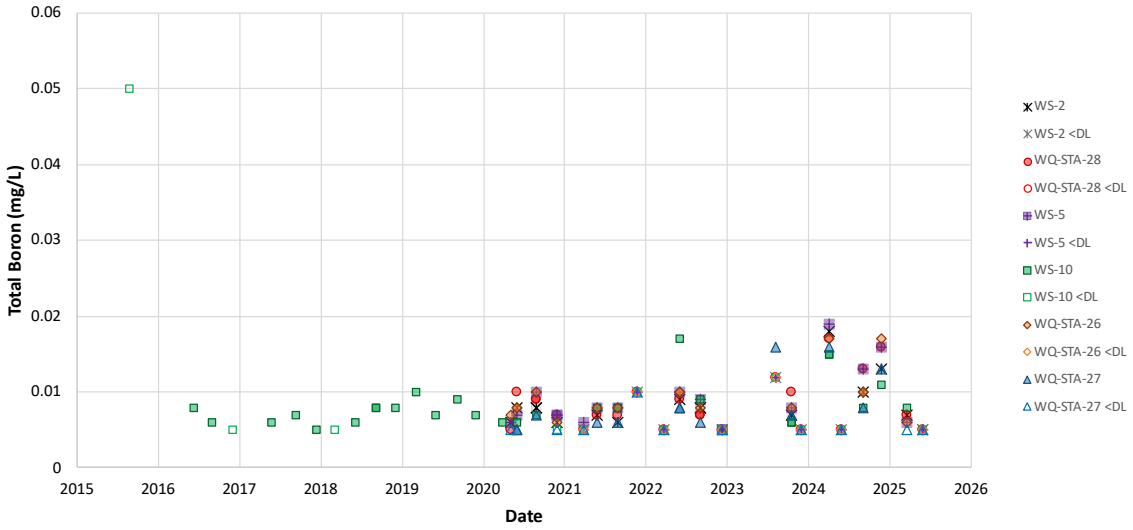


**Figure A.2-40: Total Boron at Surface Water Quality Monitoring Locations, 2015 to 2025**

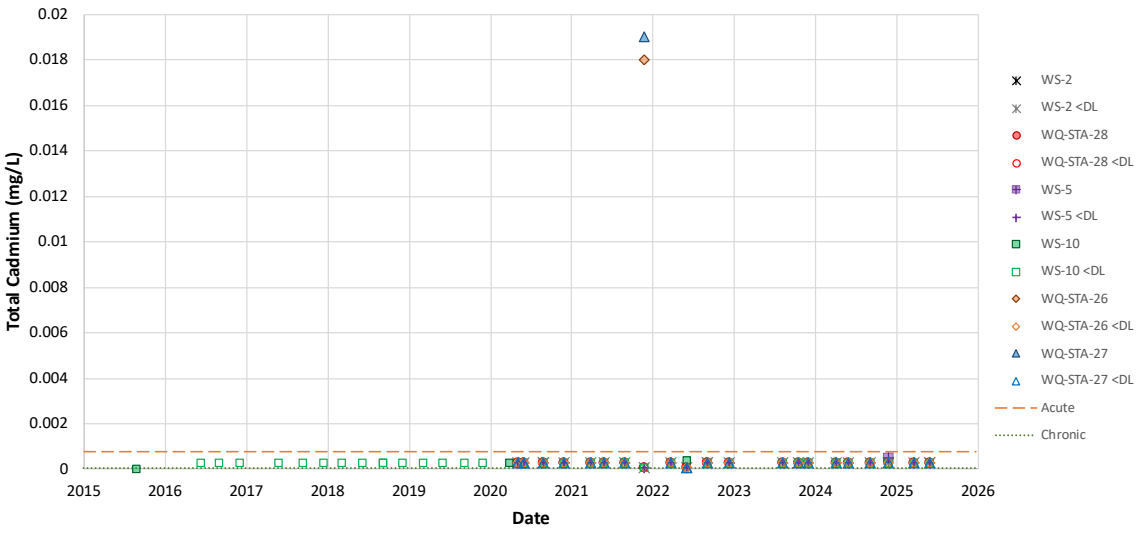


**Figure A.2-41: Total Cadmium at Surface Water Quality Monitoring Locations, 2015 to 2025**

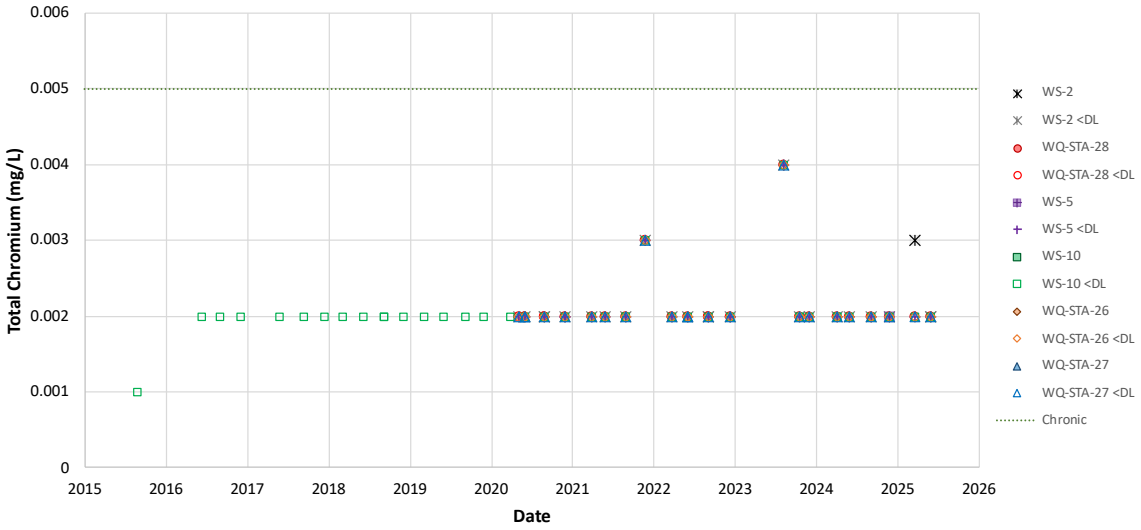


**Figure A.2-42: Total Chromium at Surface Water Quality Monitoring Locations, 2015 to 2025**

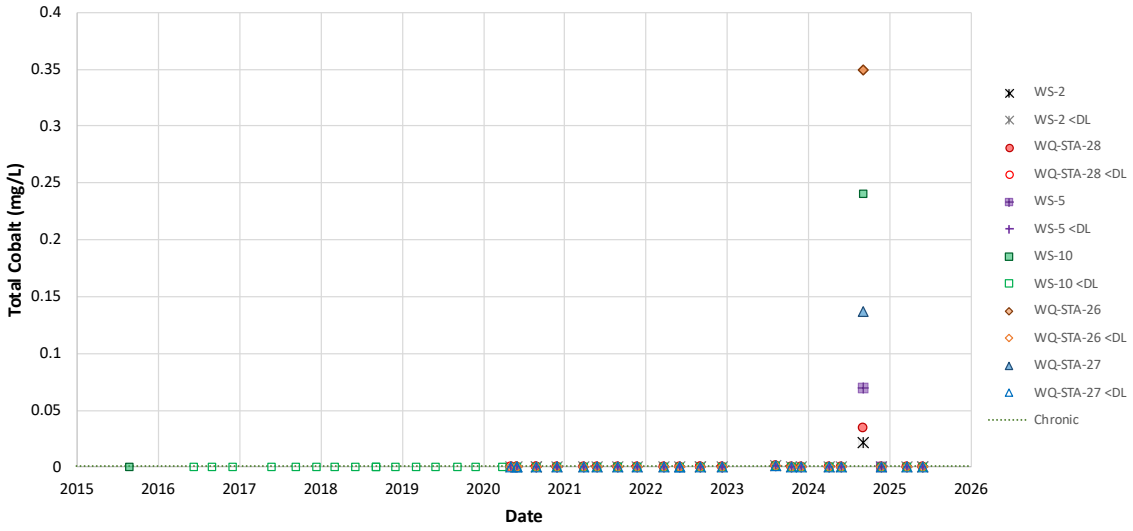


**Figure A.2-43: Total Cobalt at Surface Water Quality Monitoring Locations, 2015 to 2025**

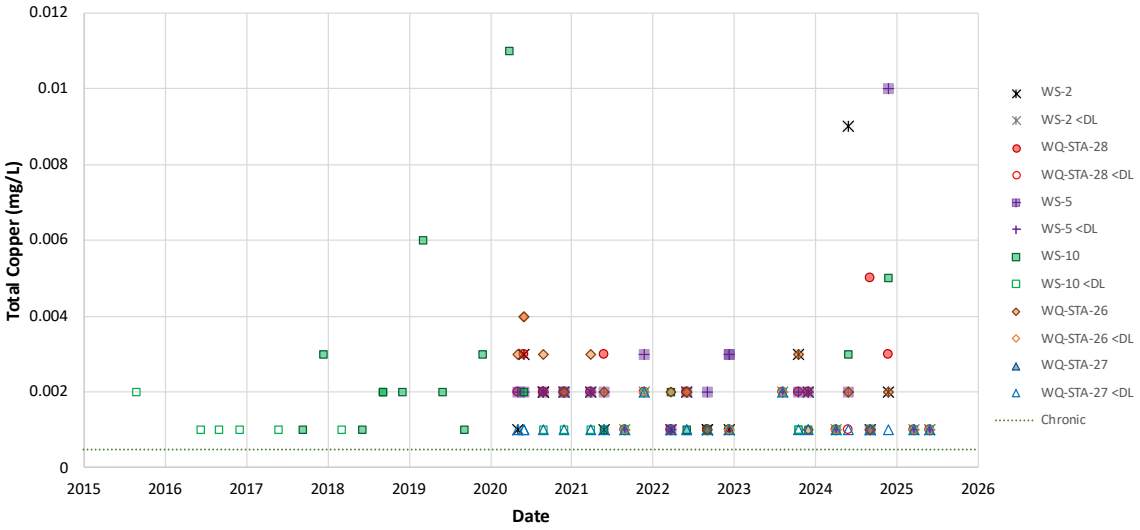


**Figure A.2-44: Total Copper at Surface Water Quality Monitoring Locations, 2015 to 2025**

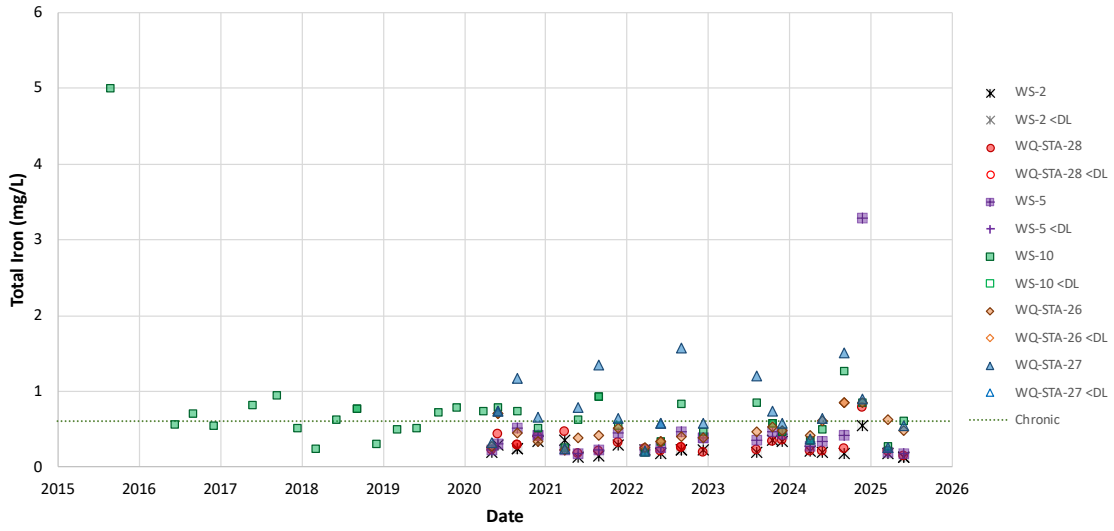


**Figure A.2-45: Total Iron at Surface Water Quality Monitoring Locations, 2015 to 2025**

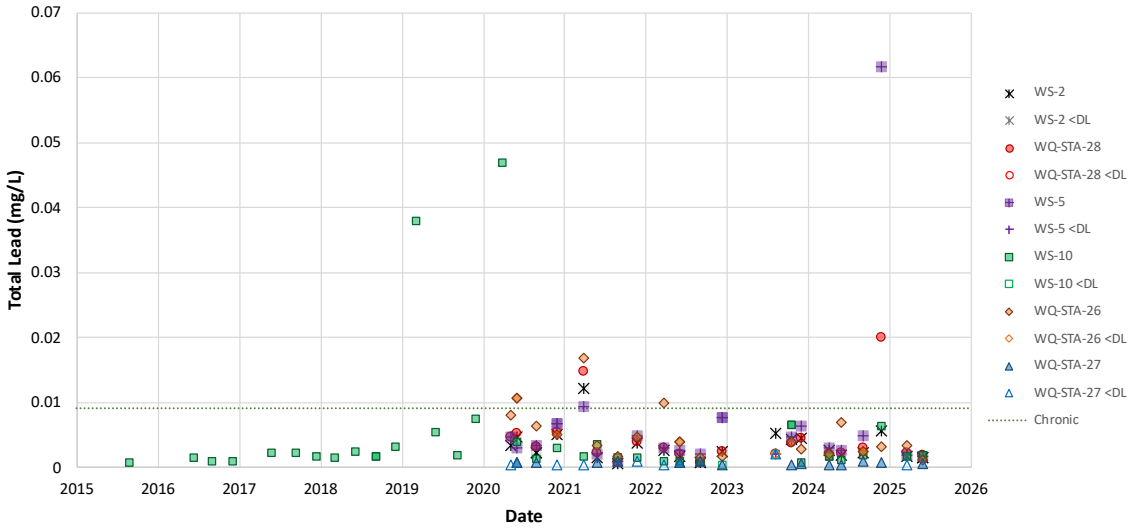


**Figure A.2-46: Total Lead at Surface Water Quality Monitoring Locations, 2015 to 2025**

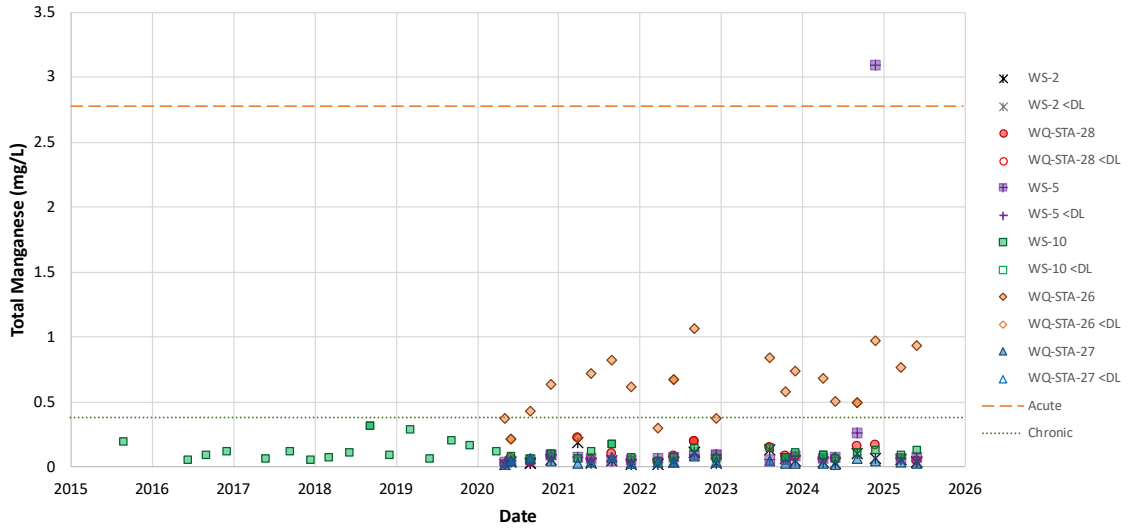


**Figure A.2-47: Total Manganese at Surface Water Quality Monitoring Locations, 2015 to 2025**

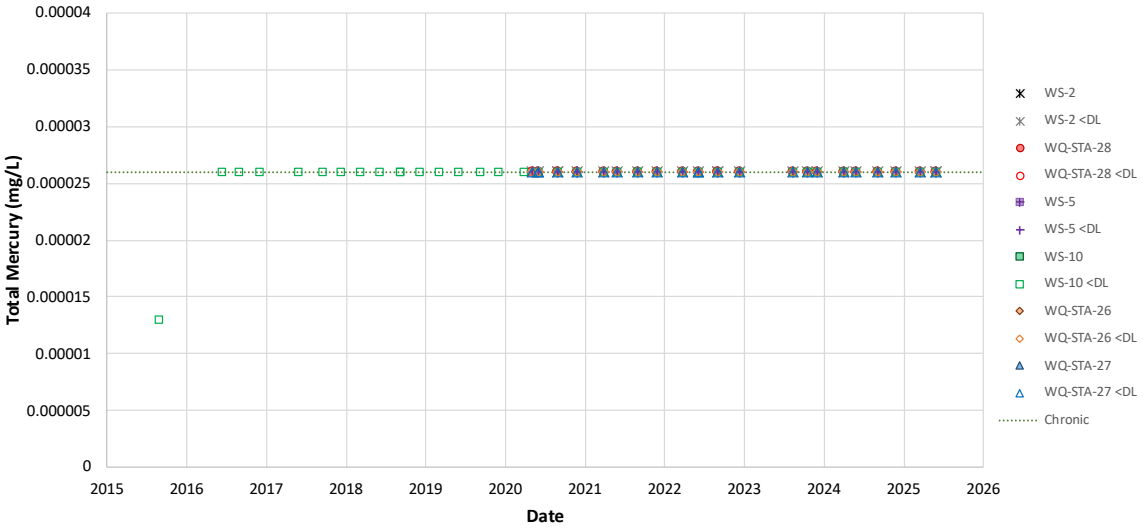


**Figure A.2-48: Total Mercury at Surface Water Quality Monitoring Locations, 2015 to 2025**

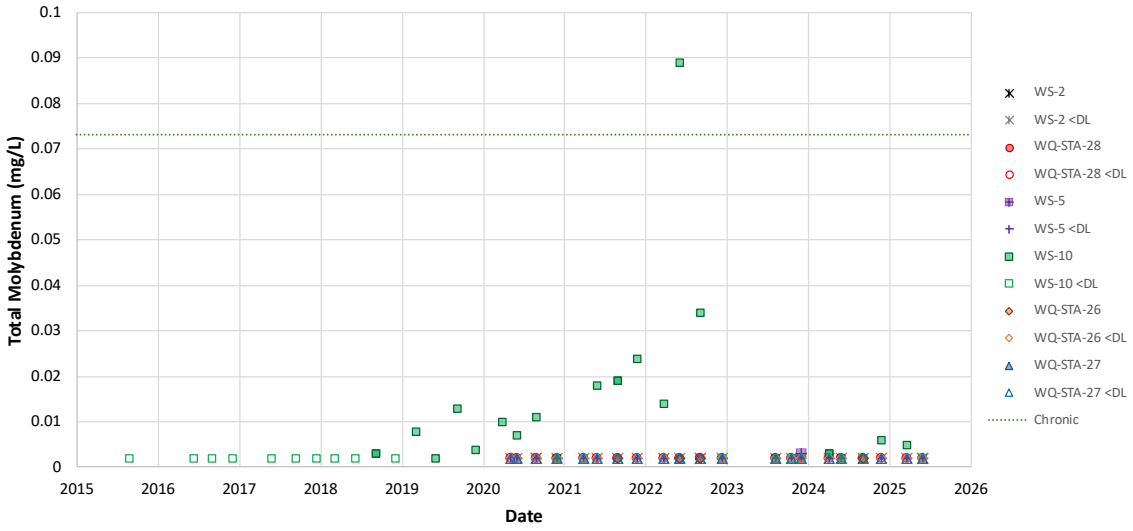


**Figure A.2-49: Total Molybdenum at Surface Water Quality Monitoring Locations, 2015 to 2025**

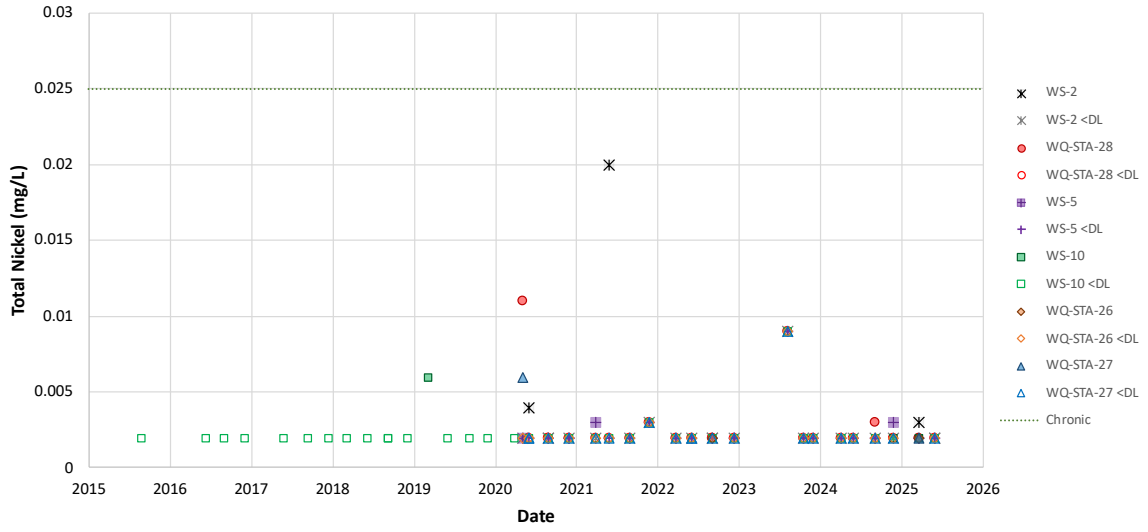


**Figure A.2-50: Total Nickel at Surface Water Quality Monitoring Locations, 2015 to 2025**

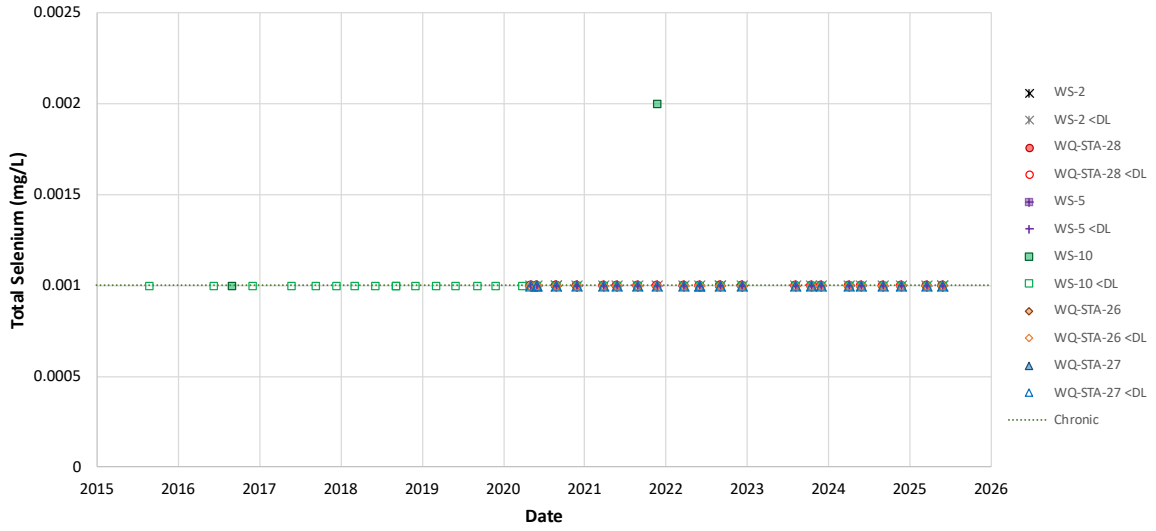


**Figure A.2-51: Total Selenium at Surface Water Quality Monitoring Locations, 2015 to 2025**

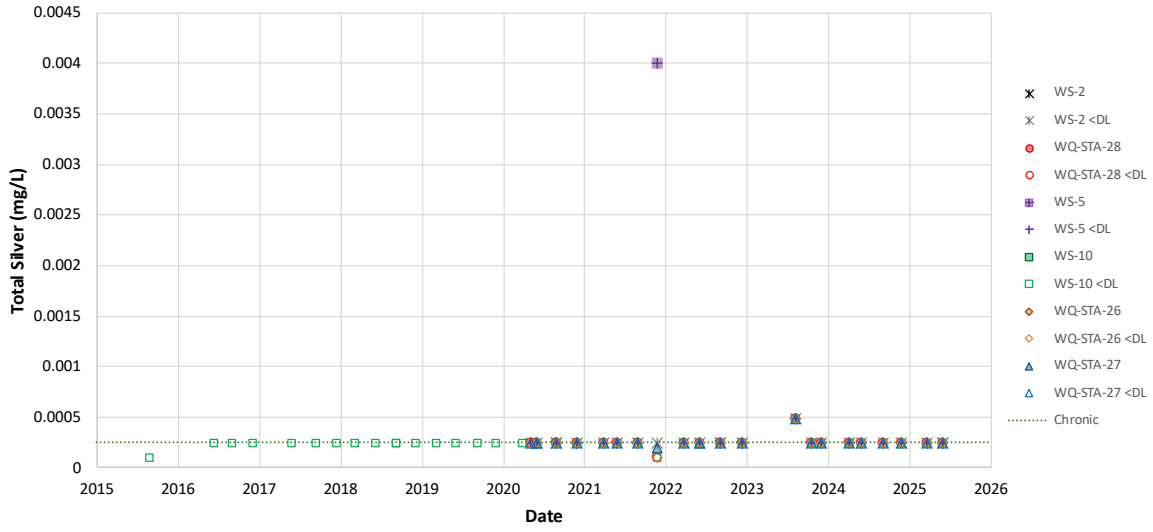


**Figure A.2-52: Total Silver at Surface Water Quality Monitoring Locations, 2015 to 2025**

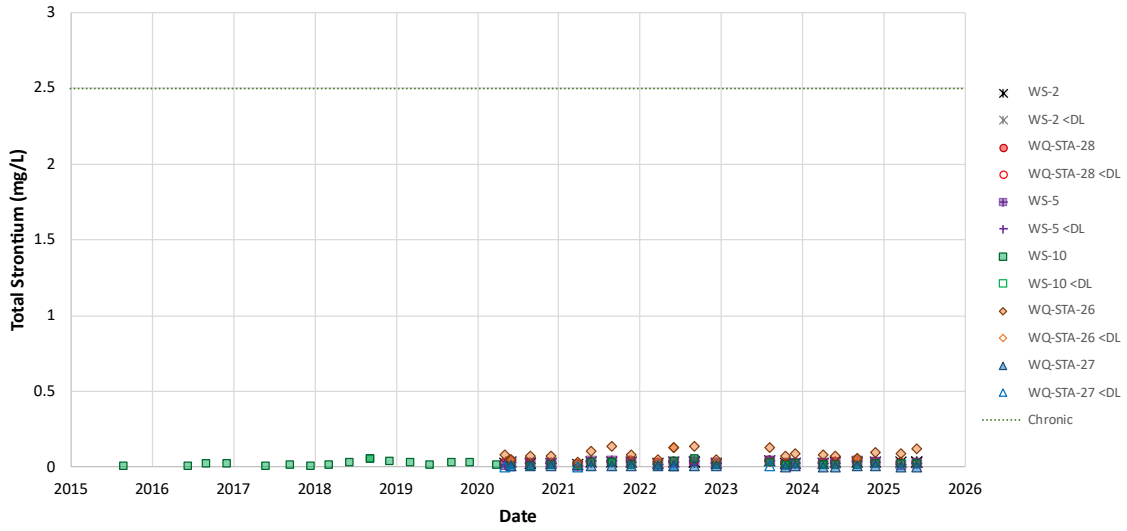


**Figure A.2-53: Total Strontium at Surface Water Quality Monitoring Locations, 2015 to 2025**

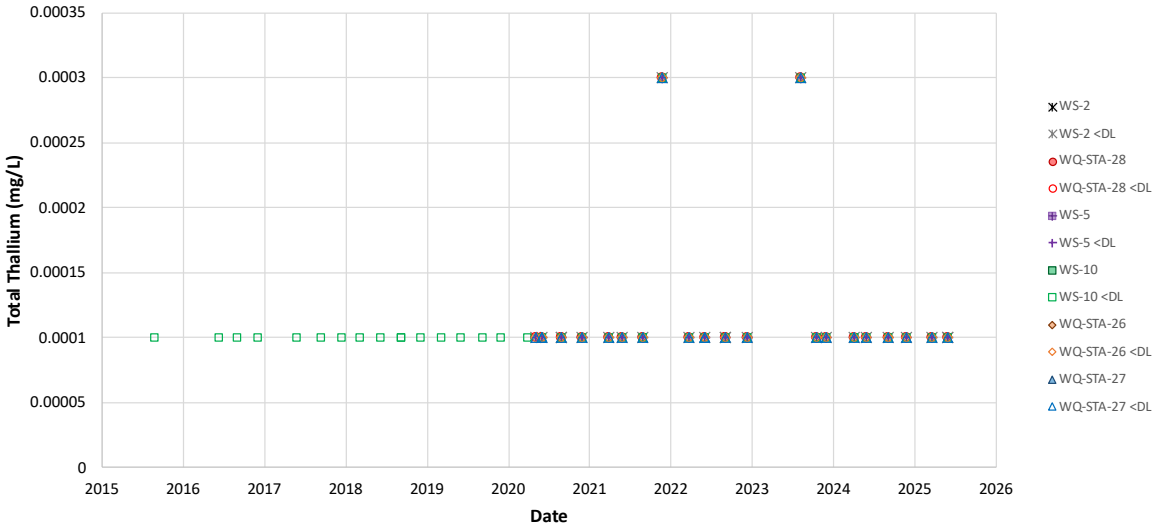


**Figure A.2-54: Total Thallium at Surface Water Quality Monitoring Locations, 2015 to 2025**

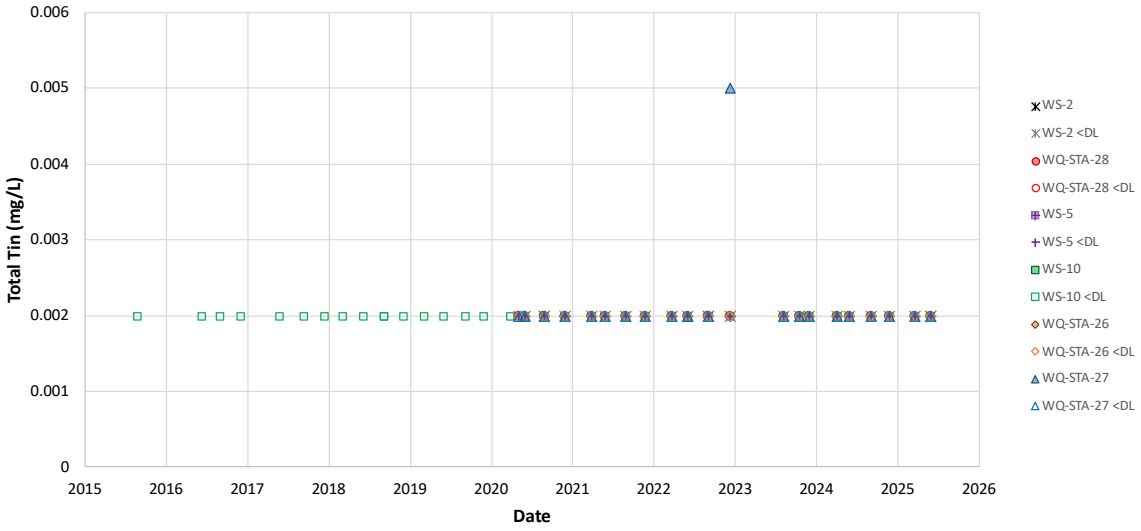


**Figure A.2-55: Total Tin at Surface Water Quality Monitoring Locations, 2015 to 2025**

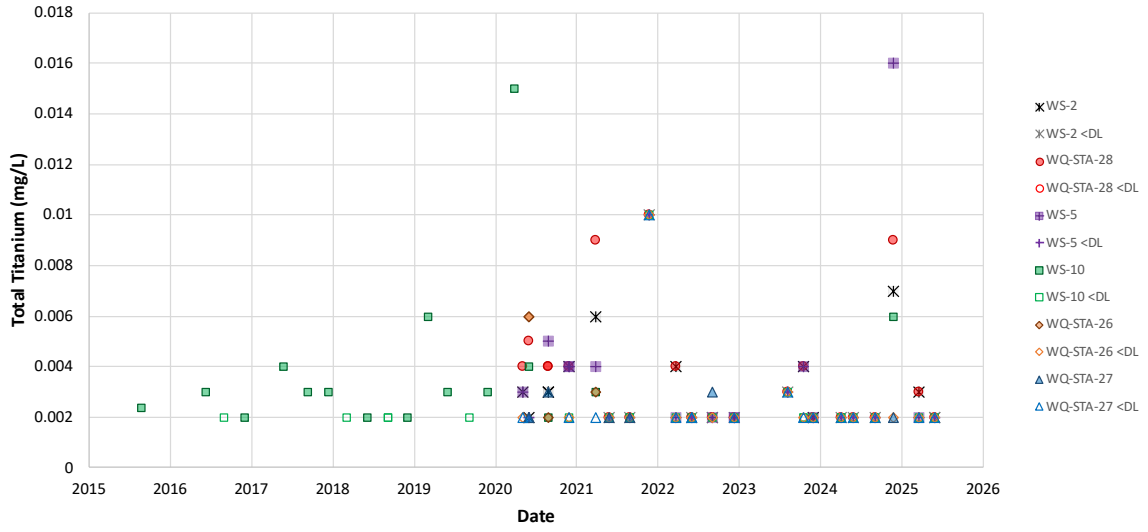


**Figure A.2-56: Total Titanium at Surface Water Quality Monitoring Locations, 2015 to 2025**

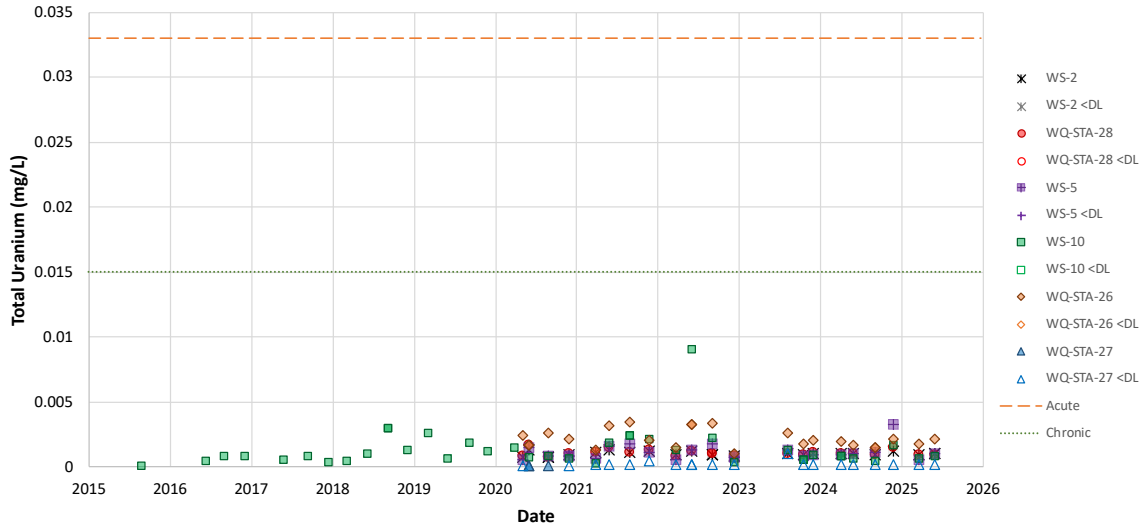


**Figure A.2-57: Total Uranium at Surface Water Quality Monitoring Locations, 2015 to 2025**

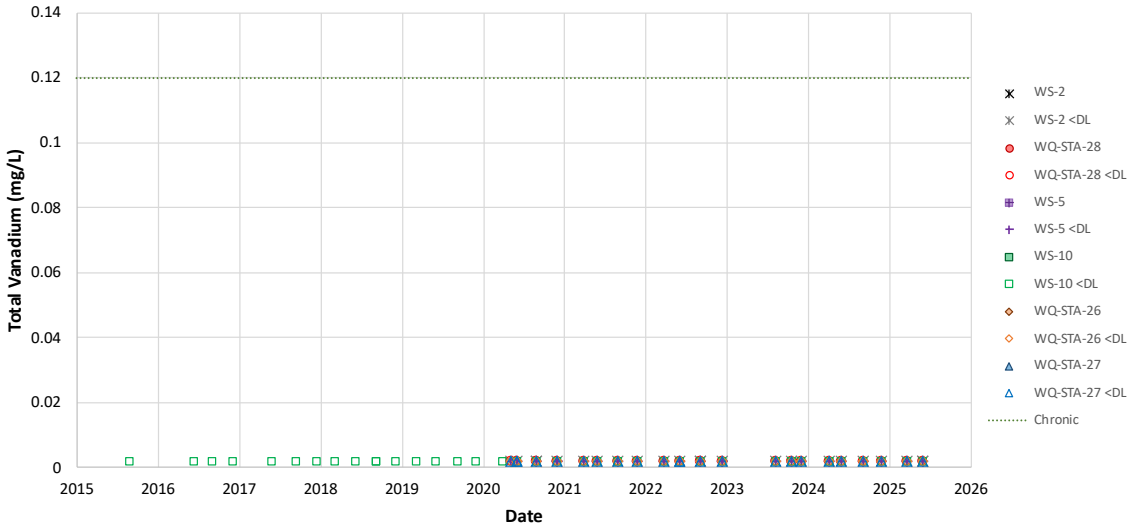


**Figure A.2-58: Total Vanadium at Surface Water Quality Monitoring Locations, 2015 to 2025**

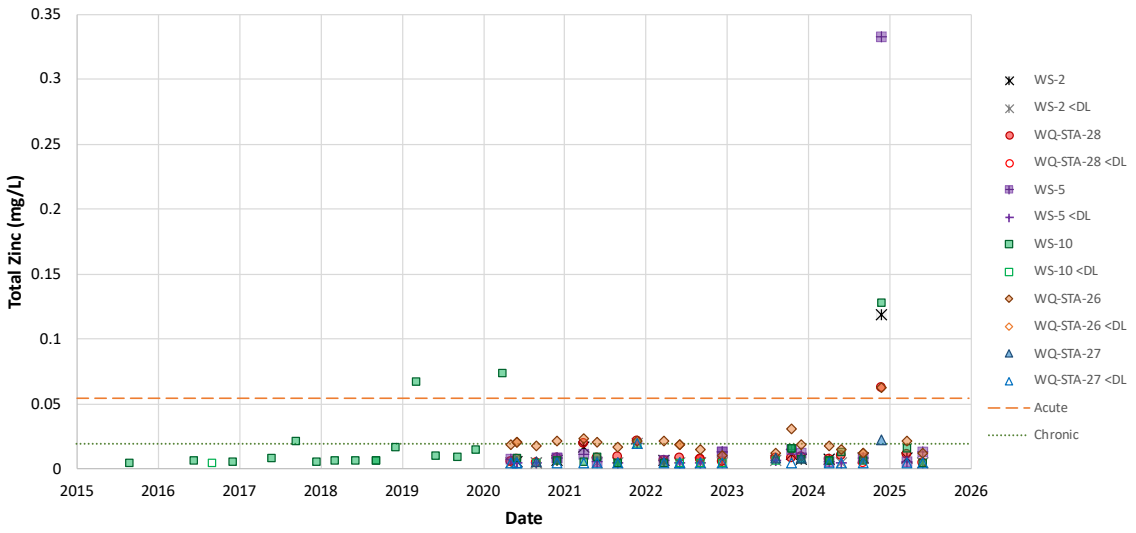


**Figure A.2-59: Total Zinc at Surface Water Quality Monitoring Locations, 2015 to 2025**

# Appendix 6.5-3: Water Quality Predictions and Assessment: South Ridge Project

# WATER QUALITY PREDICTIONS AND ASSESSMENT: SOUTH RIDGE PROJECT

PREPARED FOR:
CANADA FLUORSPAR INC.

CFI-25-01-02

28 April 2026

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# EXECUTIVE SUMMARY

Canada Fluorspar Inc. (CFI) plans to develop the South Ridge Project (the Project) located approximately 4 kilometers south-southwest of the Town of St. Lawrence, Newfoundland. The Project will consist of a single active open pit (South Ridge Pit) with mining occurring over an 18-month operational period. Mine rock and overburden will be stockpiled. The ore will be trucked to and processed at the existing AGS mill. Tailings will be deposited in the existing tailings management facility (TMF) located next to the mill, while the concentrate will be shipped off-site. During the Closure phase, CFI intends to sell most mine rock as an aggregate and reclaim the site. South Ridge Pit will naturally flood and is expected to decant in Post-closure. This report assesses potential changes in water quality resulting from the South Ridge Project.

Contact water generated within the Project area, including from pit dewatering and drainage from stockpiles, will be captured and conveyed to the East and West sedimentation ponds prior to discharge to downstream ponds and brooks, which represent the receiving environment. Six prediction nodes were selected to represent key drainage and water quality monitoring locations within two major watersheds:

Salt Cove Brook Watershed:

- West pond discharge
- Hare Ears Pond outflow
- East Branch of the Salt Cove Brook outflow
- Salt Cove Brook at WS-10

Shoal Cove Brook Watershed:

- East Pond discharge
- Shoal Cove Pond outflow at WS-5

Water quality was predicted at these locations using flow estimates from the Surface Water Hydrology Baseline and Effects Assessment Report (Falkirk 2026a) and source terms for contact and natural waters based on existing monitoring data.

Flow estimates are based on the Surface Water Hydrology Baseline and Effects Assessment Report (Falkirk 2026a). Baseline surface water flows were estimated for key receiving nodes using regional regression relationships developed from hydrometric stations on the Burin Peninsula. Drainage area was used as the primary parameter to scale flows between catchments. Areas of mine features (pit and stockpiles) were based on the expected end-of-mining footprints for Operations and Closure phases. Seasonal variation in flow was captured using mean monthly estimates used as inputs in water predictions of water quality. The approach used to calculate nitrogen concentrations was based on a combination of 2025/2026 operational and monitoring records from AGS mine and South Ridge mine plan and pit dewatering flows.

Source terms were developed using an analog approach, where water quality data from AGS Mine were used to estimate concentrations of contact waters for the Project. Baseline inputs were compiled from several years of quarterly water quality monitoring. Median monthly concentrations were used for model inputs to represent seasonal variability. In the case of non-detect concentrations, the reported detection limit was used to calculate median concentrations.

Using the estimated flows and source terms, water quality concentrations were predicted at each node assuming full mixing of inflows, where the sum of constituent loads from contributing sources was divided by the total inflow to each prediction node. Projected water quality concentrations were screened against water quality guidelines and existing conditions to identify constituents of potential concern (COPCs).

Projected concentrations of all parameters during all phases were below the Newfoundland and Labrador (NFLD) Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NFLD 2003) limits in the

discharge of East and West Ponds, except for nitrate + nitrite nitrogen in the West Pond. Concentrations of nitrate + nitrite nitrogen (10.5 mg/L) marginally exceed the NFLD ECWSR 65/03 limit of 10 mg/L in June during Operations and therefore was identified as a COPC. CFI will develop a monitoring and discharge plan to manage the portion of mine water going to the West Pond and East Pond such that exceedances for the NFLD ECWSR 65/03 limit would not be expected to occur.

Cadmium and zinc were identified as COPCs at both locations, as projected concentrations are above the short-term guidelines as follows:

- East Pond discharge:
  - Cadmium – December and March during Operations
  - Zinc – December, March, and June during Operations
- West Pond discharge:
  - Cadmium and zinc – all months during Operations

Further assessment of the short-term guideline exceedances in the discharge is required to evaluate the potential effects to aquatic life.

In the receiving environment, projected concentrations of all parameters during all phases were below the NFLD ECWSR 65/03 limits and the short-term guidelines, with the exception of cadmium and zinc which exceeded the short-term guidelines as follows:

- Hares Ears Pond Outflow:
  - Cadmium – all months during Operations, and September, December, and March during Post-closure.
  - Zinc – December and March during Operations

The following COPCs were identified at the receiving environment locations, as projected concentrations are above the long-term guidelines and or above existing conditions.

- Shoal Cove Pond Outflow (WS-5):
  - Nitrite – June during Operations
  - Copper – December and June during Operations
- Hares Ears Pond Outflow:
  - Fluoride – all months during Operations and September and December during Post -closure
  - Nitrate – June during Operations
  - Nitrite – all months during Operations
  - Cadmium– all months during Operations and September, December, and March during Post-closure
  - Copper – all months during Closure and Post-closure
  - Zinc all months during Operations and December, March, and June during Post-closure
- East Branch of Salt Cove Brook:
  - Copper – all months during Operations and December and March during Post-closure

- Salt Cove Brook Outflow:
  - Copper –June during Operations
  - Iron – September and June during all phases

Elevated detection limits above long-term guidelines and a high percentage of non-detect data in the existing conditions and source terms data, particularly for cadmium and cobalt, contributed to the projected long-term guideline exceedances and overall uncertainty in the projections of these parameters. Further assessment of the short-term and long-term guideline exceedances is required to evaluate the potential risks to aquatic life.

Considering the results of this water quality modelling program, the following recommendations are provided:

- Incorporate the monitoring and management of quality of discharges into the water management plan, such that the discharges are expected to remain below the NFLD ECWSR 65/03 limits.
- Refine the understanding of existing site conditions including the collection of additional surface and groundwater quality data as listed below:
  - Improve existing surface water quality dataset by collecting additional samples at locations throughout the study area and seepage analogs at AGS Mine.
  - Analyze samples with detection limits below the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life (CCME 2019) and Federal Environmental Quality Guidelines (FEQGs, ECCC 2024).
  - Continue laboratory and field kinetic tests.

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## Appendices

Appendix A. Predicted Concentrations of Nitrogen Species
Appendix B. Water Quality Projections and Screening Results

# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| **AGS** | Arthor Gordon Stollery |
| **CCME** | Canadian Council of Ministers of the Environment |
| **CFI** | Canada Fluorspar Inc. |
| **COPC** | Constituent of potential concern |
| **East Pond** | East Sedimentation Pond |
| **ECCC** | Environment and Climate Change Canada |
| **ECWSR** | Environmental Control Water and Sewage Regulations |
| **ETMF** | Exposure and Toxicity Modifying Factor |
| **FEQG** | Federal Environmental Quality Guidelines |
| **ML/ARD** | Metal leaching and Acid Rock Drainage |
| **NFLD** | Newfoundland and Labrador Regulations |
| **West Pond** | West Sedimentation Pond |
| **WQ** | Water quality |

# 1 INTRODUCTION

## 1.1 BACKGROUND

Canada Fluorspar Inc. (CFI) plans to develop the South Ridge Project (the Project). The Project is located approximately 4 kilometers south-southwest of the Town of St. Lawrence, between the existing AGS Mine and the Blue Beach Marine Terminal operated by CFI (Figure 1-1).

The Project will consist of a single active open pit (South Ridge Pit) with mining occurring over an 18-month operational period (Figure 1-1). Mine rock produced by the Project is expected to be of sufficiently high quality to be used as construction aggregate to support the development of Project infrastructure. Unused mine rock and overburden will be stockpiled to the northeast of the pit, while the ore will be processed at the existing AGS mill. Concentrate will be produced through dense media separation followed by flotation, with tailings deposited in the existing tailings management facility located next to the AGS mill. The concentrate will be shipped off-site through the existing Blue Beach Marine Terminal. After operations, CFI intends to sell mine rock as an aggregate and reclaim the South Ridge Pit, including the potential to naturally flood the open pit.

## 1.2 STUDY OBJECTIVES AND REPORT STRUCTURE

This report provides an initial prediction and assessment of potential changes to water quality as a result of the Project. Future water quality is predicted both in discharges from the Project and the downstream receiving environment. The prediction and assessment of water quality changes is conducted for three snapshots representing: 1) Construction and Operation, 2) Closure and 3) Post-closure of the South Ridge Mine site. Water management during the Construction phase is similar to that during Operations, but during Construction the stockpiles are yet not fully developed. As a conservative approach, the end of Operation water management scenario was used to represent Construction phase conditions; therefore, the Construction phase was not simulated. For each snapshot, water quality was predicted for a range of seasonal flow and water quality conditions.

The following sections of the report describe:

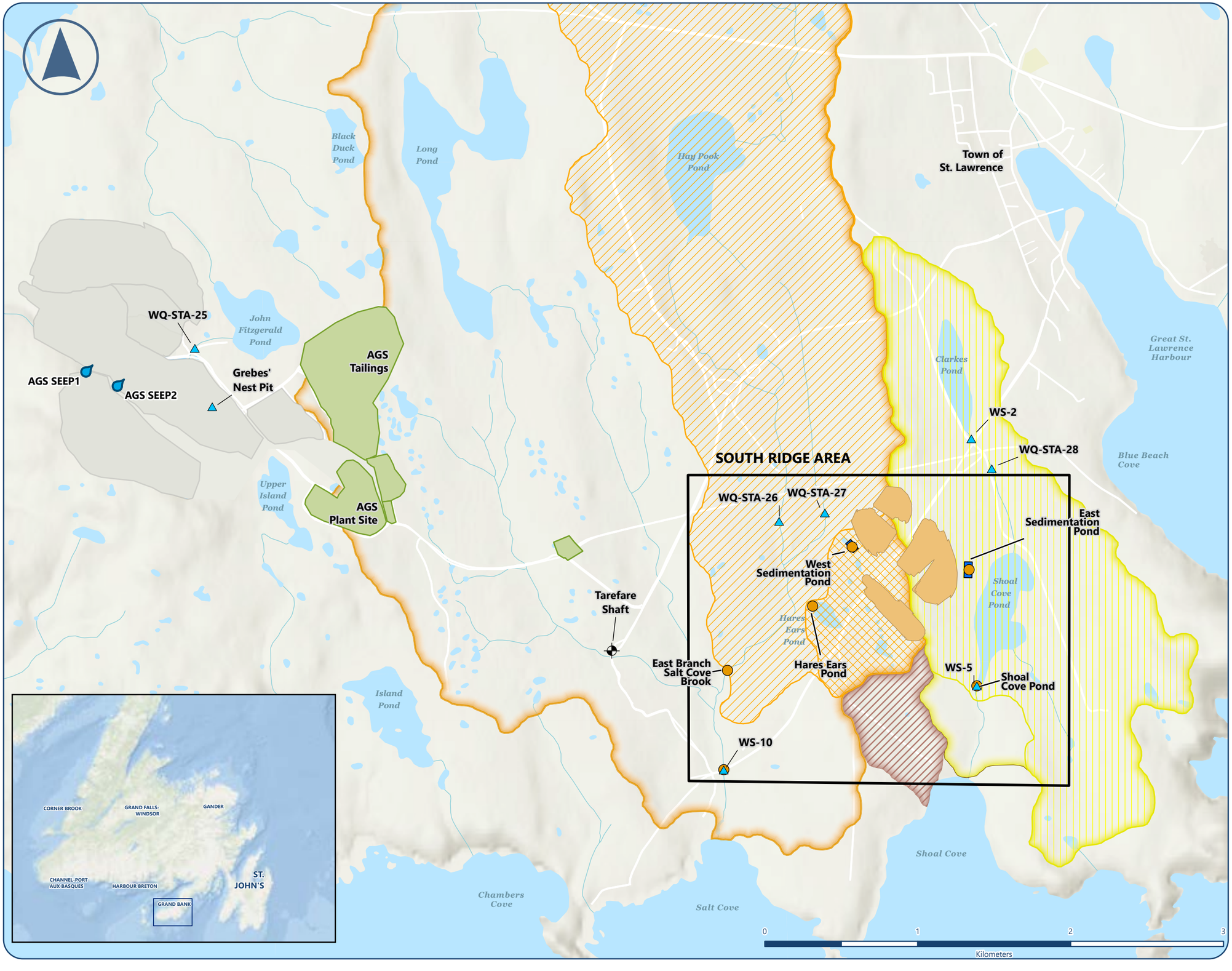
- Section 2: Site water management and present conceptual flow diagrams during each phase.
- Section 3: The methodology of flow estimation, the assumptions used for water quality predictions, and the basis for water quality screening.
- Section 4: Flow inputs.
- Section 5: Water quality inputs and assumptions.
- Section 6: Assessment and screening of predicted discharges and receiving environment. conditions relative to applicable guidelines and existing conditions.
- Section 7: Conclusions.
- Section 8: Recommendations.

CFI
CANADA FLUORSPAR INC.

# SOUTH RIDGE MINE

## FIGURE 1-1
## WATER QUALITY PREDICTIONS AND ASSESSMENT

APRIL, 2026




- Groundwater Wells
- Seep
- Water Quality Stations
- Water Quality Prediction Node
- Sedimentation Pond
- Proposed Project Infrastructure
- Shared AGS Mine Infrastructure
- Existing AGS Mine Infrastructure

Watersheds

- Salt Cove Brook
- East Branch of Salt Cove Brook
- Hares Ears Pond
- Shoal Cove Pond Brook
- Shoal Cove Pond
- Unnamed Tributary to Shoal Cove Brook

Scale: 1:24,000
when printed on 11 by 17 inch paper

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This map and associated spatial data were prepared by Falkirk Environmental Consultant Ltd. for the exclusive use of the client and are not intended for distribution or use by any third party without the express written consent of Falkirk Environmental Consultant Ltd. Data featured in this map has been derived from a variety of digital sources and, as such, FEC does not warrant the accuracy, completeness, or reliability of this map or its data for any other purpose. Spatial Reference: Name: NAD83(CSRS)v2 UTM Zone 21N File: EA_Figures_20260406.aprx, Published to pdf on 2026-04-16 10:37 AM by PaulCampbell

# 2 WATER MANAGEMENT

The Project is located on a divide between the Salt Cove Brook and Shoal Cove Brook watersheds (Figure 1-1).

During the Construction and Operation stages, non-contact flows from these watersheds will be conveyed around the Project footprint and report to downstream ponds and brooks which represent the receiving environment. Contact water generated within the Project area, including from pit dewatering and drainage (runoff and seepage) from stockpiles, will be captured and conveyed to either the East Sedimentation Pond (East Pond) or to the West Sedimentation Pond (West Pond). The East Pond discharges to Shoal Cove Pond, which also receives drainage from historical tailings located upstream (Figure 2-1). Outflow from Shoal Cove Pond is monitored by CFI for water quality providing baseline conditions. Accordingly, this location was selected as the node representing receiving environment of Shoal Cove Brook. The West Pond discharges to Hares Ears Pond, which outflows to the East Branch of Salt Cove Brook. The East Branch and West Branch of Salt Cove Brook merge to form Salt Cove Brook. Salt Cove Brook is monitored at location WS-10, which is affected by operation of the AGS plant and tailings facility. Six prediction nodes were selected to represent key drainage and water quality monitoring locations:

Salt Cove Brook Watershed:

- West pond discharge
- Hare Ears Pond outflow
- East Branch of Salt Cove Brook
- Salt Cove Brook at WS-10

Shoal Cove Brook Watershed:

- East Pond discharge
- Shoal Cove Pond outflow (WS-5)

During Closure conditions, surface water and groundwater flow patterns change from the operational scenario primarily due to the cessation of active dewatering, while mine rock stockpiles remain in place (Figure 2-2). Pit will allow the pit to fill passively and to reduce volumes of contact water in discharges. Contact water during Closure is therefore dominated by runoff and seepage from stockpiles, rather than mine water. Contact flows are still directed through defined pathways toward managed ponds (East Pond and West Pond) and downstream receiving environments. Non-contact flows from the Salt Cove and Shoal Cove watersheds continue to be routed around the Project footprint in a manner similar to Operations.

In Post-closure conditions, hydrologic behaviour differs from Closure as the pit lake is allowed to overflow to Hares Ears Pond (Figure 2-3). Most of the mine rock from the stockpile will be removed from the site and the remaining portion will be reclaimed using stockpiled overburden and topsoil and allowed to revegetate. Runoff from reclaimed stockpile is classified as non-contact and is conveyed to the West Pond and East Pond. Contact water in the Post-closure period is therefore limited to pit overflow and seepage from remaining mine rock. All water infiltrating into and reacting with remaining mine rock was assumed to be captured by ditches and conveyed to the West Pond and East Pond. This conservative assumption for prediction of water quality in these ponds was taken because a portion of the infiltration will recharge to groundwater through the base of stockpile and will bypass the ponds. The groundwater model indicates that water from the pit lake could travel via subsurface and discharge to Shoal Cove Brook and Shoal Cove Pond (Mining One, 2026a). Contaminant load from this pathway was added to the Shoal Cove Pond outflow node #20 on Figure 2-3.

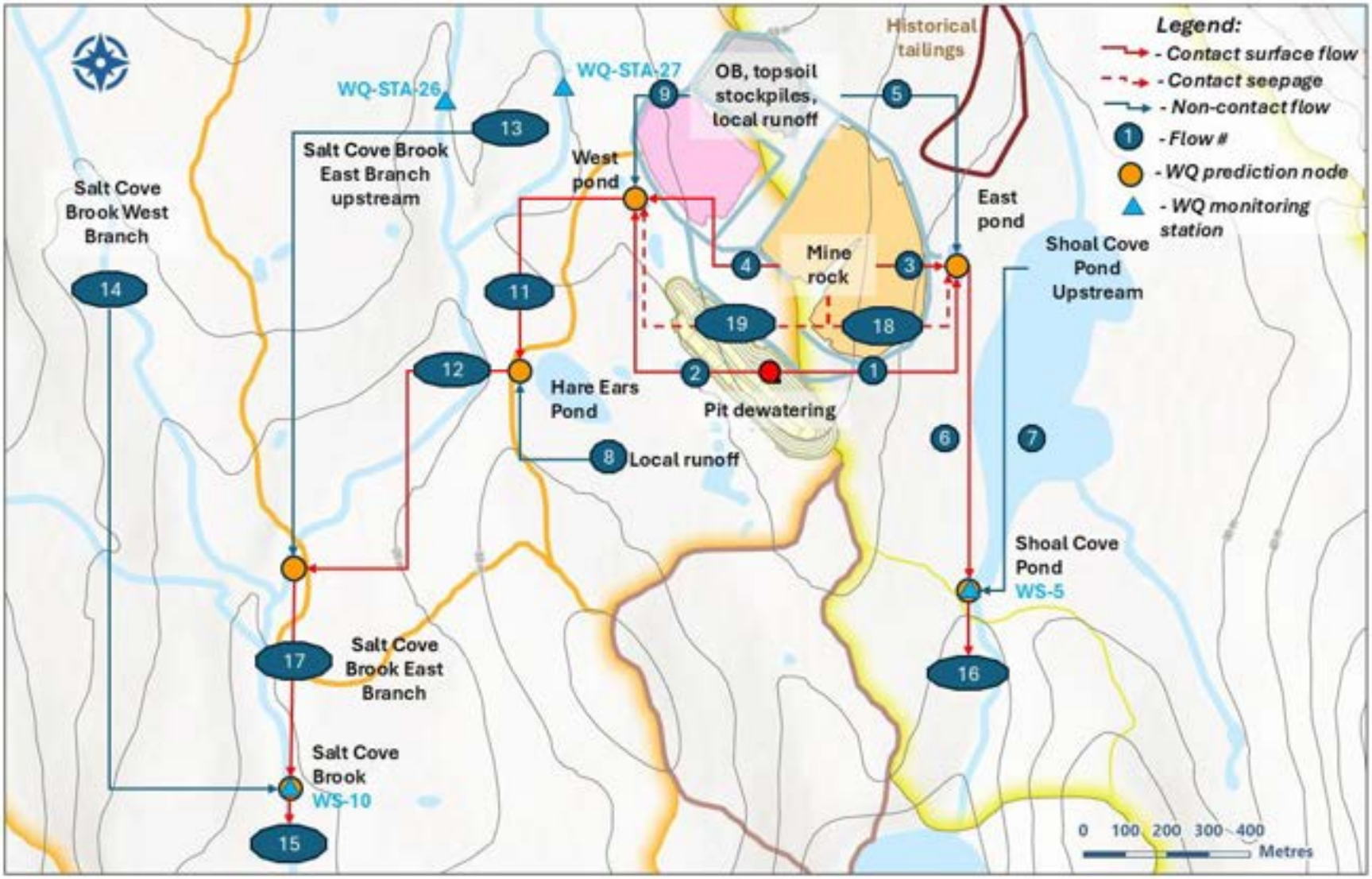


**Figure 2-1: South Ridge Project Flow Diagram During Operations**

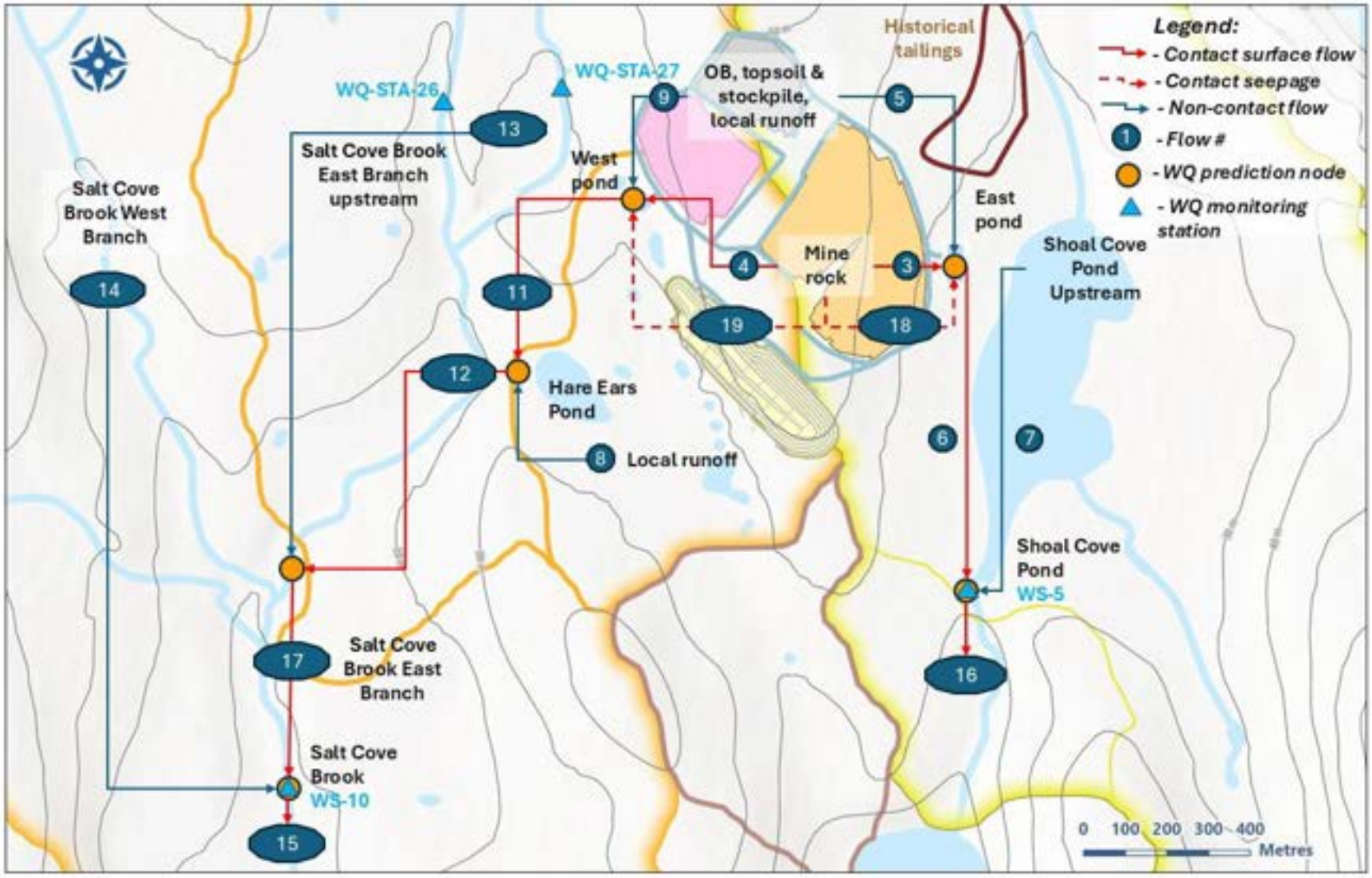


**Figure 2-2: South Ridge Project Flow Diagram During Closure**

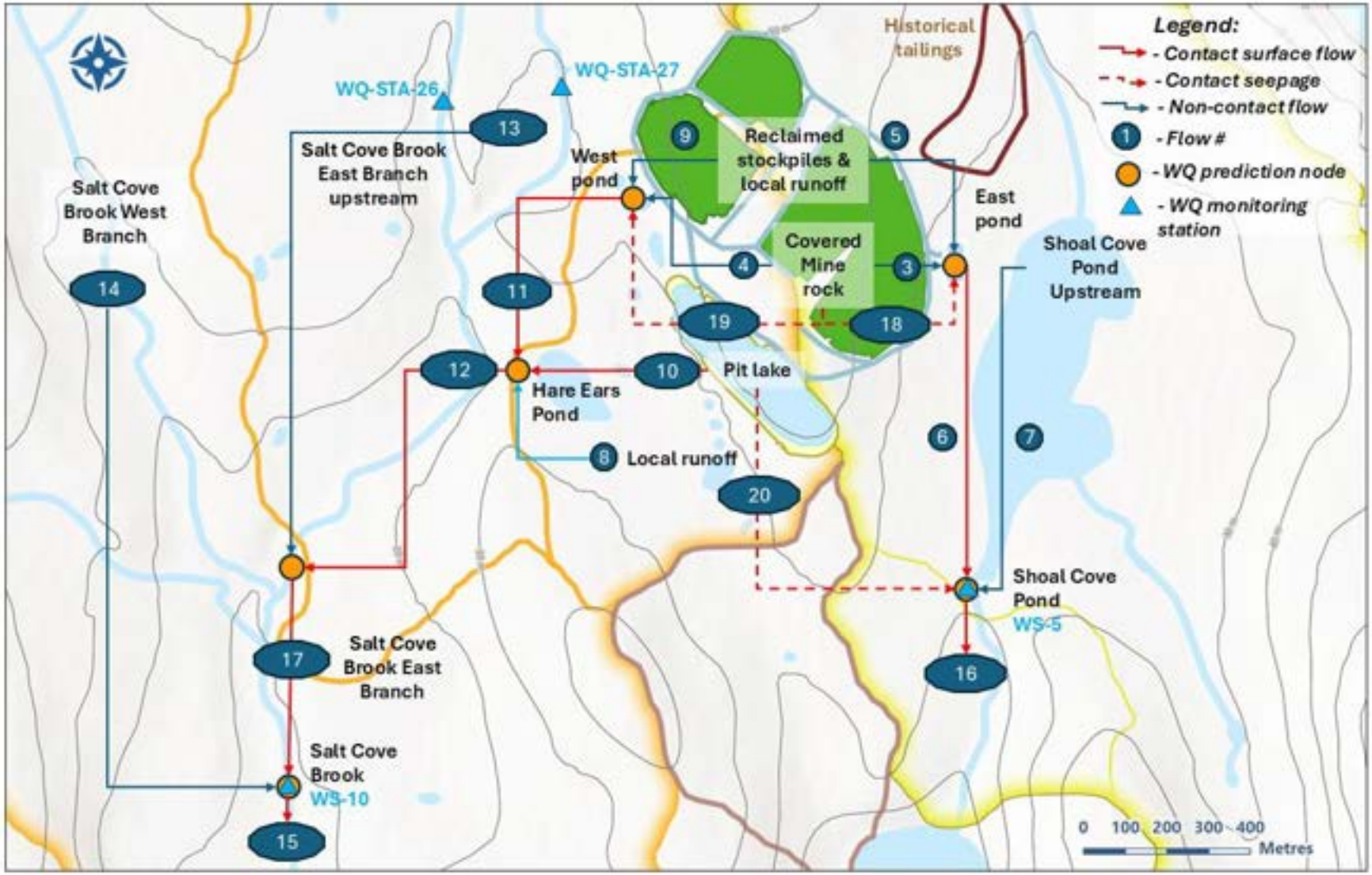


**Figure 2-3: South Ridge Project Flow Diagram During Post-Closure**

# 3 METHODOLOGY

## 3.1 FLOW ESTIMATES

Flow estimates were derived as part of the Surface Water Hydrology Baseline and Effects Assessment Report (Falkirk 2026a) completed for the Project. As part of hydrology study (Falkirk 2026a), baseline surface water flows were estimated for key receiving nodes using regional regression relationships developed from Water Survey of Canada hydrometric stations on the Burin Peninsula. Baseline flows for ungauged Project catchments were estimated using regression relationships between discharge and drainage area. Drainage area was used as the primary parameter to scale flows between catchments. Areas of Project features (pit and stockpiles) were based on the expected end-of-mining footprints for Operations and Closure stages. Seasonal variation in flow was captured using mean monthly estimates, with higher flows during winter and early spring and lower flows in late summer.

Potential hydrologic effects of the Project were assessed using a water balance analysis (Falkirk 2026a). Precipitation, evapotranspiration, infiltration, and runoff were calculated for all project phases and catchments. The water balance assessment used historical meteorological records along with provided information on current and proposed land uses, and existing soil types as identified through previous reporting. Project-related changes in flow at the Project site were applied to the baseline values at each receiving environment node to estimate monthly flows for input to the water quality predictions. At nodes where multiple water sources mix, the monthly flow volumes from each contributing source were summed (i.e. flows #6, #11, #12, #15, #16, and #17 on Figure 2-1.). In this report, flows from the mine rock footprint were assessed separately from other land uses, in recognition of different assumptions for water quality draining from mine rock (see Sections 5.1.1 and 5.2.1). To support a conservative water quality assessment, net infiltration into mine rock is assumed to report as toe seepage (flows #18 and #19), all of which is collected and conveyed to the ponds (Figure 2-1). This assumption was not considered conservative for the water quantity assessment, and mine rock seepage was not included in flow rates provided in the water quantity assessment section and supporting documents (Falkirk 2026a).

The water balance calculations also accounted for pumped discharge associated with pit dewatering array of dewatering wells and sump(s). Horizontal dewatering wells will be drilled into walls of the pit and will anticipate collecting a flow of ~1,600 $m^3$/day (Mining One 2026b). This flow will be directed to sumps, where it will mix with pit wall runoff and pumped out from the pit. Half of this combined dewatering discharge was assumed to report to the East sedimentation pond (i.e., to Shoal Cove Pond) and the other half was assumed to report to the West sedimentation pond (i.e., to Hares Ears Pond). These correspond to flows 1 and 2 on Figure 2-1. CFI would like to have operational flexibility to manage proportions of this flow to minimize environmental impacts on the receiving environment.

## 3.2 WATER QUALITY PREDICTIONS

The Project is evaluated across distinct mine phases (Operations, Closure, and Post-closure) to reflect changes in site conditions and water management practices over time.

Water quality was predicted for parameters that had relevant water quality criteria (see Section 3.3). This study does not predict pH changes in water but based on the Metal Leaching/Acid Rock Drainage

(ML/ARD) assessment (Falkirk 2026b) and monitoring of AGS discharges, pH is expected to stay within regulatory limits and guidelines discussed in Section 3.3.

Water quality concentrations were predicted at each node ($C_{node}$) assuming full mixing of inflows, where the sum of constituent loads from contributing sources is divided by the total inflow to each prediction node:

$$C_{node} = \frac{\Sigma C_i Q_i}{\Sigma Q_i}$$

Where:

- $Q_i$ – flow rate of input $i$ entering the node (Table 4-1)
- $C_i$ – concentration of constituent in flow $i$ entering the node (Table 5-1)
- $i$ – flow identification number in Table 4-1 and Table 5-1 for corresponding snapshot and season.

An exception to this calculation is Shoal Cove Pond (node WS-5) during Post-closure because flow associated with mass loading from the pit lake via groundwater (flow #20 on Figure 2-3) is already accounted for in total outflows from this node (#16 Figure 2-3). Concentrations are conservatively calculated as follows:

$$C_{16} = \frac{C_6 Q_6 + C_7 Q_7 + C_{20} Q_{20}}{Q_6 + Q_7}$$

Where:

- $Q_6, Q_7, Q_{20}$ - flow rate of inputs 6, 7 and 20 from Table 4-1 for Post-closure phase
- $C_6, C_7, C_{20}$ - concentration of constituents in flows 6, 7 and 20 from Table 5-1 for Post-closure phase

Water quality was monitored quarterly with the highest sampling frequency occurring in September, December, March, and June. Therefore, these months were selected for the predictions and respective mean monthly flows from Table 4-1 were used as inputs to represent seasonal variability for each snapshot of Project phase.

In developing source terms, an analog approach was applied, where water quality data from suitable locations at the AGS Mine were used to represent the Project conditions due to insufficient kinetic testing data. Available datasets were screened for completeness and representativeness; however, data gaps did exist, notably the absence of reported fluoride and dissolved metals in some datasets. Water quality data were compiled and collated from Grebes Nest Pit (GBN) discharge (WQ-STA-25), pit lakes (Grebes Nest Pit and Center Pit), AGS mine rock seeps and South Ridge surface- and groundwater monitoring locations. Median concentrations were used for model inputs to reduce the influence of outliers and better represent expected conditions, but not the worst -case. In the case of non-detect concentrations, the reported detection limit was used to calculate median concentrations. Water quality inputs are described in detail in Section 5 of this report.

A major source of nitrogen species in mine water is undetonated explosives containing ammonium nitrate. The approach used to calculate nitrogen concentrations was based on a combination of 2025/2026 operational and monitoring records from GBN of AGS mine and South Ridge mine plan and pit dewatering flows. Monitoring of seepages and pit discharges indicates that most nitrogen is leached mine water

discharge from the open pits, while waste rock seeps show low concentrations. Accordingly, it was assumed that nitrogen is predominantly leached into mine water and is not significantly transported with mine rock or ore to stockpiles. The following equation is used calculate monthly concentration of nitrogen species in South Ridge pit mine water ($C_{N-spec,mon}$ in mg N /L):

$$C_{N-spec,mon} = \frac{\left(M_{ore,i} \times PF_{ore} + M_{rock,i} \times PF_{rock}\right) \times NF_{expl} \times FE_{lost} \times F_{spec} \times 1000}{Q_{mon} \times N_{days}}$$

Where:

- $M_{ore,i}\ and\ M_{rock,i}$ - tonnes of rock and ore mined in moth $i$ of mine plan (Appendix A)
- $PF_{ore} and\ PF_{rock}$ – explosive used: 0.28 kg and 0.26 kg per tonne of ore or rock, respectively
- $NF_{expl}$ – weight fraction of nitrogen in the explosive, 0.265 assuming (CFI, 2026a)
- $FE_{lost}$ – fraction of explosive lost, estimated to be 0.0115 from average the GBN pit November 2025- March 2026 monitoring data (CFI, 2026b);
- $F_{spec}$ – fraction of nitrogen in nitrate (0.9), ammonia (0.08) and nitrite (0.02) based on AGS data
- 1000 – concentration conversion of kg/m$^3$ to mg/L
- $Q_{mon}$ – monthly pit dewatering flow in m$^3$/day, sum of flows 1 and 2 from Table 4-1
- $N_{days}$ – days in month, assumed to be 30 days.

For each calendar month, a range of potential concentrations was predicted based on variability in monthly tonnages of ore and rock ($M_{ore,i}\ and\ M_{rock,i}$) as shown in Appendix A. Maximum concentrations of nitrogen species (nitrate, nitrite and ammonia) were conservatively selected for each calendar month reflecting the highest tonnage at month 7 and used as inputs to the pit dewatering shown in Table 5-1. Note that nitrogen inputs are based on the assumption that operational processes and other factors controlling the fraction of nitrogen lost at GBN pit (November 2025-March 2026) and the South Ridge Mine are the same.

## 3.3 WATER QUALITY ASSESSMENT

The surface water quality assessment was completed to evaluate Project-related changes to water quality for the defined assessment boundaries. Surface water quality modelling was completed using a mass-balance model as described in Section 3.2 and Section 5, and the results of the site-wide average annual water balance (Falkirk 2026a). To evaluate the potential effects of the Project on surface water quality the downstream environment, concentrations were projected for three mine phases: Operations, Closure, and Post-closure. Model projections were developed for two discharge locations and four receiving environment locations. The surface water quality assessment nodes are listed below and shown on Figure 2-1, Figure 2-2, and Figure 2-3.

- Discharge locations:
  - West Pond Outflow
  - East Pond Outflow
- Receiving environment locations:
  - Hares Ears Pond Outflow
  - East Branch Salt Cove Brook

- Salt Cove Brook Outflow (WS-10)
- Shoal Cove Pond Outflow (WS-5)

Projected concentrations at the discharge locations were compared to the follow screening values (Table 3-1):

- Canadian Council of Ministers of the Environment (CCME) short-term water quality guidelines for the protection of aquatic life (CCME 2019), and
- Newfoundland and Labrador (NFLD) Environmental Control Water and Sewage Regulations (ECWSR) 65/03 (NFLD 2003).

Projected concentrations at the receiving environment locations were compared to the screening values listed above and a select list of long-term water quality guidelines (Table 3-1). The selected long-term guidelines were a combination of the CCME long term water quality guidelines for the protection of aquatic life (CCME 2019) and Federal Environmental Quality Guidelines (FEQGs, ECCC 2024). The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.

Screening values that are exposure and toxicity modifying factor (ETMF)-dependant were calculated using existing conditions data from WS-5 or WS-10. Specifically, assessment locations in the Shoal Cove Brook watershed used the median values from the WS-5 existing conditions dataset and assessment locations in the Salt Cove Brook watershed used the median values from the WS-10 existing conditions dataset.

**Table 3-1: Modelled Parameters and Screening Values**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life[a] | | Newfoundland and Labrador Regulation 65/03 |
|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | |
| Chloride | mg/L | 640 | 120 | - |
| Fluoride | mg/L | - | 0.12 | - |
| Ammonia | mg-N/L | - | 5.2 to 5.7 | 2 |
| Nitrate | mg-N/L | 124 | 2.9 | - |
| Nitrite | mg-N/L | - | 0.06 | - |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 |
| Aluminum[b] | mg/L | - | 0.5 to 0.67 | - |
| Arsenic | mg/L | - | 0.005 | 0.5 |
| Barium | mg/L | - | - | 5 |
| Boron | mg/L | 29 | 1.5 | 5 |
| Cadmium[b] | mg/L | 0.00034 to 0.00068 | 0.00004 to 0.000063 | 0.05 |
| Chromium[c] | mg/L | - | 0.005 | 0.05 |
| Cobalt[b] | mg/L | - | 0.00078 | - |
| Copper[b] | mg/L | - | 0.001 to 0.002 | 0.3 |
| Iron[b] | mg/L | - | 0.59 to 0.64 | 10 |
| Lead[b] | mg/L | - | 0.0075 to 0.0093 | 0.2 |
| Manganese[b] | mg/L | 2.0 to 2.5 | 0.38 | - |
| Mercury | mg/L | - | 0.000026 | 0.005 |
| Molybdenum | mg/L | - | 0.073 | - |
| Nickel[b] | mg/L | - | 0.025 | 0.5 |
| Selenium | mg/L | - | 0.001 | 0.01 |
| Silver | mg/L | - | 0.00025 | 0.05 |
| Strontium | mg/L | - | 2.5 | - |
| Thallium | mg/L | - | 0.0008 | - |
| Uranium | mg/L | 0.033 | 0.015 | - |
| Vanadium | mg/L | - | 0.12 | - |
| Zinc[b] | mg/L | 0.028 to 0.051 | 0.013 to 0.018 | 0.5 |

*Notes:*
*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.*
*b) Guidelines is dependant on one or more ETMF. Refer to Section 3.3 for details.*
*c) The guideline for hexavalent chromium was used total chromium.*
*Double-underlined guidelines apply to the dissolved fraction.*

Projected concentrations at each assessment node and for each modelled phase were screened to identify constituents of potential concern (COPCs). The COPC screening was a multi-step process that involved comparing projected concentrations to the screening values listed in Table 3-1 and existing conditions. The screening process was divided into two main categories; discharge locations and receiving environment locations, and the screening steps are as follows:

- **Discharge locations:**
  - If projected concentrations are above a screening value, the parameter was identified as a COPC.
- **Receiving environment locations**: The receiving environment locations were further divided into two categories: locations with available monitoring data (i.e., WS-5 and WS-10) and locations with no available monitoring data. The screening steps are as follows:
  - Existing conditions concentrations below screening values:
    - If projected concentrations are greater than one or more screening value and greater than existing conditions, the parameter was identified as a COPC.
  - Existing conditions concentrations above screening values:
    - If projected concentrations are greater than one or more screening value and greater than existing conditions (by 10% or more), the parameter was identified as a COPC. An increase of 10% was considered to represent a conservative evaluation of whether a measurable Project-related change to water quality was expected to occur. Given temporal variability, variability in sampling and laboratory methods, and uncertainty inherent in estimates from the water quality model, projected increase of less than 10% above existing concentrations was considered unlikely to reflect a meaningful Project-related change to water quality.

# 4 FLOW INPUTS

Table 4-1 presents the monthly flow inputs used in the water quality model, summarizing estimated contact and non-contact contributions for Operational, Closure and Post-closure snapshots. The flow numbers correspond to Figure 2-1, Figure 2-2, and Figure 2-3. Maximum pit lake seepage to the Shoal Cove Pond and Brook of 50.4 $m^3$/day of was provided by Mining One (2026a).

**Table 4-1: Mean Monthly Flow Inputs ($m^3/d$) to the Water Quality Model for Operational, Closure and Post-Closure Conditions**

| Mine Phase | Month | Pumping Wells to East Pond | Pumping Wells to West Pond | Mine Rock Stockpile to East Pond | Mine Rock Stockpile to West Pond | Overburden, Topsoil Local Runoff to East Pond | East Pond Outflow | Shoal Cove Baseline | Hares Ears Baseline Inflow | Overburden, Topsoil Local Runoff to West Pond | Pit Decanting to Hares Ears Pond | West Pond Outflow | Hares Ears Pond Outflow | East Branch Salt Cove Brook Upstream | West Branch Salt Cove Brook | Salt Cove Brook Outflow (WS-10) | Shoal Cove Pond Outflow (WS-5) | East Branch Salt Cove Brook | Mine Rock seepage to West Pond | Mine Rock seepage to West Pond | Pit lake seepage to Shoal Cove Brook |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flow # * | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Operations | January | 666 | 666 | 208 | 23 | 228 | 1,310 | 18,520 | 2,597 | 353 | 0 | 1,064 | 3,661 | 59,967 | 51,197 | 114,825 | 19,830 | 63,628 | 208 | 23 | 0 |
| | February | 663 | 663 | 204 | 22 | 228 | 1,299 | 17,260 | 2,399 | 351 | 0 | 1,059 | 3,458 | 56,022 | 47,941 | 107,420 | 18,560 | 59,480 | 204 | 22 | 0 |
| | March | 692 | 692 | 248 | 27 | 275 | 1,463 | 21,185 | 2,961 | 415 | 0 | 1,162 | 4,123 | 68,701 | 58,682 | 131,506 | 22,648 | 72,824 | 248 | 27 | 0 |
| | April | 733 | 733 | 313 | 34 | 344 | 1,702 | 25,555 | 3,562 | 512 | 0 | 1,314 | 4,876 | 83,240 | 71,698 | 159,813 | 27,257 | 88,115 | 313 | 34 | 0 |
| | May | 624 | 624 | 144 | 16 | 160 | 1,072 | 15,415 | 2,199 | 242 | 0 | 898 | 3,097 | 49,881 | 42,839 | 95,817 | 16,487 | 52,978 | 144 | 16 | 0 |
| | June | 584 | 584 | 83 | 9 | 92 | 841 | 11,806 | 1,723 | 139 | 0 | 741 | 2,464 | 37,888 | 32,242 | 72,594 | 12,648 | 40,352 | 83 | 9 | 0 |
| | July | 553 | 553 | 34 | 4 | 35 | 656 | 9,077 | 1,371 | 51 | 0 | 611 | 1,981 | 28,872 | 24,440 | 55,294 | 9,733 | 30,854 | 34 | 4 | 0 |
| | August | 564 | 564 | 48 | 5 | 47 | 708 | 7,712 | 1,143 | 72 | 0 | 647 | 1,790 | 24,665 | 21,030 | 47,485 | 8,420 | 26,455 | 48 | 5 | 0 |
| | September | 619 | 619 | 135 | 15 | 126 | 1,014 | 13,044 | 1,879 | 202 | 0 | 851 | 2,730 | 41,866 | 35,464 | 80,060 | 14,058 | 44,596 | 135 | 15 | 0 |
| | October | 655 | 655 | 190 | 21 | 193 | 1,229 | 17,216 | 2,444 | 303 | 0 | 1,000 | 3,443 | 55,559 | 47,308 | 106,310 | 18,445 | 59,002 | 190 | 21 | 0 |
| | November | 717 | 717 | 288 | 32 | 319 | 1,611 | 19,355 | 2,622 | 484 | 0 | 1,264 | 3,887 | 63,176 | 54,145 | 121,207 | 20,966 | 67,062 | 288 | 32 | 0 |
| | December | 707 | 707 | 272 | 30 | 303 | 1,555 | 19,721 | 2,694 | 462 | 0 | 1,230 | 3,924 | 64,269 | 55,085 | 123,278 | 21,276 | 68,193 | 272 | 30 | 0 |
| Closure | January | 0 | 0 | 208 | 23 | 251 | 667 | 18,520 | 2,597 | 353 | 0 | 399 | 2,995 | 59,967 | 51,197 | 114,159 | 19,187 | 62,963 | 208 | 23 | 0 |
| | February | 0 | 0 | 204 | 22 | 251 | 659 | 17,260 | 2,399 | 351 | 0 | 396 | 2,795 | 56,022 | 47,941 | 106,757 | 17,920 | 58,817 | 204 | 22 | 0 |
| | March | 0 | 0 | 248 | 27 | 295 | 792 | 21,185 | 2,961 | 415 | 0 | 470 | 3,431 | 68,701 | 58,682 | 130,815 | 21,977 | 72,132 | 248 | 27 | 0 |
| | April | 0 | 0 | 313 | 34 | 362 | 987 | 25,555 | 3,562 | 512 | 0 | 581 | 4,142 | 83,240 | 71,698 | 159,080 | 26,542 | 87,382 | 313 | 34 | 0 |
| | May | 0 | 0 | 144 | 16 | 172 | 461 | 15,415 | 2,199 | 242 | 0 | 274 | 2,473 | 49,881 | 42,839 | 95,193 | 15,876 | 52,354 | 144 | 16 | 0 |
| | June | 0 | 0 | 83 | 9 | 99 | 264 | 11,806 | 1,723 | 139 | 0 | 157 | 1,879 | 37,888 | 32,242 | 72,010 | 12,070 | 39,768 | 83 | 9 | 0 |
| | July | 0 | 0 | 34 | 4 | 35 | 103 | 9,077 | 1,371 | 51 | 0 | 58 | 1,429 | 28,872 | 24,440 | 54,741 | 9,180 | 30,301 | 34 | 4 | 0 |
| | August | 0 | 0 | 48 | 5 | 49 | 145 | 7,712 | 1,143 | 72 | 0 | 82 | 1,226 | 24,665 | 21,030 | 46,921 | 7,858 | 25,891 | 48 | 5 | 0 |
| | September | 0 | 0 | 135 | 15 | 137 | 406 | 13,044 | 1,879 | 202 | 0 | 232 | 2,111 | 41,866 | 35,464 | 79,441 | 13,451 | 43,977 | 135 | 15 | 0 |
| | October | 0 | 0 | 190 | 21 | 210 | 591 | 17,216 | 2,444 | 303 | 0 | 345 | 2,788 | 55,559 | 47,308 | 105,655 | 17,807 | 58,347 | 190 | 21 | 0 |
| | November | 0 | 0 | 288 | 32 | 344 | 920 | 19,355 | 2,622 | 484 | 0 | 547 | 3,170 | 63,176 | 54,145 | 120,490 | 20,275 | 66,345 | 288 | 32 | 0 |
| | December | 0 | 0 | 272 | 30 | 330 | 875 | 19,721 | 2,694 | 462 | 0 | 522 | 3,217 | 64,269 | 55,085 | 122,571 | 20,596 | 67,486 | 272 | 30 | 0 |
| Post-closure | January | 0 | 0 | 206 | 23 | 231 | 644 | 18,522 | 2,597 | 340 | 375 | 386 | 3,357 | 59,973 | 51,208 | 114,538 | 19,217 | 63,330 | 206 | 23 | 50.4 |
| | February | 0 | 0 | 204 | 22 | 233 | 641 | 17,263 | 2,399 | 340 | 381 | 385 | 3,166 | 56,027 | 47,951 | 107,144 | 17,954 | 59,193 | 204 | 22 | 50.4 |
| | March | 0 | 0 | 248 | 27 | 273 | 769 | 21,187 | 2,961 | 402 | 341 | 457 | 3,759 | 68,707 | 58,693 | 131,159 | 22,007 | 72,466 | 248 | 27 | 50.4 |
| | April | 0 | 0 | 313 | 34 | 333 | 958 | 25,558 | 3,562 | 495 | 313 | 564 | 4,439 | 83,246 | 71,709 | 159,393 | 26,566 | 87,685 | 313 | 34 | 50.4 |
| | May | 0 | 0 | 144 | 16 | 159 | 448 | 15,417 | 2,199 | 235 | 227 | 266 | 2,692 | 49,887 | 42,850 | 95,429 | 15,915 | 52,579 | 144 | 16 | 50.4 |
| | June | 0 | 0 | 83 | 9 | 91 | 257 | 11,809 | 1,723 | 134 | 144 | 152 | 2,019 | 37,894 | 32,253 | 72,166 | 12,116 | 39,913 | 83 | 9 | 50.4 |
| | July | 0 | 0 | 32 | 4 | 31 | 95 | 9,080 | 1,371 | 47 | 40 | 55 | 1,465 | 28,878 | 24,450 | 54,794 | 9,225 | 30,343 | 32 | 4 | 50.4 |
| | August | 0 | 0 | 40 | 4 | 43 | 123 | 7,715 | 1,143 | 63 | 74 | 72 | 1,289 | 24,671 | 21,041 | 47,001 | 7,888 | 25,960 | 40 | 4 | 50.4 |
| | September | 0 | 0 | 108 | 12 | 119 | 334 | 13,047 | 1,879 | 177 | 217 | 201 | 2,297 | 41,872 | 35,474 | 79,642 | 13,432 | 44,168 | 108 | 12 | 50.4 |
| | October | 0 | 0 | 170 | 19 | 189 | 529 | 17,218 | 2,444 | 279 | 297 | 316 | 3,057 | 55,564 | 47,319 | 105,940 | 17,798 | 58,621 | 170 | 19 | 50.4 |
| | November | 0 | 0 | 288 | 32 | 318 | 893 | 19,358 | 2,622 | 468 | 421 | 532 | 3,575 | 63,181 | 54,155 | 120,912 | 20,301 | 66,756 | 288 | 32 | 50.4 |
| | December | 0 | 0 | 272 | 30 | 305 | 850 | 19,723 | 2,694 | 448 | 435 | 508 | 3,637 | 64,275 | 55,096 | 123,007 | 20,624 | 67,912 | 272 | 30 | 50.4 |

*Note: * see flow diagrams*

# 5 WATER QUALITY INPUTS

## 5.1 CONTACT WATER

This section summarizes the water quality data used to define the source terms for the various contact waters associated with the Project. Source term concentrations are compared to water quality screening criteria developed for WS-10, which have lower guidelines for Cd, Cu, Mn, and Zn than WS-5 (Table 3-1).

### 5.1.1 Mine Rock Runoff and Seepage

The primary dataset selected to represent mine waste conditions is from two seeps located at the toe of the existing mine rock stockpile at AGS. Dissolved metal concentrations were used as mine rock inputs, based on the assumption that most of the suspended fraction will be removed at the sedimentation pond. The number of samples (n=4) did not cover all seasons; therefore, overall mean concentrations were used across seasons. This source term was applied to seepage during all project phases, as well as to runoff from uncovered rock during Operation and Closure.

All parameters were below the NFLD ECWSR 65/03 limits. Short-term CCME guideline exceedances include cadmium and zinc. Long-term guideline exceedances include fluoride, cadmium, cobalt, copper, and zinc. Cobalt concentrations in seeps and other source terms described in Section 5 were below detection limits (ranging from 0.002 to 0.001 mg/L), which are above the guideline (0.00078 mg/L) resulting in frequent exceedances in modelled results (Table 5-1).

### 5.1.2 Pit Dewatering

Pit dewatering water quality is represented by station WQ-STA-25 (Grebes Nest Pit sump discharge), which was reviewed and assumed representative of operational pit water chemistry. Concentrations of key metals (e.g., zinc, cadmium, copper) are consistent with expectations from geochemical characterization Falkirk (2026b). Total concentrations of metals were used due to lack of data on the dissolved fraction. Also, data from Center pit lake were used to supplement parameters where WQ-STA-25 data were limited (i.e. chloride, aluminum, cobalt, lead, manganese, mercury, molybdenum, strontium, thallium, and vanadium). Fluoride concentrations were sourced from the baseline groundwater concentrations (Falkirk 2026c). Due to the seasonal variability observed at WQ-STA-25 and in predicted nitrogen species concentrations, median concentrations of WQ-STA-25 data from March, June, September, and December were used to define the source terms representing spring, summer, fall, and winter conditions, respectively. Seasonal inputs of nitrate, ammonia and nitrite nitrogen were calculated as described in Section 3.2

Nitrate and nitrite nitrogen ($N\text{-}NO_3+NO_2$) could marginally exceed the NFLD ECWSR 65/03 limit of 10 mg/L between month 4 and 8 of operations depending on the calendar month (Appendix A). Short-term CCME guideline exceedances include cadmium and zinc in across all seasons. Long-term guideline exceedances occur for nitrate, nitrite, fluoride, arsenic, cadmium, cobalt, copper, lead, uranium, and zinc across all seasons. Long-term iron guideline is exceeded in winter and spring.

### 5.1.3 Pit Decanting

Closure pit water quality is expected to differ from operational conditions due to the cessation of blasting and dewatering. Grebes Nest Pit discharge (WQ-STA-25) and Grebes Nest Pit Lake (GNP) datasets were compared; while concentrations are generally similar, WQ-STA-25 shows higher nitrogen species, likely associated with explosives. For post-closure conditions, nitrogen species were preferentially taken from the GNP dataset, where nitrate concentrations are lower, consistent with post-blasting conditions. Data from the GNP were used to supplement parameters where WQ-STA-25 data were limited and include nitrogen species, chloride, aluminum, cobalt, lead, manganese, mercury, molybdenum, strontium, thallium, uranium, and vanadium. Fluoride concentrations were again sourced from the baseline groundwater concentrations (Falkirk 2026c). Total concentrations of metals were conservatively used as inputs. Seasonal source terms (monthly medians) were developed for this source term as some key parameters showed seasonal variability.

No exceedances of NFLD ECWSR 65/03 limit criteria were identified. Short-term guideline exceedances include cadmium and zinc during all seasons. Long-term guideline exceeded for fluoride, arsenic, cadmium, cobalt, copper, and zinc. Iron exceeded during winter and spring.

## 5.2 Non-Contact Water

Concentrations of non-contact water medians compared to water quality criteria as follows to be consistent with assessment of projections:

- Shoal Cove Pond water quality predictions were screened against criteria developed using ETMFs from WS-5.
- Local Runoff, East and West Branches of Salt Cove Brook were screened against criteria developed using ETMFs from WS-10.

### 5.2.1 Local Runoff, Overburden and Topsoil Stockpiles

Outside of the stockpile and pit footprints, the water quality of local site runoff reporting to the East Branch of Salt Cove Brook and Shoal Cove Ponds is represented by two sets of baseline samples recently collected from three locations around the proposed mine site as detailed in the Surface Water Quality Existing Conditions and Assessment (Falkirk 2026d). Drainage from overburden, topsoil, and mine rock stockpile cover, which will be constructed from these materials, is assumed to be similar to local runoff water quality which currently interacts with these materials that naturally cover the site.

Seasonal variability was not assessed due to the availability of a single sampling event. No exceedances of the NFLD ECWSR 65/03 limits or short-term CCME guideline were identified. Long-term guidelines exceeded for fluoride, cadmium, cobalt, and manganese. Similar to cobalt, cadmium concentrations were below detection limit (0.0003 mg/L), but this limit was above the long-term guideline of 0.00004 mg/L resulting in frequent exceedances of the screening criteria in non-contact waters discussed below (Table 5-1). Total concentrations were conservatively used, but dissolved metals were also available.

### 5.2.2 Shoal Cove Pond Upstream (WS-5)

Median seasonal values from existing monitoring data at WS-5 were used for non-contact flow #7 (Figure 2-1 to Figure 2-3) representing baseline drainage to Shoal Cove Pond (Table 5-1). A constant median fluoride concentration of 1.4 mg/L from the preliminary water quality baseline report for WS-5 was used (Golder Associates 2015). Long-term guideline exceedances were identified for fluoride, cadmium, and cobalt across all seasons, and copper in winter, fall and summer. Cadmium and cobalt exceedances are likely artifacts due to high detection limits.

### 5.2.3 Salt Cove Brook East Branch Upstream

Median values from existing monitoring data WQ-STA-27 were used for each season. Existing Fluoride data are not available at this station; therefore, current data from WS-10 and an estimate of 0.62 mg/L, obtained from the preliminary water quality baseline report (Golder Associates 2015) at WS-10, were used to fill the monitoring gap for this parameter. Long-term guideline exceedances were identified for fluoride, cadmium, and cobalt across all seasons. Cadmium and cobalt were screened because of high detection limits, which were conservative used as inputs for non-detects, as discussed above. Iron exceeded long-term guidelines in all seasons except spring.

### 5.2.4 Salt Cove Brook West Branch (WS-10)

Seasonal median values from existing monitoring data at WS-10 were developed to represent flow #14 (Figure 2-1 to Figure 2-3) with a constant fluoride median value (0.62 mg/L) obtained from Golder Associates (2015) to substitute months with missing existing monitoring data. Long-term guideline exceedances were identified for fluoride, cadmium, and cobalt across all seasons. Copper exceeded the guideline in winter and spring, and iron exceeded long-term the guideline in the fall. Similar to Shoal Cove Pond Upstream (WS-5) cadmium and cobalt exceedances are likely artifacts due to high detection limits.

**Table 5-1: Summary of Source Term Concentrations**

| | | | $Cl^-$ | $F^-$ | $NH_3$ | $NO_3$ | $NO_2$ | $NO_3+NO_2$ | Al[b] | As | Ba | B | Cd[b] | Cr[b] | Co[b] | Cu[b] | Fe[b] | Pb[b] | Mn[b] | Hg | Mo | Ni[b] | Se | Ag | Sr | Tl | U | V | Zn[b] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Guidelines** | | | mg/L | mg/L | mg/L | mg-N/L | mg-N/L | mg-N/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| **WS-5** | | Highest Detection Limit | - | - | 0.03 | 0.05 | 0.05 | 0.05 | - | 0.002 | - | 0.01 | 0.0003 | 0.002 | 0.001 | 0.002 | - | 0.0021 | - | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | - | 0.0001 | - | 0.002 | 0.005 |
| | | CCME Short-Term [a] | 640 | - | - | 124 | - | - | - | - | - | 29 | 0.00068 | - | - | - | - | - | 2.5 | - | - | - | - | - | - | - | 0.033 | - | 0.051 |
| | | Long-Term [a] | 120 | 0.12 | 5.69 | 2.9 | 0.06 | - | 0.67 | 0.005 | - | 1.5 | 0.000063 | 0.005 | 0.00078 | 0.00219 | 0.64 | 0.0093 | 0.38 | 0.000026 | 0.073 | 0.025 | 0.001 | 0.00025 | 2.5 | 0.0008 | 0.015 | 0.12 | 0.018 |
| | | NFLD Criteria | - | - | - | - | - | 10 | - | 0.5 | 5 | 5 | 0.05 | 0.05 | - | 0.3 | 10 | 0.2 | - | 0.005 | - | 0.5 | 0.01 | 0.05 | - | - | - | - | 0.5 |
| **WS-10** | | Highest Detection Limit | - | 0.1 | 0.05 | 0.05 | 0.01 | 0.05 | - | 0.002 | - | 0.05 | 0.0003 | 0.002 | 0.001 | 0.002 | - | 0.0005 | - | 0.000013 | 0.002 | 0.002 | 0.001 | 0.0001 | - | 0.0001 | - | 0.002 | 0.005 |
| | | CCME Short-Term [a] | 640 | - | - | 124 | - | - | - | - | - | 29 | 0.00034 | - | - | - | - | - | 2 | - | - | - | - | - | - | - | 0.033 | - | 0.028 |
| | | Long-Term [a] | 120 | 0.12 | 5.91 | 2.9 | 0.06 | - | 0.5 | 0.005 | - | 1.5 | 0.00004 | 0.005 | 0.00078 | 0.00104 | 0.59 | 0.0075 | 0.38 | 0.000026 | 0.073 | 0.025 | 0.001 | 0.00025 | 2.5 | 0.0008 | 0.015 | 0.12 | 0.013 |
| | | NFLD Criteria | - | - | 2.00 | - | - | 10 | - | 0.5 | 5 | 5 | 0.05 | 0.05 | - | 0.3 | 10 | 0.2 | - | 0.005 | - | 0.5 | 0.01 | 0.05 | - | - | - | - | 0.5 |
| **Parameter** | | | $Cl^-$ | $F^-$ | $NH_3$ | $NO_3$ | $NO_2$ | $NO_3+NO_2$ | Al[b] | As | Ba | B | Cd[b] | Cr[b] | Co[b] | Cu[b] | Fe[b] | Pb[b] | Mn[b] | Hg | Mo | Ni[b] | Se | Ag | Sr | Tl | U | V | Zn[b] |
| **Source Terms (Analog)** | **Flows** | **Phase** | Season | mg/L | mg/L | N-mg/L | mg-N/L | mg-N/L | mg-N/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| **Mine Rock Runoff** (AGS Seeps) | 3, 4 | Operation, closure | All-season median | 5.0 | 0.58 | 0.015 | 0.61 | 0.025 | 0.85 | 0.093 | 0.002 | 0.037 | 0.05 | **0.00059** | 0.001 | 0.0025 | 0.002 | 0.052 | 0.00095 | 0.081 | 0.000013 | 0.008 | 0.002 | 0.001 | 0.0001 | 0.1 | 0.0001 | 0.0031 | 0.002 | **0.042** |
| **Mine Rock Seepage** (AGS Seeps) | 18,19 | All phases | All-season median | 5.0 | 0.58 | 0.015 | 0.61 | 0.025 | 0.85 | 0.093 | 0.002 | 0.037 | 0.05 | **0.00059** | 0.001 | 0.0025 | 0.002 | 0.052 | 0.00095 | 0.081 | 0.000013 | 0.008 | 0.002 | 0.001 | 0.0001 | 0.1 | 0.0001 | 0.0031 | 0.002 | **0.042** |
| **Local and runoff overburden** | 5, 8, 9 | Operation | All-season median | 25 | 0.79 | 0.03 | 0.14 | 0.05 | 0.14 | 0.47 | 0.002 | 0.017 | 0.05 | 0.0003 | 0.002 | 0.002 | 0.001 | 0.21 | 0.0010 | 0.53 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.018 | 0.0001 | 0.0002 | 0.002 | 0.009 |
| **Mine rock cover** (See local runoff and overburden) | 3, 4 | Post-closure | All-season median | 25 | 0.79 | 0.03 | 0.14 | 0.05 | 0.14 | 0.47 | 0.002 | 0.017 | 0.05 | 0.0003 | 0.002 | 0.002 | 0.001 | 0.21 | 0.0010 | 0.53 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.018 | 0.0001 | 0.0002 | 0.002 | 0.009 |
| **Pit Dewatering** (Grebes Nest Pit + CP + South Ridge Groundwater) | 1, 2 | Operation | Fall | 15 | 1.8 | 0.1 | 12 | 0.28 | 12 | 0.06 | 0.012 | 0.091 | 0.019 | **0.00072** | 0.001 | 0.002 | 0.006 | 0.32 | 0.0078 | 0.01 | 0.000026 | 0.017 | 0.002 | 0.001 | 0.0001 | 0.31 | 0.0003 | 0.021 | 0.002 | **0.043** |
| | | | Winter | 15 | 1.8 | 0.1 | 11 | 0.24 | 11 | 0.06 | 0.014 | 0.11 | 0.015 | **0.00094** | 0.002 | 0.002 | 0.012 | 1.2 | 0.0078 | 0.01 | 0.000026 | 0.017 | 0.0035 | 0.001 | 0.0001 | 0.31 | 0.0003 | 0.021 | 0.002 | **0.11** |
| | | | Spring | 15 | 1.8 | 0.1 | 11 | 0.25 | 11.2 | 0.06 | 0.014 | 0.11 | 0.018 | **0.0011** | 0.0025 | 0.002 | 0.019 | 1.9 | 0.0078 | 0.01 | 0.000026 | 0.017 | 0.0045 | 0.001 | 0.0001 | 0.31 | 0.0003 | 0.021 | 0.002 | **0.14** |
| | | | Summer | 15 | 1.8 | 0.1 | 13 | 0.29 | 13 | 0.06 | 0.012 | 0.085 | 0.019 | **0.0006** | 0.001 | 0.002 | 0.010 | 0.56 | 0.0078 | 0.01 | 0.000026 | 0.017 | 0.004 | 0.001 | 0.0001 | 0.31 | 0.0003 | 0.021 | 0.002 | **0.087** |
| **Pit Decanting** (Grebes Nest Pit + GNP + South Ridge Groundwater) | 10, 20 | Post-closure | Fall | 14 | 1.8 | 0.02 | 2.3 | 0.05 | 2.3 | 0.1 | 0.012 | 0.091 | 0.019 | **0.00072** | 0.001 | 0.002 | 0.006 | 0.32 | 0.0054 | 0.016 | 0.000026 | 0.008 | 0.002 | 0.001 | 0.0001 | 0.2 | 0.0003 | 0.013 | 0.002 | **0.043** |
| | | | Winter | 14 | 1.8 | 0.02 | 2.3 | 0.05 | 2.3 | 0.1 | 0.014 | 0.11 | 0.015 | **0.00094** | 0.002 | 0.002 | 0.012 | 1.2 | 0.0054 | 0.016 | 0.000026 | 0.008 | 0.0035 | 0.001 | 0.0001 | 0.2 | 0.0003 | 0.013 | 0.002 | **0.11** |
| | | | Spring | 14 | 1.8 | 0.02 | 2.3 | 0.05 | 2.3 | 0.1 | 0.014 | 0.11 | 0.018 | **0.0011** | 0.0025 | 0.002 | 0.019 | 1.9 | 0.0054 | 0.016 | 0.000026 | 0.008 | 0.0045 | 0.001 | 0.0001 | 0.2 | 0.0003 | 0.013 | 0.002 | **0.14** |
| | | | Summer | 14 | 1.8 | 0.02 | 2.3 | 0.05 | 2.3 | 0.1 | 0.012 | 0.085 | 0.019 | **0.0006** | 0.001 | 0.002 | 0.010 | 0.56 | 0.0054 | 0.016 | 0.000026 | 0.008 | 0.004 | 0.001 | 0.0001 | 0.2 | 0.0003 | 0.013 | 0.002 | **0.087** |
| **Salt Cove Brook East Branch Upstream** (WQ-STA-27) | 13 | All phases | Fall | 6.0 | 0.62 | 0.03 | 0.05 | 0.05 | 0.05 | 0.18 | 0.002 | 0.012 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.001 | 1.4 | 0.001 | 0.076 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.011 | 0.0001 | 0.0002 | 0.002 | 0.005 |
| | | | Winter | 9.5 | 0.62 | 0.03 | 0.05 | 0.05 | 0.05 | 0.16 | 0.002 | 0.011 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.001 | 0.63 | 0.00055 | 0.046 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.0083 | 0.0001 | 0.0002 | 0.002 | 0.007 |
| | | | Spring | 8.0 | 0.62 | 0.03 | 0.05 | 0.05 | 0.05 | 0.13 | 0.002 | 0.009 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.001 | 0.25 | 0.0005 | 0.042 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.006 | 0.0001 | 0.0002 | 0.002 | 0.005 |
| | | | Summer | 8.0 | 0.73 | 0.03 | 0.05 | 0.05 | 0.05 | 0.18 | 0.002 | 0.011 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.001 | 0.65 | 0.0008 | 0.041 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.008 | 0.0001 | 0.0002 | 0.002 | 0.005 |
| **Shoal Cove Pond** (WS-5) | 7 | All phases | Fall | 16 | 1.4 | 0.035 | 0.05 | 0.05 | 0.05 | 0.16 | 0.002 | 0.19 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.0015 | 0.45 | 0.0029 | 0.082 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.044 | 0.0001 | 0.0015 | 0.002 | 0.005 |
| | | | Winter | 22 | 1.4 | 0.03 | 0.11 | 0.05 | 0.11 | 0.34 | 0.002 | 0.13 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.0025 | 0.45 | 0.0074 | 0.099 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.026 | 0.0001 | 0.00095 | 0.002 | 0.012 |
| | | | Spring | 20 | 1.4 | 0.03 | 0.11 | 0.05 | 0.11 | 0.4 | 0.002 | 0.084 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.001 | 0.23 | 0.003 | 0.072 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.021 | 0.0001 | 0.0006 | 0.002 | 0.007 |
| | | | Summer | 19 | 1.4 | 0.03 | 0.05 | 0.05 | 0.05 | 0.15 | 0.002 | 0.16 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.002 | 0.27 | 0.0027 | 0.079 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.036 | 0.0001 | 0.0014 | 0.002 | 0.005 |
| **Salt Cove Brook West Branch** (WS-10) | 14 | All phases | Fall | 12 | 0.62 | 0.05 | 0.05 | 0.05 | 0.05 | 0.19 | 0.002 | 0.036 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.001 | 0.87 | 0.0018 | 0.17 | 0.000026 | 0.011 | 0.002 | 0.001 | 0.00025 | 0.038 | 0.0001 | 0.0023 | 0.002 | 0.007 |
| | | | Winter | 12 | 0.62 | 0.04 | 0.08 | 0.05 | 0.08 | 0.27 | 0.002 | 0.029 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.0015 | 0.52 | 0.0025 | 0.11 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.025 | 0.0001 | 0.00095 | 0.002 | 0.0075 |
| | | | Spring | 13 | 0.62 | 0.03 | 0.075 | 0.05 | 0.075 | 0.23 | 0.002 | 0.021 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.0015 | 0.28 | 0.0018 | 0.092 | 0.000026 | 0.0065 | 0.002 | 0.001 | 0.00025 | 0.021 | 0.0001 | 0.0011 | 0.002 | 0.012 |
| | | | Summer | 11 | 0.73 | 0.045 | 0.09 | 0.05 | 0.09 | 0.27 | 0.002 | 0.026 | 0.002 | 0.0003 | 0.002 | 0.001 | 0.001 | 0.59 | 0.0023 | 0.083 | 0.000026 | 0.002 | 0.002 | 0.001 | 0.00025 | 0.027 | 0.0001 | 0.00085 | 0.002 | 0.008 |

*Notes:*
*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. See Section 3.3*
*b) Guidelines is dependant on one or more ETMF. Refer to Section 3.3 for details.*
*c) The guideline for hexavalent chromium was used total chromium.*
*Double-Underlined guidelines apply to the dissolved fraction*
*Bold values are above the short-term acute guidelines.*
*Grey shaded values are above the long-term chronic guidelines.*
*Underlined values are above the Newfoundland and Labrador Regulation 65/03 limit.*

# 6 WATER QUALITY ASSESSMENT

The results of the COPC screening for each assessment node are presented in the following sections and Table 6-1 to Table 6-6. The assessment identified parameters that are predicted to exceed water quality guidelines at discharge locations and in the receiving environment; however, an evaluation of the potential effects of any guidelines exceedances on aquatic health was not completed.

## 6.1 DISCHARGES

Projected concentrations of all parameters during all phases were below the NFLD ECWSR 65/03 limits at both discharge locations (i.e., East and West Pond outflows), except for nitrate + nitrite nitrogen in the West Pond. Concentrations of nitrate + nitrite nitrogen (10.5 mg-N/L) marginally exceed the limit of 10 mg-N/L in June during Operations; therefore, nitrate + nitrite nitrogen was identified as a COPC. Cadmium and zinc were also identified as COPCs in the discharge from both locations, as projected concentrations are above the short-term guidelines in one or more months during Operations (Table 6-1 and Table 6-2).

At the East pond outflow, cadmium and zinc were identified as a COPC in December and March (cadmium) and December, March, and June (zinc) during Operations only. During Operations the inputs to the East pond are pit dewatering, mine rock runoff and seepage, and local site runoff. Concentrations of cadmium and zinc in the pit dewatering and mine rock runoff and seepage are above the short-term guidelines (Section 5), resulting in the exceedances in the East pond outflow. During Closure, pit dewatering stops, and concentrations decrease to below the guidelines. During Post-closure, after the mine rock is covered and the site is rehabilitated, concentrations decrease further and are projected to remain below guidelines.

At the West pond outflow, the marginal exceedances of nitrate + nitrite nitrogen above NFLD ECWSR 65/03 limit have resulted from elevated nitrogen concentration in the mine water pumped from the pit. This exceedance can be mitigated by sending less mine water to the West Pond (40%) and more to the East pond (60%) rather than the 50:50 split assumed in the base case predictions. CFI will develop a monitoring and discharge plan to manage the portion of mine water going to the West Pond and East Pond such that exceedances for the NFLD ECWSR 65/03 limit would not be expected to occur.

Cadmium and zinc were identified as a COPC in all months during Operations only. Similar to the East pond, the West pond receives input from the pit dewatering, mine rock mine rock runoff and seepage, and local site runoff. With the exception of the local site runoff, the source terms for these inputs are above the short-term guidelines for cadmium and zinc (Section 5) resulting in the exceedances in the West pond outflow. During Closure, the pit dewatering to the West pond stops, and concentrations decrease to below the guidelines. During Post-closure, after the mine rock is covered and the site is rehabilitated, concentrations decrease further and are projected to remain below guidelines.

During Post-closure, pit lake becomes a discharge and decants to the Hares Ears pond. The pit lake water quality is discussed in Section 5.1.3.

**Table 6-1: Projected Water Quality Screening Results for East Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | East Pond Outflow | | | | COPC Screening | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Cadmium[(b)] | mg/L | 0.00068 | - | 0.05 | September | - | 0.00063 | 0.00049 | 0.00039 | - | - | - |
| | | | | | December | - | **0.00069** | 0.00048 | 0.00039 | **COPC** | - | - |
| | | | | | March | - | **0.00076** | 0.00048 | 0.00039 | **COPC** | - | - |
| | | | | | June | - | 0.00056 | 0.00048 | 0.00039 | - | - | - |
| Zinc[(b)] | mg/L | 0.051 | - | 0.5 | September | - | 0.039 | 0.031 | 0.02 | - | - | - |
| | | | | | December | - | **0.069** | 0.03 | 0.02 | **COPC** | - | - |
| | | | | | March | - | **0.081** | 0.03 | 0.02 | **COPC** | - | - |
| | | | | | June | - | **0.07** | 0.03 | 0.02 | **COPC** | - | - |

*Notes:*
*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.*
*b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.*
*Double-Underlined guidelines apply to the dissolved fraction.*
*Bold values are above the short-term acute guidelines.*
*COPC = constituent of potential concern; - = projected concentration is less than the screening value and/or existing conditions.*

**Table 6-2: Projected Water Quality Screening Results for West Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | West Pond Outflow | | | | COPC Screening | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 | September | - | 9.1 | 0.19 | 0.13 | - | - | - |
| | | | | | December | - | 6.4 | 0.18 | 0.13 | - | - | - |
| | | | | | March | - | 6.7 | 0.18 | 0.13 | - | - | - |
| | | | | | June | - | 10.5 | 0.18 | 0.13 | **COPC** | - | - |
| Cadmium[(b)] | mg/L | 0.00034 | - | 0.05 | September | - | **0.00061** | 0.00032 | 0.00028 | **COPC** | - | - |
| | | | | | December | - | **0.00066** | 0.00032 | 0.00028 | **COPC** | - | - |
| | | | | | March | - | **0.00076** | 0.00032 | 0.00028 | **COPC** | - | - |
| | | | | | June | - | **0.00054** | 0.00032 | 0.00028 | **COPC** | - | - |
| Zinc[(b)] | mg/L | 0.028 | - | 0.5 | September | - | **0.034** | 0.011 | 0.0085 | **COPC** | - | - |
| | | | | | December | - | **0.07** | 0.011 | 0.0085 | **COPC** | - | - |
| | | | | | March | - | **0.087** | 0.011 | 0.0085 | **COPC** | - | - |
| | | | | | June | - | **0.071** | 0.011 | 0.0085 | **COPC** | - | - |

*Notes:*
*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.*
*b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.*
*Double-Underlined guidelines apply to the dissolved fraction.*
*Bold values are above the short-term acute guidelines.*
*Underlined values are above the Newfoundland and Labrador Regulation 65/03 limit.*
*COPC = constituent of potential concern; - = projected concentration is less than the screening value and/or existing conditions.*

## 6.2 RECEIVING ENVIRONMENT

### 6.2.1 Shoal Cove Pond Outflow (WS-5)

Projected concentrations of all parameters during all phases are below the short-term guidelines and NFLD ECWSR 65/03 limits at the Shoal Cove Pond Outflow. Nitrite and copper were identified as COPCs at this location, as projected concentrations are above the long-term guidelines and existing conditions in one or more month during Operations (Table 6-3).

During operations, surface water quality at the Shoal Cove Pond Outflow assessment location is represented by a combination of the discharge from the East Pond and the existing data collected at WS-5. Concentrations of nitrite and copper are projected to be above the long-term guidelines and existing conditions by more than 10% in June (nitrite and copper) and December (copper).

The existing conditions concentrations of fluoride, cadmium, and cobalt at WS-5 are above the long-term guidelines in all months, and these exceedances persist in the projected concentrations throughout all phases. These constituents were not identified as COPCs because the projected concentrations are within 10% of existing conditions during all phases. It should be noted the detection limits for cadmium and cobalt in the existing conditions data above the respective long-term guidelines, which contributes to the uncertainty in the projections for these parameters.

### 6.2.2 Hares Ears Pond Outflow

Projected concentrations of all parameters during all phases are below the short-term guidelines and NFLD ECWSR 65/03 limits at the Hare Ears Pond Outflow, except for cadmium and zinc concentrations which are above the short-term guidelines in one or more phase. Fluoride, nitrate, nitrite, cadmium, copper, and zinc were identified as COPCs at this location, as projected concentrations are above the long-term guidelines in at least one month and Project phase (Table 6-4).

Existing conditions at Hares Ears Pond is represented by the local site runoff source term (Section 5.2.1); during Operations and Closure, surface water quality at the Hare Ears Pond Outflow assessment location is represented by a combination of the discharge from the West Pond and local site runoff; during Post-closure, Hares Ears Pond also receives pit decanting. Concentrations of fluoride, cadmium, cobalt, and manganese in these sources are above the short-term (cadmium) and long-term guidelines, resulting in the exceedances at this assessment location. Cobalt and manganese were not identified as COPCs as the projected concentrations are equal to or less than existing conditions. Fluoride and cadmium were identified as COPCs in all months during operations and in September and December during Post-closure. It should be noted the detection limits for cadmium and cobalt in the local site runoff are above the respective long-term guidelines, which contributes to the uncertainty in the projections for these parameters.

Nitrate was identified as a COPC in June during Operations and nitrite was identified as COPCs in all months during Operations. The exceedances are primarily the result of the concentrations in pit dewatering, which are above the guideline throughout Operations. Copper is a COPC in all months during Operations and Post-closure and zinc is a COPC in all months during Operations and three months during Post-closure. The exceedances of copper and zinc are a result of the elevated concentrations, relative to

the guidelines, in the discharge from the West Pond during Operations and the pit decanting during Post-closure.

### 6.2.3 East Branch of Salt Cove Brook

Projected concentrations of all parameters during all phases are below the short-term guidelines and NFLD ECWSR 65/03 limits at the East Branch Salt Cove Brook location.

Surface water quality at the East Branch Salt Cove Brook (flow #17 in Figure 2-1) assessment location is represented by a combination of the discharge from the Hare Ears Pond Outflow and existing data collected at WQ-STA-27. Concentrations of fluoride, cadmium, and cobalt in the existing conditions data at WQ-STA-27 are above the long-term guidelines, and these exceedances persist in the projected concentrations throughout all phases. However, these constituents were not identified as COPCs because the projected concentrations are within 10% of the existing conditions concentrations at this location. Similarly, concentrations of iron are above the long-term guideline in three months of all Project phases but are within 10% of existing conditions and therefore not a COPC. Copper was identified as a COPC in all months during Operations and two months during Post-Closure. (Table 6-5).

### 6.2.4 Salt Cove Brook (WS-10)

Projected concentrations of all parameters during all phases are below the short-term guidelines and NFLD ECWSR 65/03 limits at the Salt Cove Brook Outflow. Copper and iron were identified as COPCs at this location, as projected concentrations are long-term guidelines in at least one month and Project phase (Table 6-6).

Surface water quality at the Salt Cove Brook Outflow assessment location is represented by a combination of the discharge from the Hare Ears Pond Outflow, East Branch Salt of Cove Brook, and existing data collected at WS-10. The existing conditions concentrations of fluoride, cadmium, cobalt, and copper at WS-10 are above the long-term guidelines in two or more months, and these exceedances persist in the projected concentrations throughout all phases. Concentrations of fluoride, cadmium, and cobalt are projected to be above the long-term guideline during all Project phases; however, all projected concentrations are within 10% of existing conditions. For this reason, these constituents were not identified as a COPCs. Similar to Hares Ears Pond, detection limits for cadmium and cobalt in the existing conditions data at WS-10 are above the long-term guidelines, which contributes to the uncertainty in the projections. Copper was identified as COPC in June during Operations as projected concentrations are above the long-term guideline and existing conditions (which are below the guideline). Iron was identified as a COPC in two months (September and June) in all modelled phases. Iron concentrations at this location in September may be overpredicted due to the conservatively high iron source term value assumed for the East Branch Salt of Cove Brook. Future water quality monitoring of East Branch Salt of Cove Brook should verify predictions and COPC screening for Salt of Cove Brook.

**Table 6-3: Projected Water Quality Screening Results for Shoal Cove Pond Outflow (WS-5)**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Shoal Cove Pond Outflow (WS-5) | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Fluoride | mg/L | - | 0.12 | - | September | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | 0% | -2% | -2% |
| | | | | | December | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | -1% | -2% | -2% |
| | | | | | March | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | -1% | -2% | -2% |
| | | | | | June | 1.4 | 1.4 | 1.4 | 1.4 | SV | - | - | 0.2% | -1% | -1% |
| Nitrite | mg-N/L | - | 0.06 | - | September | 0.05 | 0.059 | 0.05 | 0.05 | - | - | - | 19% | -1% | -1% |
| | | | | | December | 0.05 | 0.056 | 0.049 | 0.05 | - | - | - | 11% | -1% | -1% |
| | | | | | March | 0.05 | 0.055 | 0.049 | 0.05 | - | - | - | 11% | -1% | -1% |
| | | | | | June | 0.05 | 0.061 | 0.05 | 0.05 | **COPC** | - | - | 22% | -1% | -1% |
| Cadmium[(b)] | mg/L | 0.00068 | 0.000063 | 0.05 | September | 0.0003 | 0.00032 | 0.00031 | 0.0003 | SV | SV | SV | 8% | 2% | 0% |
| | | | | | December | 0.0003 | 0.00033 | 0.00031 | 0.0003 | SV | SV | SV | 9% | 3% | 1% |
| | | | | | March | 0.0003 | 0.00033 | 0.00031 | 0.0003 | SV | SV | SV | 10% | 2% | 1% |
| | | | | | June | 0.0003 | 0.00032 | 0.0003 | 0.0003 | SV | SV | SV | 6% | 1% | 0% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 8% | 4% | 3% |
| | | | | | December | 0.001 | 0.0011 | 0.0011 | 0.001 | SV | SV | SV | 9% | 6% | 5% |
| | | | | | March | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 8% | 5% | 4% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 7% | 3% | 2% |
| Copper[(b)] | mg/L | - | 0.00219 | 0.3 | September | 0.0015 | 0.0017 | 0.0015 | 0.0015 | - | - | - | 14% | 0% | -1% |
| | | | | | December | 0.0025 | 0.0028 | 0.0025 | 0.0024 | **COPC** | - | - | 11% | -1% | -2% |
| | | | | | March | 0.001 | 0.0016 | 0.001 | 0.001 | - | - | - | 57% | 2% | 1% |
| | | | | | June | 0.002 | 0.0024 | 0.002 | 0.002 | **COPC** | - | - | 18% | 0% | -1% |

*Notes:*

*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.*

*b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.*

*Double-Underlined guidelines apply to the dissolved fraction.*

*Grey shaded values are above the long-term chronic guidelines.*

*COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value, but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.*

**Table 6-4: Projected Water Quality Screening Results for Hares Ears Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Hares Ears Outflow | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Fluoride | mg/L | - | 0.12 | - | September | 0.79 | 1.0 | 0.79 | 0.9 | **COPC** | - | **COPC** | 28% | 0% | 14% |
| | | | | | December | 0.79 | 0.96 | 0.79 | 0.91 | **COPC** | - | **COPC** | 22% | 0% | 15% |
| | | | | | March | 0.79 | 0.95 | 0.79 | 0.86 | **COPC** | - | SV | 20% | 0% | 9% |
| | | | | | June | 0.79 | 1.0 | 0.79 | 0.86 | **COPC** | - | SV | 29% | 0% | 9% |
| Nitrate | mg-N/L | 124 | 2.9 | - | September | 0.14 | 2.8 | 0.14 | 0.37 | - | - | - | 1935% | 2% | 162% |
| | | | | | December | 0.14 | 2.0 | 0.14 | 0.43 | - | - | - | 1345% | 3% | 208% |
| | | | | | March | 0.14 | 1.9 | 0.14 | 0.35 | - | - | - | 1281% | 3% | 151% |
| | | | | | June | 0.14 | 3.1 | 0.14 | 0.31 | **COPC** | - | - | 2145% | 2% | 119% |
| Nitrite | mg-N/L | - | 0.06 | - | September | 0.05 | 0.1 | 0.05 | 0.05 | **COPC** | - | - | 102% | 0% | 1% |
| | | | | | December | 0.05 | 0.084 | 0.05 | 0.049 | **COPC** | - | - | 68% | 0% | -2% |
| | | | | | March | 0.05 | 0.083 | 0.05 | 0.048 | **COPC** | - | - | 65% | 0% | -3% |
| | | | | | June | 0.05 | 0.11 | 0.05 | 0.05 | **COPC** | - | - | 114% | 0% | 0% |
| Cadmium[(b)] | mg/L | 0.00034 | 0.00004 | 0.05 | September | 0.0003 | **0.0004** | 0.0003 | **0.00035** | **COPC** | SV | **COPC** | 32% | 1% | 15% |
| | | | | | December | 0.0003 | **0.00041** | 0.0003 | **0.00038** | **COPC** | SV | **COPC** | 38% | 1% | 26% |
| | | | | | March | 0.0003 | **0.00043** | 0.0003 | **0.00037** | **COPC** | SV | **COPC** | 43% | 1% | 22% |
| | | | | | June | 0.0003 | **0.00037** | 0.0003 | 0.00032 | **COPC** | SV | SV | 24% | 0% | 7% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.002 | 0.002 | 0.002 | 0.002 | - | SV | SV | 0% | 0% | 1% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | SV | - | -1% | 0% | -2% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.0019 | - | SV | - | 0% | 0% | -3% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | SV | - | 0% | 0% | 0% |
| Copper[(b)] | mg/L | - | 0.00104 | 0.3 | September | 0.001 | 0.0021 | 0.001 | 0.0015 | **COPC** | - | **COPC** | 113% | 1% | 53% |
| | | | | | December | 0.001 | 0.003 | 0.001 | 0.0025 | **COPC** | - | **COPC** | 198% | 1% | 147% |
| | | | | | March | 0.001 | 0.004 | 0.001 | 0.0028 | **COPC** | - | **COPC** | 302% | 1% | 176% |
| | | | | | June | 0.001 | 0.0031 | 0.001 | 0.0017 | **COPC** | - | **COPC** | 213% | 0% | 69% |
| Manganese[(b)] | mg/L | 2 | 0.38 | - | September | 0.53 | 0.41 | 0.53 | 0.48 | - | - | - | -23% | -1% | -9% |
| | | | | | December | 0.53 | 0.43 | 0.52 | 0.45 | - | - | - | -19% | -1% | -15% |
| | | | | | March | 0.53 | 0.44 | 0.53 | 0.46 | - | - | - | -18% | -1% | -13% |
| | | | | | June | 0.53 | 0.4 | 0.53 | 0.49 | - | - | - | -24% | 0% | -8% |
| Zinc[(b)] | mg/L | 0.028 | 0.013 | 0.5 | September | 0.009 | 0.017 | 0.0092 | 0.013 | **COPC** | - | - | 87% | 3% | 40% |
| | | | | | December | 0.009 | **0.028** | 0.0093 | 0.023 | **COPC** | - | **COPC** | 213% | 3% | 157% |
| | | | | | March | 0.009 | **0.031** | 0.0093 | 0.022 | **COPC** | - | **COPC** | 243% | 3% | 140% |
| | | | | | June | 0.009 | 0.028 | 0.0092 | 0.015 | **COPC** | - | **COPC** | 206% | 2% | 66% |

*Notes:*
*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.*
*b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.*
*Double-Underlined guidelines apply to the dissolved fraction. Bold values are above the short-term acute guidelines. Grey shaded values are above the long-term chronic guidelines.*
*COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value, but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.*

**Table 6-5: Projected Water Quality Screening Results for East Branch of Salt Cove Brook**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | East Branch Salt Cove Brook | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Fluoride | mg/L | - | 0.12 | - | September | 0.62 | 0.64 | 0.63 | 0.63 | SV | SV | SV | 4% | 1% | 2% |
| | | | | | December | 0.62 | 0.64 | 0.63 | 0.63 | SV | SV | SV | 3% | 1% | 2% |
| | | | | | March | 0.62 | 0.64 | 0.63 | 0.63 | SV | SV | SV | 3% | 1% | 2% |
| | | | | | June | 0.73 | 0.75 | 0.73 | 0.74 | SV | SV | SV | 2% | 0% | 1% |
| Cadmium[(b)] | mg/L | 0.00034 | 0.00004 | 0.05 | September | 0.0003 | 0.00031 | 0.0003 | 0.0003 | SV | SV | SV | 2% | 0% | 1% |
| | | | | | December | 0.0003 | 0.00031 | 0.0003 | 0.0003 | SV | SV | SV | 2% | 0% | 1% |
| | | | | | March | 0.0003 | 0.00031 | 0.0003 | 0.0003 | SV | SV | SV | 2% | 0% | 1% |
| | | | | | June | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 0% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 5% |
| | | | | | December | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 5% |
| | | | | | March | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 4% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 5% |
| Copper[(b)] | mg/L | - | 0.00104 | 0.3 | September | 0.001 | 0.0011 | 0.001 | 0.001 | **COPC** | - | - | 7% | 0% | 3% |
| | | | | | December | 0.001 | 0.0011 | 0.001 | 0.0011 | **COPC** | - | **COPC** | 11% | 0% | 7% |
| | | | | | March | 0.001 | 0.0012 | 0.001 | 0.0011 | **COPC** | - | **COPC** | 17% | 0% | 8% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | **COPC** | - | - | 13% | 0% | 3% |
| Iron[(b)] | mg/L | - | 0.59 | 10 | September | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | -5% | -4% | -4% |
| | | | | | December | 0.63 | 0.62 | 0.61 | 0.62 | - | - | - | -2% | -3% | -2% |
| | | | | | March | 0.25 | 0.26 | 0.25 | 0.26 | - | - | - | 6% | -1% | 2% |
| | | | | | June | 0.65 | 0.63 | 0.63 | 0.63 | - | - | - | -3% | -3% | -3% |

*Notes:*

*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.*

*b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.*

*Double-Underlined guidelines apply to the dissolved fraction.*

*Grey shaded values are above the long-term chronic guidelines.*

*COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value, but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.*

**Table 6-6: Projected Water Quality Screening Results for Salt Cove Brook (WS-10)**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Salt Cove Brook Outflow (WS-10) | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Fluoride | mg/L | - | 0.12 | - | September | 0.62 | 0.63 | 0.62 | 0.63 | SV | SV | SV | 2% | 1% | 1% |
| | | | | | December | 0.62 | 0.63 | 0.62 | 0.63 | SV | SV | SV | 2% | 1% | 1% |
| | | | | | March | 0.62 | 0.63 | 0.62 | 0.63 | SV | SV | SV | 2% | 1% | 1% |
| | | | | | June | 0.73 | 0.74 | 0.73 | 0.73 | SV | SV | SV | 1% | 0% | 0% |
| Cadmium[(b)] | mg/L | 0.00034 | 0.00004 | 0.05 | September | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 0% |
| | | | | | December | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 1% |
| | | | | | March | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 1% |
| | | | | | June | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 0% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 3% |
| | | | | | December | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 2% |
| | | | | | March | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 2% |
| | | | | | June | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 3% |
| Copper[(b)] | mg/L | - | 0.00104 | 0.3 | September | 0.001 | 0.001 | 0.001 | 0.001 | - | - | - | 4% | 0% | 1% |
| | | | | | December | 0.0015 | 0.0013 | 0.0012 | 0.0013 | - | - | - | -14% | -18% | -16% |
| | | | | | March | 0.0015 | 0.0013 | 0.0012 | 0.0013 | - | - | - | -12% | -18% | -15% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | **COPC** | - | - | 7% | 0% | 2% |
| Iron[(b)] | mg/L | - | 0.59 | 10 | September | 0.87 | 1.1 | 1.1 | 1.1 | **COPC** | **COPC** | **COPC** | 31% | 32% | 32% |
| | | | | | December | 0.52 | 0.57 | 0.57 | 0.57 | - | - | - | 10% | 10% | 10% |
| | | | | | March | 0.28 | 0.27 | 0.26 | 0.26 | - | - | - | -2% | -5% | -4% |
| | | | | | June | 0.59 | 0.61 | 0.61 | 0.61 | **COPC** | **COPC** | **COPC** | 4% | 4% | 4% |

*Notes:*

*a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up-to-date guideline than the corresponding CCME value.*

*b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.*

*Double-Underlined guidelines apply to the dissolved fraction.*

*Grey shaded values are above the long-term chronic guidelines.*

*COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value, but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.*

# 7 CONCLUSIONS

Projected concentrations of all parameters during all phases were below the NFLD ECWSR 65/03 limits in the discharge of East and West Ponds, except for nitrate + nitrite nitrogen in the West Pond. Concentrations of nitrate + nitrite nitrogen (10.5 mg/L) marginally exceed the NFLD ECWSR 65/03 limit of 10 mg/L in June during Operations and therefore was identified as a COPC. CFI will develop a monitoring and discharge plan to manage the portion of mine water going to the West Pond and East Pond such that exceedances for the NFLD ECWSR 65/03 limit would not be expected to occur.

Cadmium and zinc were identified as COPCs at both locations, as projected concentrations are above the short-term guidelines as follows:

- East Pond Outflow:
  - Cadmium – December and March during Operations.
  - Zinc – December, March, and June during Operations.
- West Pond Outflow:
  - Cadmium and zinc– all months during Operations.

Further assessment of the short-term guideline exceedances in the discharge is required to evaluate the potential effects to aquatic life.

In the receiving environment, projected concentrations of all parameters during all phases were below the NFLD ECWSR 65/03 limits and the short-term guidelines, with the exception of cadmium and zinc which exceeded the short-term guidelines as follows:

- Hares Ears Pond Outflow:
  - Cadmium – all months during Operations, and September, December, and March during Post-closure.
  - Zinc – December and March during Operations

The following COPCs were identified at the receiving environment locations, as projected concentrations are above the long-term guidelines and above existing conditions.

- Shoal Cove Pond Outflow (WS-5):
  - Nitrite – June during Operations
  - Copper – December and June during Operations
- Hares Ears Pond Outflow:
  - Fluoride – all months during Operations and September and December during Post-closure
  - Nitrate – June during Operations
  - Nitrite – all months during Operations
  - Cadmium – all months during Operations and September, December, and March during Post-closure
  - Copper – all months during Closure and Post-closure
  - Zinc – all months during Operations and December, March, and June during Post-closure

- East Branch of Salt Cove Brook:
  - Copper – all months during Operations and December and March during Post-closure
- Salt Cove Brook (WS-10):
  - Copper – June during Operations
  - Iron – September and June during all phases

Elevated detection limits above long-term guidelines and a high percentage of non-detect data in the existing conditions and source terms data, particularly for cadmium and cobalt, contributed to the projected long-term guideline exceedances and overall uncertainty in the projections of these parameters. Further assessment of the short-term and long-term guideline exceedances is required to evaluate the potential risks to aquatic life.

# 8 RECOMMENDATIONS

Considering the results of this water quality modelling program, the following recommendations are provided:

- Incorporate the monitoring and management of quality of discharges into the water management plan, such that the discharges are expected to remain below the NFLD ECWSR 65/03 limits.
- Refine the understanding of existing site conditions including the collection of additional data as listed below:
  - Improve existing surface water quality dataset by collecting additional samples at locations throughout the study area and seepage analogs at AGS.
  - Analyze samples with detection limits below the CCME and FEQG guidelines for the protection of aquatic life.
    Continue laboratory and field kinetic tests to verify seepage quality from mine rock.

# 9 STUDY LIMITATIONS

It is important to acknowledge certain limitations inherent in the process of preparing technical documents. This section aims to outline some limitations and provide transparency into the potential impact on the findings and conclusions presented herein. It is recommended that readers of this report consider these limitations while interpreting and applying the information presented. Future investigations or additional studies may be necessary to further explore and validate the findings and overcome these limitations.

**Scope and Generalizability**: Every effort has been made by Falkirk Environmental Consultants Ltd. (Falkirk) to conduct a thorough and accurate study. No warranty, express or implied, is made. Results presented in this document may not be applicable in all circumstances or settings and should be limited to the spatial and temporal scope presented alone. Variations in conditions, resources, and contextual factors could influence outcomes and conclusions.

**Data Limitations**: The findings and recommendations presented in this document are based on data provided to Falkirk, which may extend outside any data collected and analyzed within the defined scope of work. The accuracy and reliability of the study rely on the quality and availability of data. While efforts

are made to verify data integrity, certain limitations such as data accessibility, accuracy, or completeness may influence the analysis and subsequent findings.

**Assumptions, Estimations, and Methods**: In situations where specific data points or information are unavailable, certain assumptions and estimations are made. These assumptions are based on available knowledge and expertise at the time of analysis, recognizing that variations in these assumptions could potentially affect the accuracy of the results. The study was conducted using recognized standard practices, engineering, and scientific methods. However, limitations inherent to these methods, such as sample size, bias, or measurement errors, could impact the reliability and validity of the findings.

**Duty of Care and Professional Standards**: This study has been conducted in adherence to the code of practice outlined by professional engineering and scientific associations, by exercising a level of care and skill consistent with the members of the science and engineering professions practising under similar conditions in the jurisdiction where the services are provided. However, it is important to recognize that even with the application of standard practices, unforeseen circumstances or human error may introduce limitations to the findings and conclusions presented.

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**Contractual Agreements**: It is important to note that nothing in the Study Limitations section will supersede clauses in existing contractual agreements, including but not limited to Master Service Agreements, Work Authorizations, and Purchase Orders that govern the scope of work outlined in this report. Any conflicting terms and conditions defined in these agreements take precedence.

# 10 CLOSURE

We trust this Report meets your present requirements. Please do not hesitate to contact the undersigned should you have any questions.

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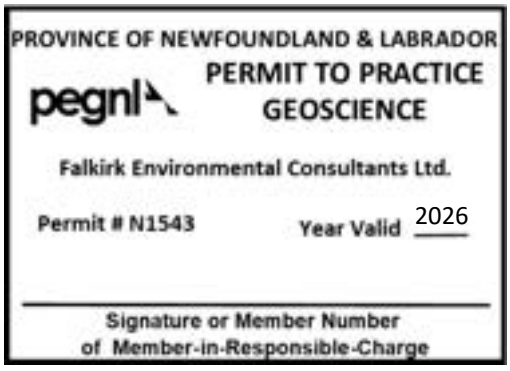

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# APPENDIX A. PREDICTED CONCENTRATIONS OF NITROGEN SPECIES

APPENDIX A. PREDICTED CONCENTRATIONS OF NITROGEN SPECIES

| Month of operations | Unit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pit Material Movement** | | | | | | | | | | | | | | | | | | | |
| **Ore** | wmt | 489 | 15,202 | 47,562 | 45,539 | 60,816 | 41,285 | 84,433 | 72,789 | 109,106 | 95,715 | 35,935 | 73,019 | 43,570 | 47,356 | 45,525 | 57,434 | 28,047 | 109,106 |
| **Mine rock** | wmt | 30,106 | 118,687 | 186,337 | 417,496 | 438,621 | 521,672 | 510,567 | 497,211 | 280,894 | 256,701 | 124,065 | 76,981 | 116,430 | 62,644 | 64,475 | 52,566 | 22,269 | 521,672 |
| **Ore** | dry tonnes | 474 | 14,746 | 46,135 | 44,173 | 58,992 | 40,046 | 81,900 | 70,605 | 105,833 | 92,844 | 34,857 | 70,828 | 42,263 | 45,935 | 44,159 | 55,711 | 27,206 | 105,833 |
| **Mine rock** | dry tonnes | 29,203 | 115,126 | 180,747 | 404,971 | 425,462 | 506,022 | 495,250 | 482,295 | 272,467 | 249,000 | 120,343 | 74,672 | 112,937 | 60,765 | 62,541 | 50,989 | 21,601 | 506,022 |
| **Total tonnage** | dry tonnes | 29,677 | 129,872 | 226,882 | 449,144 | 484,454 | 546,068 | 577,150 | 552,900 | 378,300 | 341,844 | 155,200 | 145,500 | 155,200 | 106,700 | 106,700 | 106,700 | 48,807 | 611,855 |
| **Pit lost** | N kg/mon | 24 | 104 | 183 | 360 | 389 | 437 | 464 | 444 | 306 | 277 | 125 | 119 | 126 | 87 | 87 | 87 | 40 | 464 |
| Pit N-total March | mg/L | 0.6 | 2.5 | 4.4 | 8.7 | 9.4 | 10.5 | 11.2 | 10.7 | 7.4 | 6.7 | 3.0 | 2.9 | 3.0 | 2.1 | 2.1 | 2.1 | 1.0 | 11.2 |
| Pit N-ammonia March | mg/L | 0.01 | 0.03 | 0.05 | 0.09 | 0.10 | 0.11 | 0.12 | 0.11 | 0.08 | 0.07 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.12 |
| Pit N-nitrate March | mg/L | 0.6 | 2.4 | 4.3 | 8.4 | 9.1 | **10.2** | **10.8** | **10.4** | 7.1 | 6.4 | 2.9 | 2.8 | 2.9 | 2.0 | 2.0 | 2.0 | 0.9 | **10.8** |
| Pit N-nitrite March | mg/L | 0.01 | 0.06 | 0.10 | 0.19 | 0.21 | 0.23 | 0.25 | 0.24 | 0.16 | 0.15 | 0.07 | 0.06 | 0.07 | 0.05 | 0.05 | 0.05 | 0.02 | 0.25 |
| Pit N-total April | mg/L | 0.5 | 2.4 | 4.2 | 8.2 | 8.8 | 9.9 | 10.5 | 10.1 | 7.0 | 6.3 | 2.8 | 2.7 | 2.9 | 2.0 | 2.0 | 2.0 | 0.9 | 10.5 |
| Pit N-ammonia April | mg/L | 0.01 | 0.02 | 0.04 | 0.09 | 0.09 | 0.10 | 0.11 | 0.11 | 0.07 | 0.07 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.11 |
| Pit N-nitrate April | mg/L | 0.5 | 2.3 | 4.0 | 7.9 | 8.6 | 9.6 | **10.2** | 9.8 | 6.7 | 6.1 | 2.8 | 2.6 | 2.8 | 1.9 | 1.9 | 1.9 | 0.9 | **10.2** |
| Pit N-nitrate April | mg/L | 0.01 | 0.05 | 0.09 | 0.18 | 0.20 | 0.22 | 0.23 | 0.22 | 0.15 | 0.14 | 0.06 | 0.06 | 0.06 | 0.04 | 0.04 | 0.04 | 0.02 | 0.23 |
| Pit N-total May | mg/L | 0.6 | 2.8 | 4.9 | 9.6 | 10.4 | 11.7 | 12.4 | 11.9 | 8.2 | 7.4 | 3.3 | 3.2 | 3.4 | 2.3 | 2.3 | 2.3 | 1.1 | 12.4 |
| Pit N-ammonia May | mg/L | 0.01 | 0.03 | 0.05 | 0.10 | 0.11 | 0.12 | 0.13 | 0.12 | 0.09 | 0.08 | 0.04 | 0.03 | 0.04 | 0.02 | 0.02 | 0.02 | 0.01 | 0.13 |
| Pit N-nitrate May | mg/L | 0.6 | 2.7 | 4.7 | 9.3 | **10.0** | **11.3** | **12.0** | **11.5** | 7.9 | 7.1 | 3.2 | 3.1 | 3.2 | 2.2 | 2.2 | 2.3 | 1.0 | **12.0** |
| Pit N-nitrate May | mg/L | 0.01 | 0.06 | 0.11 | 0.21 | 0.23 | 0.26 | 0.27 | 0.26 | 0.18 | 0.16 | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 | 0.05 | 0.02 | 0.27 |
| Pit N-total June | mg/L | 0.7 | 3.0 | 5.2 | 10.3 | 11.1 | 12.5 | 13.2 | 12.7 | 8.7 | 7.9 | 3.6 | 3.4 | 3.6 | 2.5 | 2.5 | 2.5 | 1.1 | 13.2 |
| Pit N-ammonia June | mg/L | 0.01 | 0.03 | 0.05 | 0.11 | 0.12 | 0.13 | 0.14 | 0.13 | 0.09 | 0.08 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.01 | 0.14 |
| Pit N-nitrate June | mg/L | 0.7 | 2.9 | 5.0 | 9.9 | **10.7** | **12.1** | **12.8** | **12.3** | 8.5 | 7.6 | 3.5 | 3.3 | 3.5 | 2.4 | 2.4 | 2.4 | 1.1 | **12.8** |
| Pit N-nitrate June | mg/L | 0.01 | 0.07 | 0.12 | 0.23 | 0.25 | 0.28 | 0.29 | 0.28 | 0.19 | 0.17 | 0.08 | 0.08 | 0.08 | 0.05 | 0.05 | 0.06 | 0.03 | 0.29 |
| Pit N-total July | mg/L | 0.7 | 3.1 | 5.5 | 10.9 | 11.7 | 13.2 | 14.0 | 13.4 | 9.2 | 8.3 | 3.8 | 3.6 | 3.8 | 2.6 | 2.6 | 2.6 | 1.2 | 14.0 |
| Pit N-ammonia July | mg/L | 0.01 | 0.03 | 0.06 | 0.11 | 0.12 | 0.14 | 0.15 | 0.14 | 0.10 | 0.09 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.01 | 0.15 |
| Pit N-nitrate July | mg/L | 0.7 | 3.0 | 5.3 | **10.5** | **11.3** | **12.8** | **13.5** | **13.0** | 8.9 | 8.1 | 3.7 | 3.5 | 3.7 | 2.5 | 2.5 | 2.6 | 1.2 | **13.5** |
| Pit N-nitrate July | mg/L | 0.02 | 0.07 | 0.12 | 0.24 | 0.26 | 0.29 | 0.31 | 0.30 | 0.20 | 0.18 | 0.08 | 0.08 | 0.08 | 0.06 | 0.06 | 0.06 | 0.03 | 0.31 |
| Pit N-total August | mg/L | 0.7 | 3.1 | 5.4 | 10.6 | 11.5 | 12.9 | 13.7 | 13.1 | 9.0 | 8.2 | 3.7 | 3.5 | 3.7 | 2.6 | 2.6 | 2.6 | 1.2 | 13.7 |
| Pit N-ammonia August | mg/L | 0.01 | 0.03 | 0.06 | 0.11 | 0.12 | 0.14 | 0.14 | 0.14 | 0.09 | 0.09 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.01 | 0.14 |
| Pit N-nitrate August | mg/L | 0.7 | 3.0 | 5.2 | **10.3** | **11.1** | **12.5** | **13.3** | **12.7** | 8.7 | 7.9 | 3.6 | 3.4 | 3.6 | 2.5 | 2.5 | 2.5 | 1.1 | **13.3** |
| Pit N-nitrate August | mg/L | 0.02 | 0.07 | 0.12 | 0.24 | 0.25 | 0.29 | 0.30 | 0.29 | 0.20 | 0.18 | 0.08 | 0.08 | 0.08 | 0.06 | 0.06 | 0.06 | 0.03 | 0.30 |

APPENDIX A. PREDICTED CONCENTRATIONS OF NITROGEN SPECIES

| Month of operations | Unit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pit N-total September | mg/L | 0.6 | 2.8 | 4.9 | 9.7 | 10.5 | 11.8 | 12.5 | 12.0 | 8.2 | 7.4 | 3.4 | 3.2 | 3.4 | 2.3 | 2.3 | 2.4 | 1.1 | 12.5 |
| Pit N-ammonia September | mg/L | 0.01 | 0.03 | 0.05 | 0.10 | 0.11 | 0.12 | 0.13 | 0.13 | 0.09 | 0.08 | 0.04 | 0.03 | 0.04 | 0.02 | 0.02 | 0.02 | 0.01 | 0.13 |
| Pit N-nitrate September | mg/L | 0.6 | 2.7 | 4.8 | 9.4 | **10.1** | **11.4** | **12.1** | **11.6** | 8.0 | 7.2 | 3.3 | 3.1 | 3.3 | 2.3 | 2.3 | 2.3 | 1.0 | **12.1** |
| Pit N-nitrate September | mg/L | 0.01 | 0.06 | 0.11 | 0.21 | 0.23 | 0.26 | 0.28 | 0.26 | 0.18 | 0.16 | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 | 0.05 | 0.02 | 0.28 |
| Pit N-total October | mg/L | 0.6 | 2.7 | 4.7 | 9.2 | 9.9 | 11.1 | 11.8 | 11.3 | 7.8 | 7.0 | 3.2 | 3.0 | 3.2 | 2.2 | 2.2 | 2.2 | 1.0 | 11.8 |
| Pit N-ammonia October | mg/L | 0.01 | 0.03 | 0.05 | 0.10 | 0.10 | 0.12 | 0.12 | 0.12 | 0.08 | 0.07 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.12 |
| Pit N-nitrate October | mg/L | 0.6 | 2.6 | 4.5 | 8.9 | 9.6 | **10.8** | **11.4** | **10.9** | 7.5 | 6.8 | 3.1 | 2.9 | 3.1 | 2.1 | 2.1 | 2.2 | 1.0 | **11.4** |
| Pit N-nitrate October | mg/L | 0.01 | 0.06 | 0.10 | 0.20 | 0.22 | 0.25 | 0.26 | 0.25 | 0.17 | 0.16 | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 | 0.05 | 0.02 | 0.26 |
| Pit N-total November | mg/L | 0.6 | 2.4 | 4.3 | 8.4 | 9.0 | 10.2 | 10.8 | 10.3 | 7.1 | 6.4 | 2.9 | 2.8 | 2.9 | 2.0 | 2.0 | 2.0 | 0.9 | 10.8 |
| Pit N-ammonia November | mg/L | 0.01 | 0.03 | 0.04 | 0.09 | 0.09 | 0.11 | 0.11 | 0.11 | 0.07 | 0.07 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.11 |
| Pit N-nitrate November | mg/L | 0.5 | 2.3 | 4.1 | 8.1 | 8.7 | 9.8 | **10.4** | 10.0 | 6.9 | 6.2 | 2.8 | 2.7 | 2.8 | 2.0 | 2.0 | 2.0 | 0.9 | **10.4** |
| Pit N-nitrate November | mg/L | 0.01 | 0.05 | 0.09 | 0.19 | 0.20 | 0.22 | 0.24 | 0.23 | 0.16 | 0.14 | 0.06 | 0.06 | 0.06 | 0.04 | 0.04 | 0.04 | 0.02 | 0.24 |
| Pit N-total December | mg/L | 0.6 | 2.5 | 4.3 | 8.5 | 9.2 | 10.3 | 10.9 | 10.5 | 7.2 | 6.5 | 3.0 | 2.8 | 3.0 | 2.1 | 2.0 | 2.1 | 0.9 | 10.9 |
| Pit N-ammonia December | mg/L | 0.01 | 0.03 | 0.05 | 0.09 | 0.10 | 0.11 | 0.11 | 0.11 | 0.08 | 0.07 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.11 |
| Pit N-nitrate December | mg/L | 0.5 | 2.4 | 4.2 | 8.2 | 8.9 | 10.0 | **10.6** | **10.1** | 7.0 | 6.3 | 2.9 | 2.7 | 2.9 | 2.0 | 2.0 | 2.0 | 0.9 | **10.6** |
| Pit N-nitrate December | mg/L | 0.01 | 0.05 | 0.10 | 0.19 | 0.20 | 0.23 | 0.24 | 0.23 | 0.16 | 0.14 | 0.07 | 0.06 | 0.07 | 0.05 | 0.05 | 0.05 | 0.02 | 0.24 |
| Pit N-total January | mg/L | 0.6 | 2.6 | 4.6 | 9.0 | 9.7 | 11.0 | 11.6 | 11.1 | 7.7 | 6.9 | 3.1 | 3.0 | 3.1 | 2.2 | 2.2 | 2.2 | 1.0 | 11.6 |
| Pit N-ammonia January | mg/L | 0.01 | 0.03 | 0.05 | 0.09 | 0.10 | 0.11 | 0.12 | 0.12 | 0.08 | 0.07 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.12 |
| Pit N-nitrate January | mg/L | 0.6 | 2.5 | 4.4 | 8.7 | 9.4 | **10.6** | **11.2** | **10.8** | 7.4 | 6.7 | 3.0 | 2.9 | 3.0 | 2.1 | 2.1 | 2.1 | 1.0 | **11.2** |
| Pit N-nitrate January | mg/L | 0.01 | 0.06 | 0.10 | 0.20 | 0.22 | 0.24 | 0.26 | 0.25 | 0.17 | 0.15 | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 | 0.05 | 0.02 | 0.26 |
| Pit N-total February | mg/L | 0.6 | 2.6 | 4.6 | 9.1 | 9.8 | 11.0 | 11.7 | 11.2 | 7.7 | 7.0 | 3.2 | 3.0 | 3.2 | 2.2 | 2.2 | 2.2 | 1.0 | 11.7 |
| Pit N-ammonia February | mg/L | 0.01 | 0.03 | 0.05 | 0.10 | 0.10 | 0.12 | 0.12 | 0.12 | 0.08 | 0.07 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.12 |
| Pit N-nitrate February | mg/L | 0.6 | 2.5 | 4.5 | 8.8 | 9.5 | **10.6** | **11.3** | **10.8** | 7.4 | 6.7 | 3.0 | 2.9 | 3.1 | 2.1 | 2.1 | 2.1 | 1.0 | **11.3** |
| Pit N-nitrate February | mg/L | 0.01 | 0.06 | 0.10 | 0.20 | 0.22 | 0.24 | 0.26 | 0.25 | 0.17 | 0.15 | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 | 0.05 | 0.02 | 0.26 |

# APPENDIX B. WATER QUALITY PROJECTIONS AND SCREENING RESULTS

**Table B 1: Projected Water Quality Screening Results for East Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | East Pond Outflow | | | | COPC Screening | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Chloride | mg/L | 640 | - | - | September | - | 14 | 12 | 19 | - | - | - |
| | | | | | December | - | 13 | 13 | 19 | - | - | - |
| | | | | | March | - | 13 | 12 | 19 | - | - | - |
| | | | | | June | - | 14 | 12 | 19 | - | - | - |
| Fluoride | mg/L | - | - | - | September | - | 1.3 | 0.65 | 0.72 | - | - | - |
| | | | | | December | - | 1.2 | 0.66 | 0.72 | - | - | - |
| | | | | | March | - | 1.2 | 0.66 | 0.72 | - | - | - |
| | | | | | June | - | 1.4 | 0.66 | 0.72 | - | - | - |
| Ammonia | mg-N/L | - | - | 2 | September | - | 0.088 | 0.02 | 0.025 | - | - | - |
| | | | | | December | - | 0.063 | 0.021 | 0.025 | - | - | - |
| | | | | | March | - | 0.066 | 0.021 | 0.025 | - | - | - |
| | | | | | June | - | 0.1 | 0.021 | 0.025 | - | - | - |
| Nitrate | mg-N/L | 124 | - | - | September | - | 7.6 | 0.45 | 0.29 | - | - | - |
| | | | | | December | - | 5.0 | 0.43 | 0.29 | - | - | - |
| | | | | | March | - | 5.3 | 0.44 | 0.29 | - | - | - |
| | | | | | June | - | 9.0 | 0.44 | 0.29 | - | - | - |
| Nitrite | mg-N/L | - | - | - | September | - | 0.18 | 0.034 | 0.042 | - | - | - |
| | | | | | December | - | 0.13 | 0.035 | 0.042 | - | - | - |
| | | | | | March | - | 0.13 | 0.034 | 0.042 | - | - | - |
| | | | | | June | - | 0.21 | 0.034 | 0.042 | - | - | - |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 | September | - | 7.9 | 0.61 | 0.37 | - | - | - |
| | | | | | December | - | 5.3 | 0.58 | 0.37 | - | - | - |
| | | | | | March | - | 5.6 | 0.59 | 0.37 | - | - | - |
| | | | | | June | - | 9.4 | 0.59 | 0.37 | - | - | - |
| Aluminum[(b)] | mg/L | - | - | - | September | - | 0.12 | 0.22 | 0.35 | - | - | - |
| | | | | | December | - | 0.15 | 0.24 | 0.35 | - | - | - |
| | | | | | March | - | 0.15 | 0.23 | 0.35 | - | - | - |
| | | | | | June | - | 0.11 | 0.23 | 0.35 | - | - | - |
| Arsenic | mg/L | - | - | 0.5 | September | - | 0.0081 | 0.002 | 0.002 | - | - | - |
| | | | | | December | - | 0.0075 | 0.002 | 0.002 | - | - | - |
| | | | | | March | - | 0.0074 | 0.002 | 0.002 | - | - | - |
| | | | | | June | - | 0.0086 | 0.002 | 0.002 | - | - | - |
| Barium | mg/L | - | - | 5 | September | - | 0.067 | 0.03 | 0.023 | - | - | - |
| | | | | | December | - | 0.065 | 0.029 | 0.023 | - | - | - |
| | | | | | March | - | 0.069 | 0.03 | 0.023 | - | - | - |
| | | | | | June | - | 0.068 | 0.03 | 0.023 | - | - | - |
| Boron | mg/L | 29 | - | 5 | September | - | 0.031 | 0.05 | 0.05 | - | - | - |
| | | | | | December | - | 0.034 | 0.05 | 0.05 | - | - | - |
| | | | | | March | - | 0.035 | 0.05 | 0.05 | - | - | - |
| | | | | | June | - | 0.028 | 0.05 | 0.05 | - | - | - |
| Cadmium[(b)] | mg/L | 0.00068 | - | 0.05 | September | - | 0.00063 | 0.00049 | 0.00039 | - | - | - |
| | | | | | December | - | **0.00069** | 0.00048 | 0.00039 | **COPC** | - | - |
| | | | | | March | - | **0.00076** | 0.00048 | 0.00039 | **COPC** | - | - |
| | | | | | June | - | 0.00056 | 0.00048 | 0.00039 | - | - | - |
| Chromium[(c)] | mg/L | - | - | 0.05 | September | - | 0.0011 | 0.0013 | 0.0017 | - | - | - |
| | | | | | December | - | 0.0016 | 0.0014 | 0.0017 | - | - | - |
| | | | | | March | - | 0.0019 | 0.0014 | 0.0017 | - | - | - |
| | | | | | June | - | 0.0011 | 0.0014 | 0.0017 | - | - | - |
| Cobalt[(b)] | mg/L | - | - | - | September | - | 0.0021 | 0.0023 | 0.0022 | - | - | - |
| | | | | | December | - | 0.0022 | 0.0023 | 0.0022 | - | - | - |
| | | | | | March | - | 0.0022 | 0.0023 | 0.0022 | - | - | - |
| | | | | | June | - | 0.0021 | 0.0023 | 0.0022 | - | - | - |
| Copper[(b)] | mg/L | - | = | 0.3 | September | - | 0.0043 | 0.0017 | 0.0013 | - | - | - |
| | | | | | December | - | 0.0064 | 0.0016 | 0.0013 | - | - | - |
| | | | | | March | - | 0.0098 | 0.0016 | 0.0013 | - | - | - |
| | | | | | June | - | 0.0074 | 0.0016 | 0.0013 | - | - | - |

**Table B 1: Projected Water Quality Screening Results for East Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | East Pond Outflow | | | | COPC Screening | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Iron[(b)] | mg/L | - | - | 10 | September | - | 0.24 | 0.11 | 0.16 | - | - | - |
| | | | | | December | - | 0.59 | 0.11 | 0.16 | - | - | - |
| | | | | | March | - | 0.98 | 0.11 | 0.16 | - | - | - |
| | | | | | June | - | 0.42 | 0.11 | 0.16 | - | - | - |
| Lead[(b)] | mg/L | - | - | 0.2 | September | - | 0.0051 | 0.00097 | 0.00098 | - | - | - |
| | | | | | December | - | 0.0041 | 0.00097 | 0.00098 | - | - | - |
| | | | | | March | - | 0.0042 | 0.00097 | 0.00098 | - | - | - |
| | | | | | June | - | 0.0057 | 0.00097 | 0.00098 | - | - | - |
| Manganese[(b)] | mg/L | 2.5 | - | - | September | - | 0.093 | 0.23 | 0.38 | - | - | - |
| | | | | | December | - | 0.14 | 0.25 | 0.39 | - | - | - |
| | | | | | March | - | 0.13 | 0.25 | 0.38 | - | - | - |
| | | | | | June | - | 0.08 | 0.25 | 0.38 | - | - | - |
| Mercury | mg/L | - | - | 0.005 | September | - | 0.000023 | 0.000017 | 0.000022 | - | - | - |
| | | | | | December | - | 0.000021 | 0.000018 | 0.000022 | - | - | - |
| | | | | | March | - | 0.000022 | 0.000018 | 0.000022 | - | - | - |
| | | | | | June | - | 0.000023 | 0.000018 | 0.000022 | - | - | - |
| Molybdenum | mg/L | - | - | - | September | - | 0.013 | 0.006 | 0.0039 | - | - | - |
| | | | | | December | - | 0.011 | 0.0057 | 0.0039 | - | - | - |
| | | | | | March | - | 0.011 | 0.0058 | 0.0039 | - | - | - |
| | | | | | June | - | 0.014 | 0.0058 | 0.0039 | - | - | - |
| Nickel[(b)] | mg/L | - | - | 0.5 | September | - | 0.002 | 0.002 | 0.002 | - | - | - |
| | | | | | December | - | 0.0027 | 0.002 | 0.002 | - | - | - |
| | | | | | March | - | 0.0032 | 0.002 | 0.002 | - | - | - |
| | | | | | June | - | 0.0034 | 0.002 | 0.002 | - | - | - |
| Selenium | mg/L | - | - | 0.01 | September | - | 0.001 | 0.001 | 0.001 | - | - | - |
| | | | | | December | - | 0.001 | 0.001 | 0.0010 | - | - | - |
| | | | | | March | - | 0.0010 | 0.001 | 0.001 | - | - | - |
| | | | | | June | - | 0.001 | 0.001 | 0.001 | - | - | - |
| Silver | mg/L | - | - | 0.05 | September | - | 0.00012 | 0.00015 | 0.0002 | - | - | - |
| | | | | | December | - | 0.00013 | 0.00016 | 0.0002 | - | - | - |
| | | | | | March | - | 0.00013 | 0.00016 | 0.0002 | - | - | - |
| | | | | | June | - | 0.00012 | 0.00016 | 0.0002 | - | - | - |
| Strontium | mg/L | - | - | - | September | - | 0.22 | 0.072 | 0.044 | - | - | - |
| | | | | | December | - | 0.18 | 0.069 | 0.044 | - | - | - |
| | | | | | March | - | 0.19 | 0.069 | 0.044 | - | - | - |
| | | | | | June | - | 0.24 | 0.069 | 0.044 | - | - | - |
| Thallium | mg/L | - | - | - | September | - | 0.00022 | 0.0001 | 0.00010 | - | - | - |
| | | | | | December | - | 0.00019 | 0.0001 | 0.00010 | - | - | - |
| | | | | | March | - | 0.00019 | 0.0001 | 0.0001 | - | - | - |
| | | | | | June | - | 0.00024 | 0.0001 | 0.0001 | - | - | - |
| Uranium | mg/L | 0.033 | - | - | September | - | 0.014 | 0.0021 | 0.0011 | - | - | - |
| | | | | | December | - | 0.011 | 0.002 | 0.0011 | - | - | - |
| | | | | | March | - | 0.011 | 0.002 | 0.0011 | - | - | - |
| | | | | | June | - | 0.015 | 0.002 | 0.0011 | - | - | - |
| Vanadium | mg/L | - | - | - | September | - | 0.002 | 0.002 | 0.002 | - | - | - |
| | | | | | December | - | 0.002 | 0.002 | 0.002 | - | - | - |
| | | | | | March | - | 0.002 | 0.002 | 0.002 | - | - | - |
| | | | | | June | - | 0.002 | 0.002 | 0.002 | - | - | - |
| Zinc[(b)] | mg/L | 0.051 | - | 0.5 | September | - | 0.039 | 0.031 | 0.02 | - | - | - |
| | | | | | December | - | **0.069** | 0.03 | 0.02 | **COPC** | - | - |
| | | | | | March | - | **0.081** | 0.03 | 0.02 | **COPC** | - | - |
| | | | | | June | - | **0.07** | 0.03 | 0.02 | **COPC** | - | - |

Notes:
a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up to date guideline than the corresponding CCME value.
b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.
c) The guideline for hexavalent chromium was used total chromium.
Double-underlined guidelines apply to the dissolved fraction
Bold values are above the short-term acute guidelines.
COPC = constituent of potential concern; - = projected concentration is less than the screening value and/or existing conditions.

**Table B 2: Projected Water Quality Screening Results for West Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | West Pond Outflow | | | | COPC Screening | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Chloride | mg/L | 640 | - | - | September | - | 17 | 24 | 24 | - | - | - |
| | | | | | December | - | 18 | 24 | 24 | - | - | - |
| | | | | | March | - | 18 | 24 | 24 | - | - | - |
| | | | | | June | - | 17 | 24 | 24 | - | - | - |
| Fluoride | mg/L | - | - | - | September | - | 1.5 | 0.78 | 0.74 | - | - | - |
| | | | | | December | - | 1.3 | 0.78 | 0.74 | - | - | - |
| | | | | | March | - | 1.4 | 0.78 | 0.74 | - | - | - |
| | | | | | June | - | 1.6 | 0.78 | 0.74 | - | - | - |
| Ammonia | mg-N/L | - | - | 2 | September | - | 0.1 | 0.029 | 0.028 | - | - | - |
| | | | | | December | - | 0.078 | 0.029 | 0.028 | - | - | - |
| | | | | | March | - | 0.081 | 0.029 | 0.028 | - | - | - |
| | | | | | June | - | 0.12 | 0.029 | 0.028 | - | - | - |
| Nitrate | mg-N/L | 124 | - | - | September | - | 8.8 | 0.17 | 0.13 | - | - | - |
| | | | | | December | - | 6.2 | 0.17 | 0.13 | - | - | - |
| | | | | | March | - | 6.5 | 0.17 | 0.13 | - | - | - |
| | | | | | June | - | 10 | 0.17 | 0.13 | - | - | - |
| Nitrite | mg-N/L | - | - | - | September | - | 0.21 | 0.048 | 0.047 | - | - | - |
| | | | | | December | - | 0.16 | 0.048 | 0.047 | - | - | - |
| | | | | | March | - | 0.17 | 0.048 | 0.047 | - | - | - |
| | | | | | June | - | 0.24 | 0.048 | 0.047 | - | - | - |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 | September | - | 9.1 | 0.19 | 0.13 | - | - | - |
| | | | | | December | - | 6.4 | 0.18 | 0.13 | - | - | - |
| | | | | | March | - | 6.7 | 0.18 | 0.13 | - | - | - |
| | | | | | June | - | 10.5 | 0.18 | 0.13 | **COPC** | - | - |
| Aluminum[(b)] | mg/L | - | - | - | September | - | 0.16 | 0.44 | 0.44 | - | - | - |
| | | | | | December | - | 0.21 | 0.45 | 0.44 | - | - | - |
| | | | | | March | - | 0.21 | 0.45 | 0.44 | - | - | - |
| | | | | | June | - | 0.14 | 0.45 | 0.44 | - | - | - |
| Arsenic | mg/L | - | - | 0.5 | September | - | 0.0092 | 0.002 | 0.0019 | - | - | - |
| | | | | | December | - | 0.0089 | 0.002 | 0.0019 | - | - | - |
| | | | | | March | - | 0.0088 | 0.002 | 0.0019 | - | - | - |
| | | | | | June | - | 0.0095 | 0.002 | 0.0019 | - | - | - |
| Barium | mg/L | - | - | 5 | September | - | 0.071 | 0.018 | 0.016 | - | - | - |
| | | | | | December | - | 0.069 | 0.018 | 0.016 | - | - | - |
| | | | | | March | - | 0.074 | 0.018 | 0.016 | - | - | - |
| | | | | | June | - | 0.071 | 0.018 | 0.016 | - | - | - |
| Boron | mg/L | 29 | - | 5 | September | - | 0.027 | 0.05 | 0.047 | - | - | - |
| | | | | | December | - | 0.028 | 0.05 | 0.047 | - | - | - |
| | | | | | March | - | 0.029 | 0.05 | 0.047 | - | - | - |
| | | | | | June | - | 0.025 | 0.05 | 0.047 | - | - | - |
| Cadmium[(b)] | mg/L | 0.00034 | - | 0.05 | September | - | **0.00061** | 0.00032 | 0.00028 | **COPC** | - | - |
| | | | | | December | - | **0.00066** | 0.00032 | 0.00028 | **COPC** | - | - |
| | | | | | March | - | **0.00076** | 0.00032 | 0.00028 | **COPC** | - | - |
| | | | | | June | - | **0.00054** | 0.00032 | 0.00028 | **COPC** | - | - |
| Chromium[(c)] | mg/L | - | - | 0.05 | September | - | 0.0012 | 0.0019 | 0.0019 | - | - | - |
| | | | | | December | - | 0.0019 | 0.0019 | 0.0019 | - | - | - |
| | | | | | March | - | 0.0022 | 0.0019 | 0.0019 | - | - | - |
| | | | | | June | - | 0.0012 | 0.0019 | 0.0019 | - | - | - |
| Cobalt[(b)] | mg/L | - | - | - | September | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| | | | | | December | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| | | | | | March | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| | | | | | June | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| Copper[(b)] | mg/L | - | = | 0.3 | September | - | 0.0046 | 0.0011 | 0.00094 | - | - | - |
| | | | | | December | - | 0.0073 | 0.0011 | 0.00094 | - | - | - |
| | | | | | March | - | 0.012 | 0.0011 | 0.00094 | - | - | - |
| | | | | | June | - | 0.0081 | 0.0011 | 0.00094 | - | - | - |
| Iron[(b)] | mg/L | - | - | 10 | September | - | 0.28 | 0.2 | 0.2 | - | - | - |
| | | | | | December | - | 0.75 | 0.2 | 0.2 | - | - | - |
| | | | | | March | - | 1.2 | 0.2 | 0.2 | - | - | - |
| | | | | | June | - | 0.48 | 0.2 | 0.2 | - | - | - |

**Table B 2: Projected Water Quality Screening Results for West Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | West Pond Outflow | | | | COPC Screening | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Lead[(b)] | mg/L | - | - | 0.2 | September | - | 0.0059 | 0.0010 | 0.00094 | - | - | - |
| | | | | | December | - | 0.0049 | 0.0010 | 0.00094 | - | - | - |
| | | | | | March | - | 0.005 | 0.0010 | 0.00094 | - | - | - |
| | | | | | June | - | 0.0063 | 0.0010 | 0.00094 | - | - | - |
| Manganese[(b)] | mg/L | 2 | - | - | September | - | 0.13 | 0.5 | 0.5 | - | - | - |
| | | | | | December | - | 0.21 | 0.5 | 0.5 | - | - | - |
| | | | | | March | - | 0.2 | 0.5 | 0.5 | - | - | - |
| | | | | | June | - | 0.11 | 0.5 | 0.5 | - | - | - |
| Mercury | mg/L | - | - | 0.005 | September | - | 0.000025 | 0.000025 | 0.000024 | - | - | - |
| | | | | | December | - | 0.000025 | 0.000025 | 0.000024 | - | - | - |
| | | | | | March | - | 0.000025 | 0.000025 | 0.000024 | - | - | - |
| | | | | | June | - | 0.000026 | 0.000025 | 0.000024 | - | - | - |
| Molybdenum | mg/L | - | - | - | September | - | 0.013 | 0.0024 | 0.0019 | - | - | - |
| | | | | | December | - | 0.011 | 0.0024 | 0.0019 | - | - | - |
| | | | | | March | - | 0.011 | 0.0024 | 0.0019 | - | - | - |
| | | | | | June | - | 0.014 | 0.0024 | 0.0019 | - | - | - |
| Nickel[(b)] | mg/L | - | - | 0.5 | September | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| | | | | | December | - | 0.0028 | 0.002 | 0.0019 | - | - | - |
| | | | | | March | - | 0.0034 | 0.002 | 0.0019 | - | - | - |
| | | | | | June | - | 0.0036 | 0.002 | 0.0019 | - | - | - |
| Selenium | mg/L | - | - | 0.01 | September | - | 0.00098 | 0.001 | 0.00094 | - | - | - |
| | | | | | December | - | 0.00098 | 0.001 | 0.00094 | - | - | - |
| | | | | | March | - | 0.00098 | 0.001 | 0.00094 | - | - | - |
| | | | | | June | - | 0.00099 | 0.001 | 0.00094 | - | - | - |
| Silver | mg/L | - | - | 0.05 | September | - | 0.00013 | 0.00024 | 0.00024 | - | - | - |
| | | | | | December | - | 0.00015 | 0.00024 | 0.00024 | - | - | - |
| | | | | | March | - | 0.00015 | 0.00024 | 0.00024 | - | - | - |
| | | | | | June | - | 0.00013 | 0.00024 | 0.00024 | - | - | - |
| Strontium | mg/L | - | - | - | September | - | 0.23 | 0.024 | 0.017 | - | - | - |
| | | | | | December | - | 0.19 | 0.023 | 0.017 | - | - | - |
| | | | | | March | - | 0.2 | 0.023 | 0.017 | - | - | - |
| | | | | | June | - | 0.25 | 0.023 | 0.017 | - | - | - |
| Thallium | mg/L | - | - | - | September | - | 0.00024 | 0.0001 | 0.000094 | - | - | - |
| | | | | | December | - | 0.00021 | 0.00010 | 0.000094 | - | - | - |
| | | | | | March | - | 0.00022 | 0.0001 | 0.000094 | - | - | - |
| | | | | | June | - | 0.00026 | 0.0001 | 0.000094 | - | - | - |
| Uranium | mg/L | 0.033 | - | - | September | - | 0.016 | 0.00039 | 0.00019 | - | - | - |
| | | | | | December | - | 0.012 | 0.00037 | 0.00019 | - | - | - |
| | | | | | March | - | 0.013 | 0.00038 | 0.00019 | - | - | - |
| | | | | | June | - | 0.017 | 0.00038 | 0.00019 | - | - | - |
| Vanadium | mg/L | - | - | - | September | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| | | | | | December | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| | | | | | March | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| | | | | | June | - | 0.002 | 0.002 | 0.0019 | - | - | - |
| Zinc[(b)] | mg/L | 0.028 | - | 0.5 | September | - | **0.034** | 0.011 | 0.0085 | **COPC** | - | - |
| | | | | | December | - | **0.07** | 0.011 | 0.0085 | **COPC** | - | - |
| | | | | | March | - | **0.087** | 0.011 | 0.0085 | **COPC** | - | - |
| | | | | | June | - | **0.071** | 0.011 | 0.0085 | **COPC** | - | - |

Notes:
a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up to date guideline than the corresponding CCME value.
b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.
c) The guideline for hexavalent chromium was used total chromium.
Double-underlined guidelines apply to the dissolved fraction
Bold values are above the short-term acute guidelines.
Underlined values are above the Newfoundland and Labrador Regulation 65/03 limit.
COPC = constituent of potential concern; - = projected concentration is less than the screening value and/or existing conditions.

**Table B 3: Projected Water Quality Screening Results for Shoal Cove Pond Outflow (WS-5)**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Shoal Cove Pond Outflow (WS-5) | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Chloride | mg/L | 640 | 120 | - | September | 16 | 16 | 16 | 16 | - | - | - | -1% | -1% | 0% |
| | | | | | December | 22 | 21 | 22 | 22 | - | - | - | -3% | -2% | -1% |
| | | | | | March | 20 | 20 | 20 | 20 | - | - | - | -2% | -1% | 0% |
| | | | | | June | 19 | 19 | 19 | 19 | - | - | - | -2% | -1% | 0% |
| Fluoride | mg/L | - | 0.12 | - | September | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | 0% | -2% | -2% |
| | | | | | December | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | -1% | -2% | -2% |
| | | | | | March | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | -1% | -2% | -2% |
| | | | | | June | 1.4 | 1.4 | 1.4 | 1.4 | SV | - | - | 0% | -1% | -1% |
| Ammonia | mg-N/L | - | 5.7 | 2 | September | 0.035 | 0.039 | 0.035 | 0.035 | - | - | - | 11% | -1% | -1% |
| | | | | | December | 0.03 | 0.032 | 0.03 | 0.03 | - | - | - | 8% | -1% | -1% |
| | | | | | March | 0.03 | 0.032 | 0.03 | 0.03 | - | - | - | 8% | -1% | -1% |
| | | | | | June | 0.03 | 0.035 | 0.03 | 0.03 | - | - | - | 16% | -1% | -1% |
| Nitrate | mg-N/L | 124 | 2.9 | - | September | 0.05 | 0.59 | 0.062 | 0.056 | - | - | - | 1083% | 24% | 12% |
| | | | | | December | 0.11 | 0.47 | 0.12 | 0.12 | - | - | - | 328% | 12% | 7% |
| | | | | | March | 0.11 | 0.45 | 0.12 | 0.12 | - | - | - | 307% | 11% | 6% |
| | | | | | June | 0.05 | 0.65 | 0.058 | 0.055 | - | - | - | 1194% | 17% | 10% |
| Nitrite | mg-N/L | - | 0.06 | - | September | 0.05 | 0.059 | 0.05 | 0.05 | - | - | - | 19% | -1% | -1% |
| | | | | | December | 0.05 | 0.056 | 0.049 | 0.05 | - | - | - | 11% | -1% | -1% |
| | | | | | March | 0.05 | 0.055 | 0.049 | 0.05 | - | - | - | 11% | -1% | -1% |
| | | | | | June | 0.05 | 0.061 | 0.05 | 0.05 | **COPC** | - | - | 22% | -1% | -1% |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 | September | 0.05 | 0.61 | 0.067 | 0.058 | - | - | - | 1128% | 34% | 15% |
| | | | | | December | 0.11 | 0.49 | 0.13 | 0.12 | - | - | - | 345% | 18% | 9% |
| | | | | | March | 0.11 | 0.46 | 0.13 | 0.12 | - | - | - | 322% | 16% | 8% |
| | | | | | June | 0.05 | 0.67 | 0.062 | 0.057 | - | - | - | 1240% | 23% | 13% |
| Aluminum[(b)] | mg/L | - | 0.67 | - | September | 0.16 | 0.16 | 0.16 | 0.16 | - | - | - | -2% | 1% | 3% |
| | | | | | December | 0.34 | 0.33 | 0.34 | 0.34 | - | - | - | -4% | -1% | 0% |
| | | | | | March | 0.4 | 0.38 | 0.39 | 0.4 | - | - | - | -4% | -1% | -1% |
| | | | | | June | 0.15 | 0.15 | 0.15 | 0.15 | - | - | - | -2% | 1% | 2% |
| Arsenic | mg/L | - | 0.005 | 0.5 | September | 0.002 | 0.0024 | 0.002 | 0.002 | - | - | - | 22% | 0% | 0% |
| | | | | | December | 0.002 | 0.0024 | 0.002 | 0.002 | - | - | - | 20% | 0% | 0% |
| | | | | | March | 0.002 | 0.0024 | 0.002 | 0.002 | - | - | - | 18% | 0% | 0% |
| | | | | | June | 0.002 | 0.0024 | 0.002 | 0.002 | - | - | - | 22% | 0% | 0% |
| Barium | mg/L | - | - | 5 | September | 0.19 | 0.18 | 0.19 | 0.19 | - | - | - | -5% | -3% | -3% |
| | | | | | December | 0.13 | 0.12 | 0.12 | 0.12 | - | - | - | -4% | -3% | -4% |
| | | | | | March | 0.084 | 0.083 | 0.082 | 0.082 | - | - | - | -1% | -2% | -3% |
| | | | | | June | 0.16 | 0.16 | 0.16 | 0.16 | - | - | - | -4% | -2% | -2% |
| Boron | mg/L | 29 | 1.5 | 5 | September | 0.002 | 0.0041 | 0.0035 | 0.0032 | - | - | - | 105% | 73% | 59% |
| | | | | | December | 0.002 | 0.0043 | 0.004 | 0.004 | - | - | - | 116% | 102% | 99% |
| | | | | | March | 0.002 | 0.0041 | 0.0037 | 0.0037 | - | - | - | 105% | 87% | 84% |
| | | | | | June | 0.002 | 0.0038 | 0.0031 | 0.003 | - | - | - | 88% | 53% | 50% |
| Cadmium[(b)] | mg/L | 0.00068 | 0.000063 | 0.05 | September | 0.0003 | 0.00032 | 0.00031 | 0.0003 | SV | SV | SV | 8% | 2% | 0% |
| | | | | | December | 0.0003 | 0.00033 | 0.00031 | 0.0003 | SV | SV | SV | 9% | 3% | 1% |
| | | | | | March | 0.0003 | 0.00033 | 0.00031 | 0.0003 | SV | SV | SV | 10% | 2% | 1% |
| | | | | | June | 0.0003 | 0.00032 | 0.0003 | 0.0003 | SV | SV | SV | 6% | 1% | 0% |
| Chromium[(c)] | mg/L | - | 0.005 | 0.05 | September | 0.002 | 0.0019 | 0.002 | 0.002 | - | - | - | -3% | -1% | -1% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | -1% | -1% | -1% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | -1% | -1% |
| | | | | | June | 0.002 | 0.0019 | 0.002 | 0.002 | - | - | - | -3% | -1% | -1% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 8% | 4% | 3% |
| | | | | | December | 0.001 | 0.0011 | 0.0011 | 0.001 | SV | SV | SV | 9% | 6% | 5% |
| | | | | | March | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 8% | 5% | 4% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 7% | 3% | 2% |
| Copper[(b)] | mg/L | - | 0.00219 | 0.3 | September | 0.0015 | 0.0017 | 0.0015 | 0.0015 | - | - | - | 14% | 0% | -1% |
| | | | | | December | 0.0025 | 0.0028 | 0.0025 | 0.0024 | **COPC** | - | - | 11% | -1% | -2% |
| | | | | | March | 0.001 | 0.0016 | 0.001 | 0.001 | - | - | - | 57% | 2% | 1% |
| | | | | | June | 0.002 | 0.0024 | 0.002 | 0.002 | **COPC** | - | - | 18% | 0% | -1% |
| Iron[(b)] | mg/L | - | 0.64 | 10 | September | 0.45 | 0.43 | 0.44 | 0.44 | - | - | - | -3% | -2% | -2% |
| | | | | | December | 0.45 | 0.46 | 0.43 | 0.43 | - | - | - | 2% | -3% | -3% |
| | | | | | March | 0.23 | 0.28 | 0.23 | 0.23 | - | - | - | 21% | -2% | -1% |
| | | | | | June | 0.27 | 0.28 | 0.27 | 0.27 | - | - | - | 4% | -1% | -1% |

**Table B 3: Projected Water Quality Screening Results for Shoal Cove Pond Outflow (WS-5)**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Shoal Cove Pond Outflow (WS-5) | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Lead[(b)] | mg/L | - | 0.0093 | 0.2 | September | 0.0029 | 0.003 | 0.0028 | 0.0028 | - | - | - | 6% | -2% | -2% |
| | | | | | December | 0.0074 | 0.0072 | 0.0071 | 0.0071 | - | - | - | -3% | -4% | -4% |
| | | | | | March | 0.003 | 0.0031 | 0.0029 | 0.0029 | - | - | - | 3% | -2% | -3% |
| | | | | | June | 0.0027 | 0.0029 | 0.0027 | 0.0027 | - | - | - | 7% | -1% | -2% |
| Manganese[(b)] | mg/L | 2.5 | 0.38 | - | September | 0.082 | 0.082 | 0.086 | 0.089 | - | - | - | 1% | 6% | 9% |
| | | | | | December | 0.099 | 0.1 | 0.1 | 0.11 | - | - | - | 3% | 7% | 12% |
| | | | | | March | 0.072 | 0.076 | 0.078 | 0.083 | - | - | - | 5% | 9% | 15% |
| | | | | | June | 0.079 | 0.079 | 0.083 | 0.085 | - | - | - | 0% | 5% | 8% |
| Mercury | mg/L | - | 0.000026 | 0.005 | September | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | -1% | -1% | -1% |
| | | | | | December | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | -1% | -1% | -1% |
| | | | | | March | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | -1% | -1% | -1% |
| | | | | | June | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | -1% | -1% | -1% |
| Molybdenum | mg/L | - | 0.073 | - | September | 0.002 | 0.0028 | 0.0021 | 0.002 | - | - | - | 39% | 6% | 2% |
| | | | | | December | 0.002 | 0.0027 | 0.0022 | 0.0021 | - | - | - | 33% | 8% | 4% |
| | | | | | March | 0.002 | 0.0026 | 0.0021 | 0.0021 | - | - | - | 29% | 7% | 3% |
| | | | | | June | 0.002 | 0.0028 | 0.0021 | 0.002 | - | - | - | 39% | 4% | 2% |
| Nickel[(b)] | mg/L | - | 0.025 | 0.5 | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 2% | 0% | 0% |
| | | | | | March | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 4% | 0% | 0% |
| | | | | | June | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 5% | 0% | 0% |
| Selenium | mg/L | - | 0.001 | 0.01 | September | 0.001 | 0.001 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.001 | 0.001 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.001 | 0.001 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.001 | 0.001 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| Silver | mg/L | - | 0.00025 | 0.05 | September | 0.00025 | 0.00024 | 0.00025 | 0.00025 | - | - | - | -4% | -1% | -1% |
| | | | | | December | 0.00025 | 0.00024 | 0.00025 | 0.00025 | - | - | - | -4% | -2% | -1% |
| | | | | | March | 0.00025 | 0.00024 | 0.00025 | 0.00025 | - | - | - | -3% | -1% | -1% |
| | | | | | June | 0.00025 | 0.00024 | 0.00025 | 0.00025 | - | - | - | -4% | -1% | -1% |
| Strontium | mg/L | - | 2.5 | - | September | 0.044 | 0.056 | 0.044 | 0.043 | - | - | - | 29% | 2% | 0% |
| | | | | | December | 0.026 | 0.037 | 0.028 | 0.027 | - | - | - | 44% | 7% | 3% |
| | | | | | March | 0.021 | 0.032 | 0.023 | 0.022 | - | - | - | 51% | 8% | 4% |
| | | | | | June | 0.036 | 0.05 | 0.037 | 0.036 | - | - | - | 38% | 2% | 0% |
| Thallium | mg/L | - | 0.0008 | - | September | 0.0001 | 0.00011 | 0.0001 | 0.00010 | - | - | - | 9% | 0% | 0% |
| | | | | | December | 0.0001 | 0.00011 | 0.0001 | 0.00010 | - | - | - | 7% | 0% | 0% |
| | | | | | March | 0.0001 | 0.00011 | 0.00010 | 0.00010 | - | - | - | 6% | 0% | 0% |
| | | | | | June | 0.0001 | 0.00011 | 0.0001 | 0.00010 | - | - | - | 9% | 0% | 0% |
| Uranium | mg/L | 0.033 | 0.015 | - | September | 0.0015 | 0.0024 | 0.0015 | 0.0015 | - | - | - | 60% | 1% | -1% |
| | | | | | December | 0.00095 | 0.0017 | 0.00099 | 0.00095 | - | - | - | 76% | 5% | 0% |
| | | | | | March | 0.0006 | 0.0013 | 0.00065 | 0.00062 | - | - | - | 114% | 8% | 3% |
| | | | | | June | 0.0014 | 0.0023 | 0.0014 | 0.0014 | - | - | - | 67% | 1% | -1% |
| Vanadium | mg/L | - | 0.12 | - | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| Zinc[(b)] | mg/L | 0.051 | 0.018 | 0.5 | September | 0.005 | 0.0074 | 0.0058 | 0.0053 | - | - | - | 48% | 16% | 7% |
| | | | | | December | 0.012 | 0.016 | 0.012 | 0.012 | - | - | - | 36% | 7% | 3% |
| | | | | | March | 0.007 | 0.012 | 0.0078 | 0.0074 | - | - | - | 69% | 12% | 6% |
| | | | | | June | 0.005 | 0.0093 | 0.0055 | 0.0053 | - | - | - | 86% | 11% | 6% |

Notes:

a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up to date guideline than the corresponding CCME value.

b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.

c) The guideline for hexavalent chromium was used total chromium.

Double-underlined guidelines apply to the dissolved fraction

Grey shaded values are above the long-term chronic guidelines.

COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.

**Table B 4: Projected Water Quality Screening Results for Hares Ears Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Hares Ears Outflow | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Chloride | mg/L | 640 | 120 | - | September | 25 | 22 | 25 | 24 | - | - | - | -10% | -1% | -4% |
| | | | | | December | 25 | 23 | 25 | 23 | - | - | - | -9% | -1% | -8% |
| | | | | | March | 25 | 23 | 25 | 23 | - | - | - | -8% | -1% | -8% |
| | | | | | June | 25 | 22 | 25 | 24 | - | - | - | -10% | 0% | -4% |
| Fluoride | mg/L | - | 0.12 | - | September | 0.79 | 1.0 | 0.79 | 0.9 | **COPC** | - | **COPC** | 28% | 0% | 14% |
| | | | | | December | 0.79 | 0.96 | 0.79 | 0.91 | **COPC** | - | **COPC** | 22% | 0% | 15% |
| | | | | | March | 0.79 | 0.95 | 0.79 | 0.86 | **COPC** | - | SV | 20% | 0% | 9% |
| | | | | | June | 0.79 | 1.0 | 0.79 | 0.86 | **COPC** | - | SV | 29% | 0% | 9% |
| Ammonia | mg-N/L | - | 5.2 | 2 | September | 0.03 | 0.053 | 0.03 | 0.029 | - | - | - | 76% | 0% | -3% |
| | | | | | December | 0.03 | 0.045 | 0.03 | 0.028 | - | - | - | 50% | 0% | -7% |
| | | | | | March | 0.03 | 0.044 | 0.03 | 0.028 | - | - | - | 48% | 0% | -7% |
| | | | | | June | 0.03 | 0.056 | 0.03 | 0.029 | - | - | - | 86% | 0% | -3% |
| Nitrate | mg-N/L | 124 | 2.9 | - | September | 0.14 | 2.8 | 0.14 | 0.37 | - | - | - | 1935% | 2% | 162% |
| | | | | | December | 0.14 | 2.0 | 0.14 | 0.43 | - | - | - | 1345% | 3% | 208% |
| | | | | | March | 0.14 | 1.9 | 0.14 | 0.35 | - | - | - | 1281% | 3% | 151% |
| | | | | | June | 0.14 | 3.1 | 0.14 | 0.31 | **COPC** | - | - | 2145% | 2% | 119% |
| Nitrite | mg-N/L | - | 0.06 | - | September | 0.05 | 0.1 | 0.05 | 0.05 | **COPC** | - | - | 102% | 0% | 1% |
| | | | | | December | 0.05 | 0.084 | 0.05 | 0.049 | **COPC** | - | - | 68% | 0% | -2% |
| | | | | | March | 0.05 | 0.083 | 0.05 | 0.048 | **COPC** | - | - | 65% | 0% | -3% |
| | | | | | June | 0.05 | 0.11 | 0.05 | 0.05 | **COPC** | - | - | 114% | 0% | 0% |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 | September | 0.14 | 2.9 | 0.15 | 0.37 | - | - | - | 2002% | 4% | 162% |
| | | | | | December | 0.14 | 2.1 | 0.15 | 0.43 | - | - | - | 1392% | 5% | 208% |
| | | | | | March | 0.14 | 2.0 | 0.15 | 0.35 | - | - | - | 1325% | 4% | 151% |
| | | | | | June | 0.14 | 3.2 | 0.14 | 0.31 | - | - | - | 2219% | 2% | 119% |
| Aluminum[(b)] | mg/L | - | 0.5 | - | September | 0.47 | 0.37 | 0.47 | 0.44 | - | - | - | -21% | -1% | -7% |
| | | | | | December | 0.47 | 0.39 | 0.47 | 0.41 | - | - | - | -17% | -1% | -13% |
| | | | | | March | 0.47 | 0.4 | 0.47 | 0.42 | - | - | - | -16% | -1% | -11% |
| | | | | | June | 0.47 | 0.37 | 0.47 | 0.44 | - | - | - | -21% | 0% | -6% |
| Arsenic | mg/L | - | 0.005 | 0.5 | September | 0.002 | 0.0043 | 0.002 | 0.0031 | - | - | - | 113% | 0% | 53% |
| | | | | | December | 0.002 | 0.0041 | 0.002 | 0.0036 | - | - | - | 107% | 0% | 79% |
| | | | | | March | 0.002 | 0.0039 | 0.002 | 0.0031 | - | - | - | 96% | 0% | 54% |
| | | | | | June | 0.002 | 0.0042 | 0.002 | 0.0027 | - | - | - | 112% | 0% | 36% |
| Barium | mg/L | - | - | 5 | September | 0.017 | 0.034 | 0.017 | 0.025 | - | - | - | 99% | 1% | 46% |
| | | | | | December | 0.017 | 0.033 | 0.017 | 0.029 | - | - | - | 96% | 1% | 70% |
| | | | | | March | 0.017 | 0.033 | 0.017 | 0.026 | - | - | - | 94% | 1% | 53% |
| | | | | | June | 0.017 | 0.033 | 0.017 | 0.022 | - | - | - | 95% | 1% | 30% |
| Boron | mg/L | 29 | 1.5 | 5 | September | 0.05 | 0.043 | 0.05 | 0.047 | - | - | - | -15% | 0% | -6% |
| | | | | | December | 0.05 | 0.043 | 0.05 | 0.044 | - | - | - | -14% | 0% | -12% |
| | | | | | March | 0.05 | 0.044 | 0.05 | 0.045 | - | - | - | -12% | 0% | -10% |
| | | | | | June | 0.05 | 0.042 | 0.05 | 0.047 | - | - | - | -15% | 0% | -5% |
| Cadmium[(b)] | mg/L | 0.00034 | 0.00004 | 0.05 | September | 0.0003 | **0.0004** | 0.0003 | **0.00035** | **COPC** | SV | **COPC** | 32% | 1% | 15% |
| | | | | | December | 0.0003 | **0.00041** | 0.0003 | **0.00038** | **COPC** | SV | **COPC** | 38% | 1% | 26% |
| | | | | | March | 0.0003 | **0.00043** | 0.0003 | **0.00037** | **COPC** | SV | **COPC** | 43% | 1% | 22% |
| | | | | | June | 0.0003 | **0.00037** | 0.0003 | 0.00032 | **COPC** | SV | SV | 24% | 0% | 7% |
| Chromium[(c)] | mg/L | - | 0.005 | 0.05 | September | 0.002 | 0.0018 | 0.002 | 0.0019 | - | - | - | -12% | 0% | -4% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | -1% | 0% | -2% |
| | | | | | March | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 3% | 0% | -1% |
| | | | | | June | 0.002 | 0.0018 | 0.002 | 0.0019 | - | - | - | -12% | 0% | -4% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.002 | 0.002 | 0.002 | 0.002 | - | SV | SV | 0% | 0% | 1% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | SV | - | -1% | 0% | -2% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.0019 | - | SV | - | 0% | 0% | -3% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | SV | - | 0% | 0% | 0% |
| Copper[(b)] | mg/L | - | 0.00104 | 0.3 | September | 0.001 | 0.0021 | 0.001 | 0.0015 | **COPC** | - | **COPC** | 113% | 1% | 53% |
| | | | | | December | 0.001 | 0.003 | 0.001 | 0.0025 | **COPC** | - | **COPC** | 198% | 1% | 147% |
| | | | | | March | 0.001 | 0.004 | 0.001 | 0.0028 | **COPC** | - | **COPC** | 302% | 1% | 176% |
| | | | | | June | 0.001 | 0.0031 | 0.001 | 0.0017 | **COPC** | - | **COPC** | 213% | 0% | 69% |
| Iron[(b)] | mg/L | - | 0.59 | 10 | September | 0.21 | 0.23 | 0.21 | 0.22 | - | - | - | 11% | -1% | 6% |
| | | | | | December | 0.21 | 0.38 | 0.21 | 0.34 | - | - | - | 81% | -1% | 60% |
| | | | | | March | 0.21 | 0.5 | 0.21 | 0.38 | - | - | - | 137% | -1% | 79% |
| | | | | | June | 0.21 | 0.29 | 0.21 | 0.24 | - | - | - | 39% | 0% | 12% |

**Table B 4: Projected Water Quality Screening Results for Hares Ears Pond Outflow**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Hares Ears Outflow | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Lead[(b)] | mg/L | - | 0.0075 | 0.2 | September | 0.001 | 0.0025 | 0.0010 | 0.0015 | - | - | - | 154% | 0% | 47% |
| | | | | | December | 0.001 | 0.0022 | 0.0010 | 0.0016 | - | - | - | 122% | 0% | 57% |
| | | | | | March | 0.001 | 0.0021 | 0.0010 | 0.0014 | - | - | - | 113% | 0% | 41% |
| | | | | | June | 0.001 | 0.0026 | 0.0010 | 0.0013 | - | - | - | 161% | 0% | 33% |
| Manganese[(b)] | mg/L | 2 | 0.38 | - | September | 0.53 | 0.41 | 0.53 | 0.48 | - | - | - | -23% | -1% | -9% |
| | | | | | December | 0.53 | 0.43 | 0.52 | 0.45 | - | - | - | -19% | -1% | -15% |
| | | | | | March | 0.53 | 0.44 | 0.53 | 0.46 | - | - | - | -18% | -1% | -13% |
| | | | | | June | 0.53 | 0.4 | 0.53 | 0.49 | - | - | - | -24% | 0% | -8% |
| Mercury | mg/L | - | 0.000026 | 0.005 | September | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | -1% | 0% | 0% |
| | | | | | December | 0.000026 | 0.000026 | 0.000026 | 0.000025 | - | - | - | -1% | 0% | -2% |
| | | | | | March | 0.000026 | 0.000026 | 0.000026 | 0.000025 | - | - | - | -1% | 0% | -3% |
| | | | | | June | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | -1% | 0% | 0% |
| Molybdenum | mg/L | - | 0.073 | - | September | 0.002 | 0.0054 | 0.002 | 0.0026 | - | - | - | 171% | 2% | 32% |
| | | | | | December | 0.002 | 0.0047 | 0.0021 | 0.0028 | - | - | - | 137% | 3% | 38% |
| | | | | | March | 0.002 | 0.0045 | 0.002 | 0.0025 | - | - | - | 127% | 2% | 27% |
| | | | | | June | 0.002 | 0.0056 | 0.002 | 0.0025 | - | - | - | 179% | 1% | 23% |
| Nickel[(b)] | mg/L | - | 0.025 | 0.5 | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | -1% | 0% | 1% |
| | | | | | December | 0.002 | 0.0023 | 0.002 | 0.0022 | - | - | - | 13% | 0% | 8% |
| | | | | | March | 0.002 | 0.0024 | 0.002 | 0.0022 | - | - | - | 20% | 0% | 9% |
| | | | | | June | 0.002 | 0.0025 | 0.002 | 0.0021 | - | - | - | 23% | 0% | 7% |
| Selenium | mg/L | - | 0.001 | 0.01 | September | 0.001 | 0.00099 | 0.001 | 0.001 | - | - | - | -1% | 0% | 0% |
| | | | | | December | 0.001 | 0.00099 | 0.0010 | 0.00098 | - | - | - | -1% | 0% | -2% |
| | | | | | March | 0.001 | 0.00099 | 0.001 | 0.00097 | - | - | - | -1% | 0% | -3% |
| | | | | | June | 0.001 | 0.0010 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| Silver | mg/L | - | 0.00025 | 0.05 | September | 0.00025 | 0.00021 | 0.00025 | 0.00024 | - | - | - | -14% | 0% | -5% |
| | | | | | December | 0.00025 | 0.00022 | 0.00025 | 0.00022 | - | - | - | -12% | -1% | -10% |
| | | | | | March | 0.00025 | 0.00022 | 0.00025 | 0.00023 | - | - | - | -11% | 0% | -9% |
| | | | | | June | 0.00025 | 0.00021 | 0.00025 | 0.00024 | - | - | - | -15% | 0% | -5% |
| Strontium | mg/L | - | 2.5 | - | September | 0.018 | 0.085 | 0.019 | 0.037 | - | - | - | 374% | 3% | 106% |
| | | | | | December | 0.018 | 0.072 | 0.019 | 0.042 | - | - | - | 298% | 4% | 135% |
| | | | | | March | 0.018 | 0.068 | 0.019 | 0.036 | - | - | - | 277% | 4% | 98% |
| | | | | | June | 0.018 | 0.088 | 0.018 | 0.032 | - | - | - | 390% | 2% | 78% |
| Thallium | mg/L | - | 0.0008 | - | September | 0.0001 | 0.00014 | 0.0001 | 0.00012 | - | - | - | 45% | 0% | 22% |
| | | | | | December | 0.0001 | 0.00014 | 0.00010 | 0.00012 | - | - | - | 35% | 0% | 25% |
| | | | | | March | 0.0001 | 0.00013 | 0.0001 | 0.00012 | - | - | - | 33% | 0% | 17% |
| | | | | | June | 0.0001 | 0.00015 | 0.0001 | 0.00011 | - | - | - | 47% | 0% | 15% |
| Uranium | mg/L | 0.033 | 0.015 | - | September | 0.0002 | 0.005 | 0.00022 | 0.0015 | - | - | - | 2411% | 10% | 660% |
| | | | | | December | 0.0002 | 0.004 | 0.00023 | 0.0019 | - | - | - | 1920% | 13% | 856% |
| | | | | | March | 0.0002 | 0.0038 | 0.00022 | 0.0015 | - | - | - | 1787% | 11% | 628% |
| | | | | | June | 0.0002 | 0.0052 | 0.00021 | 0.0012 | - | - | - | 2518% | 7% | 486% |
| Vanadium | mg/L | - | 0.12 | - | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | -1% | 0% | 1% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | -1% | 0% | -2% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.0019 | - | - | - | -1% | 0% | -3% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| Zinc[(b)] | mg/L | 0.028 | 0.013 | 0.5 | September | 0.009 | 0.017 | 0.0092 | 0.013 | **COPC** | - | - | 87% | 3% | 40% |
| | | | | | December | 0.009 | **0.028** | 0.0093 | 0.023 | **COPC** | - | **COPC** | 213% | 3% | 157% |
| | | | | | March | 0.009 | **0.031** | 0.0093 | 0.022 | **COPC** | - | **COPC** | 243% | 3% | 140% |
| | | | | | June | 0.009 | 0.028 | 0.0092 | 0.015 | **COPC** | - | **COPC** | 206% | 2% | 66% |

Notes:

a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up to date guideline than the corresponding CCME value.

b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.

c) The guideline for hexavalent chromium was used total chromium.

Double-underlined guidelines apply to the dissolved fraction

Bold values are above the short-term acute guidelines.

Grey shaded values are above the long-term chronic guidelines.

COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.

**Table B 5: Projected Water Quality Screening Results for East Branch of Salt Cove Brook**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | East Branch Salt Cove Brook | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Chloride | mg/L | 640 | 120 | - | September | 6.0 | 7.0 | 6.9 | 6.9 | - | - | - | 17% | 15% | 14% |
| | | | | | December | 9.5 | 10 | 10 | 10 | - | - | - | 8% | 8% | 7% |
| | | | | | March | 8.0 | 8.9 | 8.8 | 8.7 | - | - | - | 11% | 10% | 9% |
| | | | | | June | 8.0 | 8.9 | 8.8 | 8.8 | - | - | - | 11% | 10% | 9% |
| Fluoride | mg/L | - | 0.12 | - | September | 0.6 | 0.6 | 0.6 | 0.6 | SV | SV | SV | 4% | 1% | 2% |
| | | | | | December | 0.6 | 0.6 | 0.6 | 0.6 | SV | SV | SV | 3% | 1% | 2% |
| | | | | | March | 0.6 | 0.6 | 0.6 | 0.6 | SV | SV | SV | 3% | 1% | 2% |
| | | | | | June | 0.7 | 0.7 | 0.7 | 0.7 | SV | SV | SV | 2% | 0% | 1% |
| Ammonia | mg-N/L | - | 5.2 | 2 | September | 0.03 | 0.031 | 0.03 | 0.03 | - | - | - | 5% | 0% | 0% |
| | | | | | December | 0.03 | 0.031 | 0.03 | 0.03 | - | - | - | 3% | 0% | 0% |
| | | | | | March | 0.03 | 0.031 | 0.03 | 0.03 | - | - | - | 3% | 0% | 0% |
| | | | | | June | 0.03 | 0.032 | 0.03 | 0.03 | - | - | - | 5% | 0% | 0% |
| Nitrate | mg-N/L | 124 | 2.9 | - | September | 0.05 | 0.22 | 0.054 | 0.065 | - | - | - | 343% | 9% | 30% |
| | | | | | December | 0.05 | 0.16 | 0.054 | 0.068 | - | - | - | 227% | 9% | 36% |
| | | | | | March | 0.05 | 0.16 | 0.054 | 0.064 | - | - | - | 213% | 9% | 29% |
| | | | | | June | 0.05 | 0.24 | 0.054 | 0.062 | - | - | - | 378% | 9% | 24% |
| Nitrite | mg-N/L | - | 0.06 | - | September | 0.05 | 0.053 | 0.05 | 0.05 | - | - | - | 6% | 0% | 0% |
| | | | | | December | 0.05 | 0.052 | 0.05 | 0.05 | - | - | - | 4% | 0% | 0% |
| | | | | | March | 0.05 | 0.052 | 0.05 | 0.05 | - | - | - | 4% | 0% | 0% |
| | | | | | June | 0.05 | 0.053 | 0.05 | 0.05 | - | - | - | 7% | 0% | 0% |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 | September | 0.05 | 0.23 | 0.055 | 0.065 | - | - | - | 354% | 9% | 30% |
| | | | | | December | 0.05 | 0.17 | 0.055 | 0.068 | - | - | - | 235% | 9% | 36% |
| | | | | | March | 0.05 | 0.16 | 0.055 | 0.064 | - | - | - | 220% | 9% | 29% |
| | | | | | June | 0.05 | 0.25 | 0.054 | 0.062 | - | - | - | 390% | 9% | 24% |
| Aluminum[(b)] | mg/L | - | 0.5 | - | September | 0.18 | 0.19 | 0.19 | 0.19 | - | - | - | 7% | 8% | 7% |
| | | | | | December | 0.16 | 0.17 | 0.17 | 0.17 | - | - | - | 9% | 9% | 8% |
| | | | | | March | 0.13 | 0.15 | 0.15 | 0.14 | - | - | - | 12% | 12% | 10% |
| | | | | | June | 0.18 | 0.19 | 0.19 | 0.19 | - | - | - | 6% | 8% | 7% |
| Arsenic | mg/L | - | 0.005 | 0.5 | September | 0.002 | 0.0021 | 0.002 | 0.0021 | - | - | - | 7% | 0% | 3% |
| | | | | | December | 0.002 | 0.0021 | 0.002 | 0.0021 | - | - | - | 6% | 0% | 4% |
| | | | | | March | 0.002 | 0.0021 | 0.002 | 0.0021 | - | - | - | 5% | 0% | 3% |
| | | | | | June | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 7% | 0% | 2% |
| Barium | mg/L | - | - | 5 | September | 0.012 | 0.013 | 0.012 | 0.012 | - | - | - | 12% | 2% | 5% |
| | | | | | December | 0.011 | 0.012 | 0.011 | 0.012 | - | - | - | 12% | 3% | 8% |
| | | | | | March | 0.009 | 0.01 | 0.0094 | 0.0098 | - | - | - | 15% | 4% | 9% |
| | | | | | June | 0.011 | 0.012 | 0.011 | 0.012 | - | - | - | 12% | 3% | 5% |
| Boron | mg/L | 29 | 1.5 | 5 | September | 0.002 | 0.0045 | 0.0043 | 0.0041 | - | - | - | 125% | 114% | 107% |
| | | | | | December | 0.002 | 0.0044 | 0.0043 | 0.004 | - | - | - | 119% | 113% | 100% |
| | | | | | March | 0.002 | 0.0044 | 0.0043 | 0.004 | - | - | - | 119% | 113% | 102% |
| | | | | | June | 0.002 | 0.0045 | 0.0043 | 0.0041 | - | - | - | 124% | 113% | 107% |
| Cadmium[(b)] | mg/L | 0.00034 | 0.00004 | 0.05 | September | 0.0003 | 0.00031 | 0.0003 | 0.0003 | SV | SV | SV | 2% | 0% | 1% |
| | | | | | December | 0.0003 | 0.00031 | 0.0003 | 0.0003 | SV | SV | SV | 2% | 0% | 1% |
| | | | | | March | 0.0003 | 0.00031 | 0.0003 | 0.0003 | SV | SV | SV | 2% | 0% | 1% |
| | | | | | June | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 0% |
| Chromium[(c)] | mg/L | - | 0.005 | 0.05 | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | -1% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | -1% | 0% | 0% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 5% |
| | | | | | December | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 5% |
| | | | | | March | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 4% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | SV | SV | SV | 6% | 5% | 5% |
| Copper[(b)] | mg/L | - | 0.00104 | 0.3 | September | 0.001 | 0.0011 | 0.001 | 0.001 | **COPC** | - | - | 7% | 0% | 3% |
| | | | | | December | 0.001 | 0.0011 | 0.001 | 0.0011 | **COPC** | - | **COPC** | 11% | 0% | 7% |
| | | | | | March | 0.001 | 0.0012 | 0.001 | 0.0011 | **COPC** | - | **COPC** | 17% | 0% | 8% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | **COPC** | - | - | 13% | 0% | 3% |
| Iron[(b)] | mg/L | - | 0.59 | 10 | September | 1.4 | 1.4 | 1.4 | 1.4 | - | - | - | -5% | -4% | -4% |
| | | | | | December | 0.63 | 0.62 | 0.61 | 0.62 | - | - | - | -2% | -3% | -2% |
| | | | | | March | 0.25 | 0.26 | 0.25 | 0.26 | - | - | - | 6% | -1% | 2% |
| | | | | | June | 0.65 | 0.63 | 0.63 | 0.63 | - | - | - | -3% | -3% | -3% |

**Table B 5: Projected Water Quality Screening Results for East Branch of Salt Cove Brook**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | East Branch Salt Cove Brook | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Lead[(b)] | mg/L | - | 0.0075 | 0.2 | September | 0.001 | 0.0011 | 0.0010 | 0.001 | - | - | - | 9% | 0% | 2% |
| | | | | | December | 0.00055 | 0.00065 | 0.00057 | 0.0006 | - | - | - | 17% | 4% | 9% |
| | | | | | March | 0.0005 | 0.00059 | 0.00052 | 0.00054 | - | - | - | 18% | 5% | 9% |
| | | | | | June | 0.0008 | 0.00091 | 0.00081 | 0.00083 | - | - | - | 14% | 1% | 3% |
| Manganese[(b)] | mg/L | 2 | 0.38 | - | September | 0.076 | 0.096 | 0.097 | 0.095 | - | - | - | 27% | 28% | 25% |
| | | | | | December | 0.046 | 0.068 | 0.068 | 0.065 | - | - | - | 48% | 50% | 42% |
| | | | | | March | 0.042 | 0.064 | 0.065 | 0.062 | - | - | - | 53% | 54% | 47% |
| | | | | | June | 0.041 | 0.063 | 0.064 | 0.062 | - | - | - | 54% | 56% | 51% |
| Mercury | mg/L | - | 0.000026 | 0.005 | September | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| Molybdenum | mg/L | - | 0.073 | - | September | 0.002 | 0.0022 | 0.002 | 0.002 | - | - | - | 10% | 0% | 2% |
| | | | | | December | 0.002 | 0.0022 | 0.002 | 0.002 | - | - | - | 8% | 0% | 2% |
| | | | | | March | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 7% | 0% | 1% |
| | | | | | June | 0.002 | 0.0022 | 0.002 | 0.002 | - | - | - | 11% | 0% | 1% |
| Nickel[(b)] | mg/L | - | 0.025 | 0.5 | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 1% | 0% | 0% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 1% | 0% | 0% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 1% | 0% | 0% |
| Selenium | mg/L | - | 0.001 | 0.01 | September | 0.001 | 0.0010 | 0.0010 | 0.001 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.001 | 0.0010 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.001 | 0.0010 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.001 | 0.0010 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| Silver | mg/L | - | 0.00025 | 0.05 | September | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | -1% | 0% | 0% |
| | | | | | December | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | -1% | 0% | 0% |
| | | | | | March | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | -1% | 0% | 0% |
| | | | | | June | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | -1% | 0% | 0% |
| Strontium | mg/L | - | 2.5 | - | September | 0.011 | 0.016 | 0.011 | 0.012 | - | - | - | 41% | 3% | 11% |
| | | | | | December | 0.0083 | 0.012 | 0.0087 | 0.0099 | - | - | - | 44% | 6% | 20% |
| | | | | | March | 0.006 | 0.0095 | 0.0066 | 0.0074 | - | - | - | 58% | 10% | 23% |
| | | | | | June | 0.008 | 0.013 | 0.0085 | 0.0091 | - | - | - | 61% | 6% | 14% |
| Thallium | mg/L | - | 0.0008 | - | September | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 3% | 0% | 1% |
| | | | | | December | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 2% | 0% | 1% |
| | | | | | March | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 2% | 0% | 1% |
| | | | | | June | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 3% | 0% | 1% |
| Uranium | mg/L | 0.033 | 0.015 | - | September | 0.0002 | 0.0005 | 0.0002 | 0.00026 | - | - | - | 148% | 0% | 31% |
| | | | | | December | 0.0002 | 0.00042 | 0.0002 | 0.00028 | - | - | - | 110% | 1% | 41% |
| | | | | | March | 0.0002 | 0.0004 | 0.0002 | 0.00026 | - | - | - | 101% | 1% | 30% |
| | | | | | June | 0.0002 | 0.00051 | 0.0002 | 0.00025 | - | - | - | 154% | 0% | 23% |
| Vanadium | mg/L | - | 0.12 | - | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| Zinc[(b)] | mg/L | 0.028 | 0.013 | 0.5 | September | 0.005 | 0.0057 | 0.0052 | 0.0054 | - | - | - | 14% | 4% | 7% |
| | | | | | December | 0.007 | 0.0082 | 0.0071 | 0.0078 | - | - | - | 17% | 2% | 11% |
| | | | | | March | 0.005 | 0.0065 | 0.0052 | 0.0058 | - | - | - | 29% | 4% | 16% |
| | | | | | June | 0.005 | 0.0064 | 0.0052 | 0.0055 | - | - | - | 28% | 4% | 9% |

Notes:

a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up to date guideline than the corresponding CCME value.

b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.

c) The guideline for hexavalent chromium was used total chromium.

Double-underlined guidelines apply to the dissolved fraction

Grey shaded values are above the long-term chronic guidelines.

COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.

**Table B-6: Projected Water Quality Screening Results for Salt Cove Brook (WS-10)**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Salt Cove Brook Outflow (WS-10) | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Chloride | mg/L | 640 | 120 | - | September | 12 | 9.2 | 9.2 | 9.2 | - | - | - | -23% | -24% | -24% |
| | | | | | December | 12 | 11 | 11 | 11 | - | - | - | -8% | -8% | -9% |
| | | | | | March | 13 | 11 | 11 | 11 | - | - | - | -18% | -18% | -18% |
| | | | | | June | 11 | 9.8 | 9.8 | 9.8 | - | - | - | -11% | -11% | -11% |
| Fluoride | mg/L | - | 0.12 | - | September | 0.62 | 0.63 | 0.62 | 0.63 | SV | SV | SV | 2% | 1% | 1% |
| | | | | | December | 0.62 | 0.63 | 0.62 | 0.63 | SV | SV | SV | 2% | 1% | 1% |
| | | | | | March | 0.62 | 0.63 | 0.62 | 0.63 | SV | SV | SV | 2% | 1% | 1% |
| | | | | | June | 0.73 | 0.74 | 0.73 | 0.73 | SV | SV | SV | 1% | 0% | 0% |
| Ammonia | mg-N/L | - | 5.2 | 2 | September | 0.05 | 0.04 | 0.039 | 0.039 | - | - | - | -21% | -22% | -22% |
| | | | | | December | 0.04 | 0.035 | 0.034 | 0.034 | - | - | - | -13% | -14% | -14% |
| | | | | | March | 0.03 | 0.03 | 0.03 | 0.03 | - | - | - | 2% | 0% | 0% |
| | | | | | June | 0.045 | 0.038 | 0.037 | 0.037 | - | - | - | -17% | -18% | -18% |
| Nitrate | mg-N/L | 124 | 2.9 | - | September | 0.05 | 0.15 | 0.052 | 0.058 | - | - | - | 191% | 5% | 17% |
| | | | | | December | 0.08 | 0.13 | 0.066 | 0.073 | - | - | - | 58% | -18% | -8% |
| | | | | | March | 0.075 | 0.12 | 0.064 | 0.069 | - | - | - | 60% | -15% | -8% |
| | | | | | June | 0.09 | 0.17 | 0.07 | 0.075 | - | - | - | 92% | -22% | -17% |
| Nitrite | mg-N/L | - | 0.06 | - | September | 0.05 | 0.052 | 0.05 | 0.05 | - | - | - | 3% | 0% | 0% |
| | | | | | December | 0.05 | 0.051 | 0.05 | 0.05 | - | - | - | 2% | 0% | 0% |
| | | | | | March | 0.05 | 0.051 | 0.05 | 0.05 | - | - | - | 2% | 0% | 0% |
| | | | | | June | 0.05 | 0.052 | 0.05 | 0.05 | - | - | - | 4% | 0% | 0% |
| Nitrate+ Nitrite as N | mg-N/L | - | - | 10 | September | 0.05 | 0.15 | 0.053 | 0.058 | - | - | - | 197% | 5% | 17% |
| | | | | | December | 0.08 | 0.13 | 0.066 | 0.073 | - | - | - | 60% | -17% | -8% |
| | | | | | March | 0.075 | 0.12 | 0.064 | 0.069 | - | - | - | 63% | -15% | -8% |
| | | | | | June | 0.09 | 0.18 | 0.07 | 0.075 | - | - | - | 96% | -22% | -17% |
| Aluminum[(b)] | mg/L | - | 0.5 | - | September | 0.19 | 0.19 | 0.19 | 0.19 | - | - | - | 1% | 1% | 1% |
| | | | | | December | 0.27 | 0.21 | 0.21 | 0.21 | - | - | - | -20% | -20% | -20% |
| | | | | | March | 0.23 | 0.18 | 0.18 | 0.18 | - | - | - | -20% | -20% | -21% |
| | | | | | June | 0.27 | 0.22 | 0.23 | 0.22 | - | - | - | -15% | -15% | -15% |
| Arsenic | mg/L | - | 0.005 | 0.5 | September | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 4% | 0% | 1% |
| | | | | | December | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 3% | 0% | 2% |
| | | | | | March | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 3% | 0% | 1% |
| | | | | | June | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 4% | 0% | 1% |
| Barium | mg/L | - | - | 5 | September | 0.036 | 0.023 | 0.023 | 0.023 | - | - | - | -36% | -37% | -37% |
| | | | | | December | 0.029 | 0.02 | 0.019 | 0.019 | - | - | - | -31% | -33% | -32% |
| | | | | | March | 0.021 | 0.015 | 0.015 | 0.015 | - | - | - | -28% | -30% | -29% |
| | | | | | June | 0.026 | 0.018 | 0.018 | 0.018 | - | - | - | -29% | -31% | -30% |
| Boron | mg/L | 29 | 1.5 | 5 | September | 0.002 | 0.0034 | 0.0033 | 0.0032 | - | - | - | 69% | 63% | 59% |
| | | | | | December | 0.002 | 0.0033 | 0.0032 | 0.0031 | - | - | - | 66% | 62% | 55% |
| | | | | | March | 0.002 | 0.0033 | 0.0032 | 0.0031 | - | - | - | 66% | 62% | 56% |
| | | | | | June | 0.002 | 0.0034 | 0.0032 | 0.0032 | - | - | - | 69% | 62% | 59% |
| Cadmium[(b)] | mg/L | 0.00034 | 0.00004 | 0.05 | September | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 0% |
| | | | | | December | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 1% |
| | | | | | March | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 1% |
| | | | | | June | 0.0003 | 0.0003 | 0.0003 | 0.0003 | SV | SV | SV | 1% | 0% | 0% |
| Chromium[(c)] | mg/L | - | 0.005 | 0.05 | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| Cobalt[(b)] | mg/L | - | 0.00078 | - | September | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 3% |
| | | | | | December | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 2% |
| | | | | | March | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 2% |
| | | | | | June | 0.001 | 0.001 | 0.001 | 0.001 | SV | SV | SV | 3% | 3% | 3% |
| Copper[(b)] | mg/L | - | 0.00104 | 0.3 | September | 0.001 | 0.001 | 0.001 | 0.001 | - | - | - | 4% | 0% | 1% |
| | | | | | December | 0.0015 | 0.0013 | 0.0012 | 0.0013 | - | - | - | -14% | -18% | -16% |
| | | | | | March | 0.0015 | 0.0013 | 0.0012 | 0.0013 | - | - | - | -12% | -18% | -15% |
| | | | | | June | 0.001 | 0.0011 | 0.001 | 0.001 | **COPC** | - | - | 7% | 0% | 2% |
| Iron[(b)] | mg/L | - | 0.59 | 10 | September | 0.87 | 1.1 | 1.1 | 1.1 | **COPC** | **COPC** | **COPC** | 31% | 32% | 32% |
| | | | | | December | 0.52 | 0.57 | 0.57 | 0.57 | - | - | - | 10% | 10% | 10% |
| | | | | | March | 0.28 | 0.27 | 0.26 | 0.26 | - | - | - | -2% | -5% | -4% |
| | | | | | June | 0.59 | 0.61 | 0.61 | 0.61 | **COPC** | **COPC** | **COPC** | 4% | 4% | 4% |

**Table B-6: Projected Water Quality Screening Results for Salt Cove Brook (WS-10)**

| Parameter | Units | Water Quality Guidelines for the Protection of Aquatic Life(a) | | Newfoundland and Labrador Regulation 65/03 | Month | Salt Cove Brook Outflow (WS-10) | | | | COPC Screening | | | Percent Change | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short-Term Acute | Long-Term Chronic | | | Existing Conditions | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure | Operations | Closure | Post-Closure |
| Lead[(b)] | mg/L | - | 0.0075 | 0.2 | September | 0.0018 | 0.0014 | 0.0014 | 0.0014 | - | - | - | -22% | -25% | -24% |
| | | | | | December | 0.0025 | 0.0015 | 0.0014 | 0.0014 | - | - | - | -41% | -42% | -42% |
| | | | | | March | 0.0018 | 0.0011 | 0.0011 | 0.0011 | - | - | - | -37% | -39% | -38% |
| | | | | | June | 0.0023 | 0.0015 | 0.0015 | 0.0015 | - | - | - | -33% | -35% | -35% |
| Manganese[(b)] | mg/L | 2 | 0.38 | - | September | 0.17 | 0.13 | 0.13 | 0.13 | - | - | - | -24% | -24% | -25% |
| | | | | | December | 0.11 | 0.088 | 0.088 | 0.086 | - | - | - | -22% | -22% | -24% |
| | | | | | March | 0.092 | 0.077 | 0.077 | 0.075 | - | - | - | -17% | -16% | -18% |
| | | | | | June | 0.083 | 0.072 | 0.072 | 0.071 | - | - | - | -13% | -12% | -14% |
| Mercury | mg/L | - | 0.000026 | 0.005 | September | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.000026 | 0.000026 | 0.000026 | 0.000026 | - | - | - | 0% | 0% | 0% |
| Molybdenum | mg/L | - | 0.073 | - | September | 0.011 | 0.0061 | 0.006 | 0.006 | - | - | - | -45% | -45% | -45% |
| | | | | | December | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 4% | 0% | 1% |
| | | | | | March | 0.0065 | 0.0041 | 0.004 | 0.004 | - | - | - | -37% | -38% | -38% |
| | | | | | June | 0.002 | 0.0021 | 0.002 | 0.002 | - | - | - | 6% | 0% | 1% |
| Nickel[(b)] | mg/L | - | 0.025 | 0.5 | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 1% | 0% | 0% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 1% | 0% | 0% |
| Selenium | mg/L | - | 0.001 | 0.01 | September | 0.001 | 0.0010 | 0.001 | 0.001 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.001 | 0.0010 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.001 | 0.0010 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.001 | 0.0010 | 0.001 | 0.0010 | - | - | - | 0% | 0% | 0% |
| Silver | mg/L | - | 0.00025 | 0.05 | September | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.00025 | 0.00025 | 0.00025 | 0.00025 | - | - | - | -1% | 0% | 0% |
| Strontium | mg/L | - | 2.5 | - | September | 0.038 | 0.025 | 0.023 | 0.024 | - | - | - | -33% | -39% | -38% |
| | | | | | December | 0.025 | 0.018 | 0.016 | 0.016 | - | - | - | -28% | -35% | -33% |
| | | | | | March | 0.021 | 0.014 | 0.013 | 0.013 | - | - | - | -30% | -37% | -35% |
| | | | | | June | 0.027 | 0.019 | 0.017 | 0.017 | - | - | - | -29% | -38% | -36% |
| Thallium | mg/L | - | 0.0008 | - | September | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 2% | 0% | 1% |
| | | | | | December | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 1% | 0% | 1% |
| | | | | | March | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 1% | 0% | 0% |
| | | | | | June | 0.0001 | 0.0001 | 0.0001 | 0.0001 | - | - | - | 2% | 0% | 0% |
| Uranium | mg/L | 0.033 | 0.015 | - | September | 0.0023 | 0.0013 | 0.0011 | 0.0012 | - | - | - | -44% | -51% | -49% |
| | | | | | December | 0.00095 | 0.00066 | 0.00054 | 0.00058 | - | - | - | -31% | -43% | -39% |
| | | | | | March | 0.0011 | 0.00069 | 0.00058 | 0.00061 | - | - | - | -34% | -45% | -42% |
| | | | | | June | 0.00085 | 0.00066 | 0.00049 | 0.00052 | - | - | - | -22% | -42% | -39% |
| Vanadium | mg/L | - | 0.12 | - | September | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | December | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | March | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| | | | | | June | 0.002 | 0.002 | 0.002 | 0.002 | - | - | - | 0% | 0% | 0% |
| Zinc[(b)] | mg/L | 0.028 | 0.013 | 0.5 | September | 0.007 | 0.0063 | 0.006 | 0.0061 | - | - | - | -10% | -14% | -13% |
| | | | | | December | 0.0075 | 0.0079 | 0.0073 | 0.0076 | - | - | - | 5% | -3% | 2% |
| | | | | | March | 0.012 | 0.0087 | 0.008 | 0.0084 | - | - | - | -24% | -30% | -27% |
| | | | | | June | 0.008 | 0.0071 | 0.0065 | 0.0066 | - | - | - | -11% | -19% | -17% |

Notes:

a) The long-term chronic guidelines are a combination of the CCME long-term guidelines for the protection of aquatic life and the FEQGs. The FEQGs were used to supplement the CCME guidelines for parameters without guidelines and in cases where the FEQG provides a more up to date guideline than the corresponding CCME value.

b) Guideline is dependent on one or more ETMF. Refer to Section 3.3 for details.

c) The guideline for hexavalent chromium was used total chromium.

Double-underlined guidelines apply to the dissolved fraction

Grey shaded values are above the long-term chronic guidelines.

COPC = constituent of potential concern; SV = projected concentrations and existing conditions are above screening value but projections are within 10% of existing conditions; - = projected concentration is less than the screening value and/or existing conditions.

# Appendix 6.5-4: MLARD Phase 1 Report Geochemistry Testing Program Summary Memo

# SOUTH RIDGE ML/ARD ASSESSMENT: PHASE I

## PREPARED FOR:
## CANADA FLUORSPAR INC.

9 January 2026

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# REVISION HISTORY

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# EXECUTIVE SUMMARY

Canada Fluorspar Inc. (CFI) plans to develop the South Ridge Project located approximately 4 kilometers south-southwest of the town of St. Lawrence, Newfoundland. CFI intends to mine the fluorspar (fluorite) ore from Director Vein, which is hosted in the St. Lawrence Granite and tuffisite. The deposit is overlain by an average of 5 m of overburden. The South Ridge mine will consist of a single open pit operating over 18 months. Mining is expected to generate approximately 0.7 million tonnes of overburden, 4 million tonnes of mine rock, and 1 million tonnes of ore. The ore will be processed at the existing mill and mine rock will be stockpiled and is expected to be sold for use as construction aggregate. After mining, the site will be reclaimed, including natural flooding of the pit.

The report's main objective is to provide a preliminary evaluation of Acid Rock Drainage (ARD) and Metal Leaching (ML) risks associated with the exposure of project materials. The evaluation is based on geochemical testing of 25 ore and 57 mine rock samples collected from drill cores, as well as four historical tailings and 25 overburden samples obtained from test pits. Testing included acid base accounting (ABA), Shake Flask Extraction (SFE), and trace elements analysis of all samples. Mineralogical composition and Net Acid Generation (NAG) tests were conducted on selected samples. In addition, five surface water samples were collected from pools in contact with historical tailings from the former Director underground mine.

For the ARD assessment, materials with carbonate Neutralization Potential Ratio (NPR) greater than 2 are classified Non-Potentially Acid Generating (NPAG), those with NPR between 2 and 1 are classified as Uncertain Rock Type, and materials with NPR less than 1 are classified as Potentially Acid Generating (PAG). To assess metal leaching, SFE leachates and contact water were screened against the Newfoundland and Labrador Regulation 65/03 effluent limits and Canadian Council of Ministers of the Environment (CCME) guidelines for protection of freshwater aquatic life.

The ARD potential assessment for the CFI South Ridge Project concludes that ore, overburden, and historical tailings are Non-Potentially Acid Generating (NPAG), while a small fraction (<4%) of mine rock is conservatively classified as PAG based on the conservative carbonate NPR being less than 1. However, these mine rock samples possess adequate neutralization potential and are unlikely to generate acidic drainage based on evidence from Sobek NPR, NAG and mineralogical testing. The overall ARD risk is low and can be mitigated by mixing of PAG and NPAG rock during blasting, excavation, and stockpiling.

Metal concentrations in SFE leachates are fully compliant with Newfoundland and Labrador Regulation 65/03 limits, with only limited exceedances of short-term CCME guidelines for cadmium and zinc, indicating a low likelihood of acute toxicity. Concentration of these metals in SFE leachates were higher than those in contact water from historical tailings. Exceedances of long-term CCME guidelines—most commonly fluoride, copper, cadmium, lead, aluminum, and zinc—identify potential elements of interest which might affect receiving environment. These exceedances do not represent regulatory non-compliance, as CCME thresholds are not directly applicable to leach tests, but they can guide water quality predictions and assessment of the receiving environment.

Overall, the findings indicate low ARD and ML risks. Future work should focus on ongoing kinetic testing, water quality prediction, and subsequent aquatic effects assessment.

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Appendix B. Sample Logs and Photographs
Appendix C. Sample Preparation Diagram
Appendix D. Certificates of Analysis

# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| ABA | Acid Base Accounting |
| AGS | AGS Mine |
| AP | Acid Potential |
| ARD | Acid Rock Drainage |
| BC | British Columbia |
| CCME | Canadian Council of Ministers of the Environment |
| CFI | Canada Fluorspar Inc. |
| COA | Certificate of Approval |
| DMS | Dense Media Separation |
| DZO | Director Zone Ore |
| HCT | Humidity Cell Test |
| ICP-MS | Inductively Coupled Plasma Mass Spectrometry |
| LC/HC | Low-/High-Carbonate |
| ML | Metal Leaching |
| NAG | Net Acid Generation |
| NP | Neutralization Potential |
| NPAG | Non-Potentially Acid Generating |
| NPR | Neutralization Potential Ratio |
| PAG | Potentially Acid Generating |
| QP | Qualified Professional |
| RDL | Reporting Detection Limit |
| SFE | Shake Flask Extraction |
| SLG | St. Lawrence Granite |
| TC | Total Carbon |
| TIC | Total Inorganic Carbon |
| TFS | Tuffisite |
| TIC | Total Inorganic Carbon |
| UV-Vis | Ultraviolet-Visible Spectrophotometry |
| wt% | Weight Percent |

# 1 INTRODUCTION

## 1.1 BACKGROUND

Canada Fluorspar Inc. (CFI) plans to develop the South Ridge Mine (the Project). The project is located approximately 4 kilometers south-southwest of the town of St. Lawrence, between the existing AGS Mine and the Blue Beach Marine Terminal operated by CFI ( Figure 1.2-1).

The Project will consist of a single active open pit (South Ridge Pit) with mining occurring over an 18-month operational period (Figure 1.2-2). Mining is expected to generate approximately 0.7 million tonnes of overburden, 4 million tonnes of mine rock, and 1 million tonne of ore from the Director Zone. Mine rock produced by the Project is expected to be of sufficiently high quality to be used as construction aggregate to support the development of Project infrastructure. Unused mine rock and overburden will be stockpiled to the northeast of the pit, while the ore will be processed at the AGS mill. Concentrate will be produced through dense media separation (DMS) followed by flotation, with tailings deposited in the existing tailings management facility. The concentrate will be shipped off-site through the existing Blue Beach Marine Terminal. After operations, CFI intends to sell mine rock as an aggregate and reclaim the South Ridge Pit, including natural flooding of the open pit.

The Project will consist of a single active open pit (South Ridge Pit) with mining occurring over an 18-month operational period (Figure 1.2-2). Mining is expected to generate approximately 0.7 million tonnes of overburden, 4 million tonnes of mine rock, and 1 million tonne of ore from the Director Zone. Mine rock produced by the Project is expected to be of sufficiently high quality to be used as construction aggregate to support the development of Project infrastructure. Unused mine rock and overburden will be stockpiled to the northeast of the pit, while the ore will be processed at the AGS mill. Concentrate will be produced through dense media separation (DMS) followed by flotation, with tailings deposited in the existing tailings management facility. The concentrate will be shipped off-site through the existing Blue Beach Marine Terminal. After operations, CFI intends to sell mine rock as an aggregate and reclaim the South Ridge Pit, including natural flooding of the open pit.

## 1.2 STUDY OBJECTIVES

This report is intended to provide a preliminary evaluation of Acid Rock Drainage (ARD) and Metal Leaching (ML) potential of ore, mine rock, overburden and tailings generated by the Project. The investigation consists of two phases. The first phase, this report, is intended to screen the exposed materials for ARD/ML potential using static testing as described below. The second phase of the ARD/ML assessment will depend on the results of the first phase and will focus on kinetic testing, additional static testing, as well as further mineralogical work.

This report outlines the results of Phase I which focuses on the preliminary static testing program. Static testing provides qualitative information important for classification of mine waste materials and determination of parameters of concern. The classification is required for mine-waste management and development of mitigation plans as the project progresses.

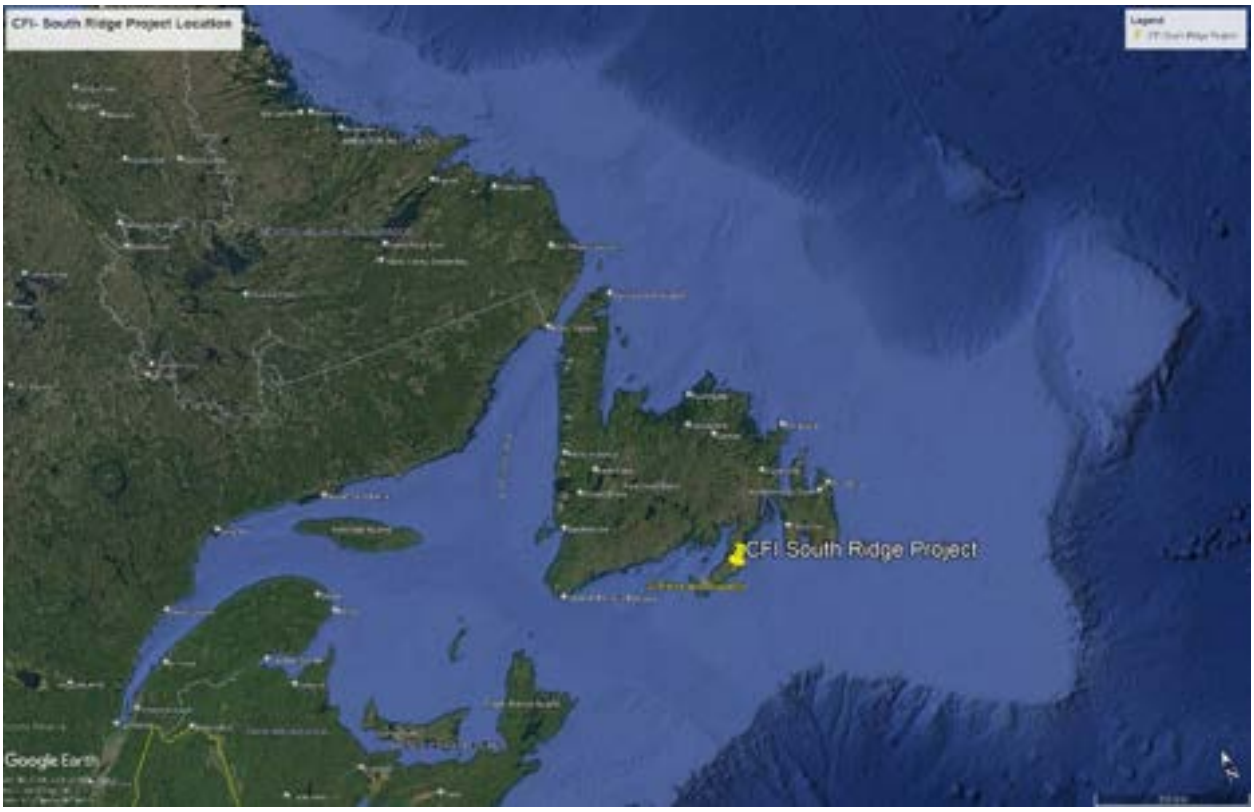


Figure 1.2-1: CFI South Ridge Project Location.

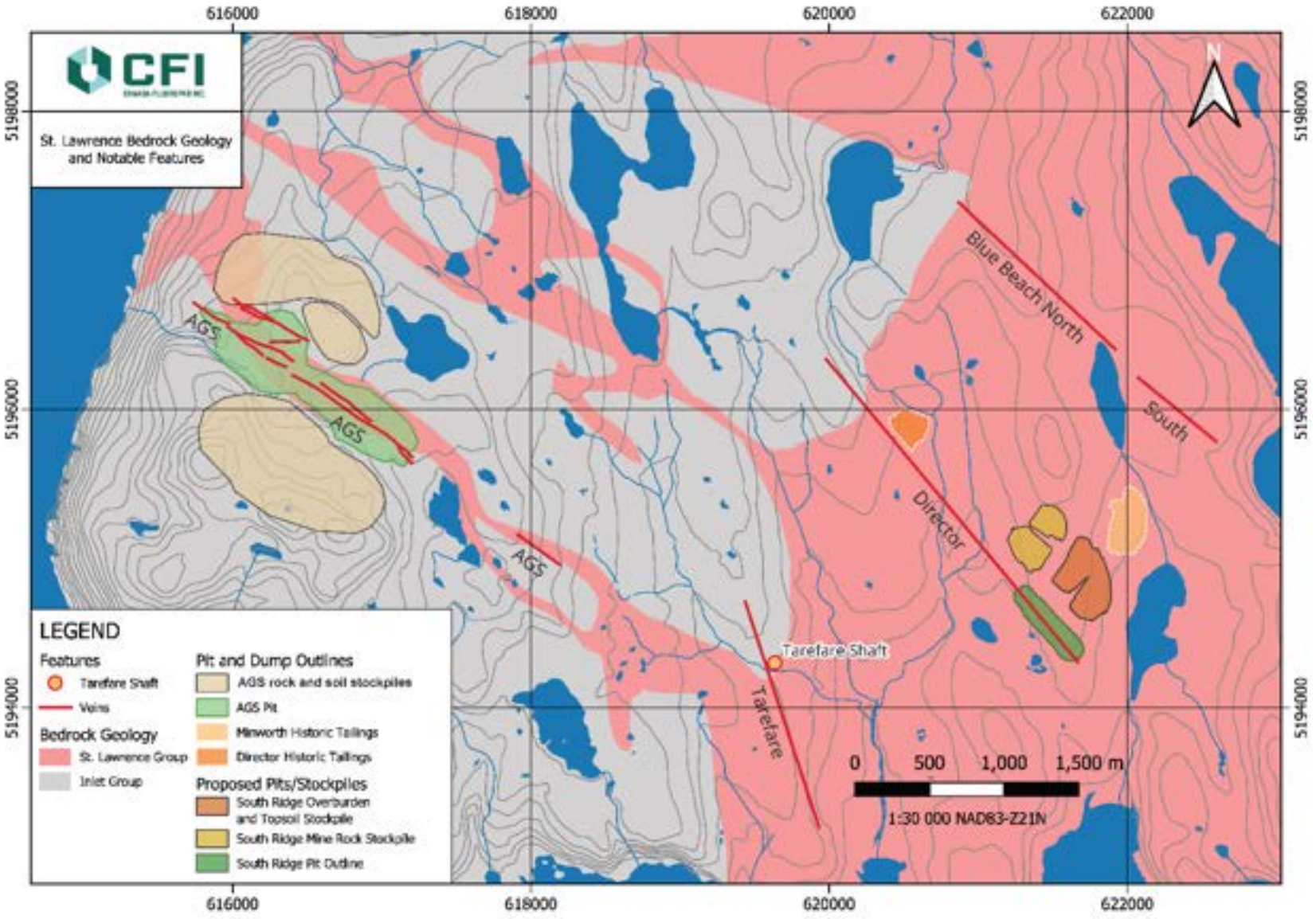


Figure 1.2-2: Bedrock Geology and Project Components.

# 2 GEOLOGICAL SETTING

## 2.1 PHYSIOGRAPHY AND CLIMATE

Elevations across the Project area range from near sea level to approximately 100 m above sea level, within a landscape of generally low to moderate relief. The area contains numerous lakes, sparse coniferous forest, and frequent bedrock outcrops, particularly near the coast and along topographic highs, streams, and road cuts. Overburden thickness generally ranges from 1 to 5 m but locally exceeds 30 m. Much of the Project area is treeless and characterized by marshes and peat bogs, resulting in poor drainage and southward-flowing surface water.

South-eastern Newfoundland has a northern Atlantic climate with short summers and prolonged winters, typically from November to April. Average winter temperatures are around −5 °C, with extremes down to approximately −18 °C, while summer temperatures average about 10 °C and range from 5 °C to 24 °C. Annual precipitation averages 140 to 180 cm (Wheeler & Owen 2023).

## 2.2 GEOLOGY

The St. Lawrence fluorspar deposits are located within the Avalon Belt of the Appalachian orogenic belt in eastern Newfoundland. The Avalon Belt is characterized by Late Precambrian successions dominated by subaerial volcanic rocks, along with marine to terrestrial clastic sedimentary units. These sequences are overlain by Cambrian-age shallow marine sedimentary rocks and minor volcanic units (O'Brien et al. 1999). Devonian to Carboniferous sedimentary and volcanic rocks unconformably overlie the older successions in several areas (Tilsely 1972). Multiple intrusive events, including Late Precambrian and Late Devonian to Carboniferous granitic intrusions, may be observed within the Avalon Zone (Van Alstine 1948).

The Project area is underlain by the St. Lawrence Granite, a high-level, peralkaline Carboniferous pluton, and related felsic intrusions (described as porphyry or rhyolite) emplaced into Late Precambrian and Cambrian units (Wilson 2000). These units are represented by argillaceous metasediments and minor metavolcanic rocks of the Inlet Group, including porphyritic andesite, lithic and crystal tuff, and brecciated tuff (RPA 2013). Miarolitic cavities are locally developed within the granite, particularly near contacts with mineralized veins, with grain size decreasing toward vein margins.

Fluorspar is the commercial name for the mineral fluorite ($CaF_2$). The fluorspar predominantly occurs within a network of at least 40 steeply dipping veins extending up to 2-3 km in length and locally exceeding 30 m in thickness (Wilson 2000; RPA 2013). The veins are spatially and genetically associated with the St. Lawrence Granite and associated felsic intrusions and are structurally controlled by faults that experienced multiple episodes of movement prior to and during mineralization. These veins typically have high-grade cores and irregular amounts of mineralized granite breccia along one or both sides referred as tuffisite by local geologists (Van Alstine 1948). Within these veins, the most common gangue mineral is quartz. Calcite occurs in nearly all the fluorite veins. Barite, galena, sphalerite, and hematite are common, while chalcopyrite, pyrite, bornite, covellite, and chalcocite are less common (Harris 1995). Sulphides (galena and sphalerite) are more common near the contacts of the veins, or where the vein cuts into the

country rocks (RPA 2013). Three main groups of fluorite veins are recognized in the St. Lawrence district (Wilson 2000).

1. Low-grade veins are the widest and most laterally extensive, with average widths of about 7 m and grades ranging from 35% to 70% $CaF_2$.
2. High-grade veins are generally narrower, typically 1 m or less in width, and have higher fluorite grades, averaging approximately 95% $CaF_2$.
3. Peripheral, or "outer," veins occur near the margins of the district and commonly contain significant barite in addition to fluorite.

The Director Vein, which will be mined as part of the Project, is classified as a low-grade vein, similar to the Blue Beach and Tarefare veins, with an average width of approximately 7 m and grades ranging from 35% to 70% $CaF_2$ (Figure 1.2-2). The Director Zone ore is represented by steeply dipping Director Vein hosted in the St. Lawrence Granite and tuffisite (Appendix A).

## 2.3 PREVIOUS GEOCHEMISTRY STUDIES

This section summarizes previous reports that have conducted ARD/ML assessments on fluorite deposits located on the St. Lawrence peninsula. The four studies discussed in this section include one from SNC Lavalin (2012), and three from Golder (2016, 2017, and 2019).

The purpose of the 2012 Geochemical Testing Program by SNC Lavalin (2012) was to present the results associated with geochemical testing performed on potential quarry rock, underground mine waste rock, dense medium separation (DMS) floats and flotation tailings generated during batch testing and pilot plant test work from Blue Beach North and Tarefare veins (Figure 1.2-2. Process waters during the pilot plant were also tested. Rock Samples from potential quarries were classified as on non-potentially acid generating (NPAG). DMS samples from both Tarefare and Blue Beach North (DMS floats) were classified as NPAG. All 28 waste rock samples from Blue Beach North and Tarefare were generally classified as NPAG, with one exception classified as PAG. This indicated low risk of ARD from waste rock of Blue Beach North and Tarefare veins, which are similar to the Director vein. Flotation tailings were classified as NPAG. There are no metal leaching concerns with respect to the evaluation criteria for all types of tested samples.

In 2016, Golder Associates prepared a report entitled "St. Lawrence Fluorspar Project – Baseline Geochemistry Program" (Golder 2016). The report presents and discusses the results of a geochemistry program conducted to characterize metal leaching and acid rock drainage potential of waste rock, tailings, and DMS floats generated from the AGS deposit (Figure 1.2-2). Waste rock samples were collected from metasedimentary and rhyolitic units. Ore, tailings, and DMS float samples were obtained from pilot-scale and locked-cycle testing. Both low carbonate and low sulphide contents have been noted within rock samples. Acid Base Accounting (ABA) testing on 60 waste rock samples showed that all samples had bulk neutralization potential ratio values greater than 2, classifying them as NPAG. Thirty-nine waste rock samples, including 5 metasediments and 14 rhyolites, had a carbonate NPR value of less than 1.0, classifying them as PAG. Most waste rock samples with carbonate NPR values less than 1 had low sulphide contents. ABA testing of the ore (two samples), DMS floats (two samples) and tailings (four samples) show that, with the exception of one DMS float and one ore sample, all materials are non-PAG. Net Acid Generating (NAG) tests were conducted and classified all samples (waste rock, ore, DMS floats and tailings) as non-acid generating. Kinetic testing via humidity cell tests were conducted for 35 weeks on

select waste rock samples and between 20-28 weeks for tailings samples. These kinetic tests indicated that waste rock and tailings are NPAG. Shake flask extraction tests on 28 waste rock, two ore, two DMS floats, and four tailings samples indicated that no parameters exceed the Certificate of Approval effluent criteria. Quantitative XRD showed that the sulphide content in the ore is composed mainly of sphalerite with lesser amounts of pyrite, chalcopyrite, and galena.

Following the 2016 Baseline Program, two further studies were undertaken by Golder providing updates on the HCTs (Golder 2017; Golder 2019). The HCTs included two waste rock samples (metasediment and rhyolite units), and two tailings samples representing high carbonate (HC) ore and low carbonate (LC) ore. Humidity cell tests ran up to 177 weeks. HCT results were generally consistent with ABA findings. Both waste rock and tailings were classified as NPAG, including the LC Tailings + Sulphide sample previously considered uncertain. Most parameters leached below Certificate of Approval) effluent limits, though zinc and cadmium increased over time in tailings, particularly in the LC Tailings + Sulphide sample. Zinc approached or briefly exceeded the COA limit in HCT leachate, but elevated concentrations were not observed downstream of the tailings pond. Based on results and stabilization of parameters of interest, termination of all HCTs was recommended in 2019.

# 3 METHODOLOGY

The approach for this ARD and ML investigation is generally consistent with the prescriptions set out in the MEND ("Mine Effluent Neutral Drainage") Prediction Manual for characterizing drainage chemistry from sulfidic geological materials (Price 2009).

## 3.1 SAMPLING

Sampling involved collection of drill core, overburden, and historical tailings samples. Drill cores were used to characterize ore and mine rock. A detailed summary of each mine material is provided below.

The numbers of samples representing each mine material comply with recommendation MEND ("Mine Effluent Neutral Drainage") Prediction Manual for Characterizing Drainage Chemistry from Sulfidic Geological Materials (Price 2009) except for ore, which is one sample less than recommendations (Price 2009). Based on Table 8.2 of this manual, a regression equation for minimum required number of samples per material was generated and used in Table 3.1-1. For mine rock, the number of granite and tuffisite samples are proportional to the relative abundance of the lithology intercepted by drill holes. Additional ore (head) samples will be generated and assessed during metallurgical program.

A total of 82 samples of ore and mine rock were collected in Fall 2025 from exploration drill cores based on the current understanding of the site geology and the estimated production volumes. Sample selection was done by the geochemistry Qualified Professional (QP) using a geological map, cross-sections, core logs, and assay results from ore zone (Appendix A and Appendix B). Samples were chosen to consist of a single lithology and to be representative, to the extent practicable, of material to be encountered within the planned mine benches and other criteria defined by the QP.

Core samples were collected by CFI personnel per the QP selection and shipped to Global ARD Laboratory (Global) in Burnaby BC. All samples were crushed to 1 inch. Select samples were composited to represent scale of mine mixing occurring over bench or width of ore zone. The maps, cross-sections, logs of individual

samples and resulting composites are presented Appendix A and Appendix B. Resulting numbers of mine rock and ore samples submitted for geochemical testing are shown in Table 3.1-1.

Twenty-five overburden samples were collected from eight pits dug by backhoe, down to bedrock or refusal. Overburden was sampled at three depths: immediately below the topsoil (top), at the midpoint between the top and bottom, and at the end of the hole (bottom). Any visually distinct layers encountered during excavation were also sampled. Pit locations are shown in Appendix A and logs and photographs are in Appendix B. All samples were submitted for geochemical tests.

Tailings are being generated during metallurgical testing conducted at the time of writing and will be subjected to ML/ARD characterization. Four samples of historical tailings produced from mining of Director vein were collected from ground surface and used as a geochemical analog until future tailings from metallurgical testing are available.

Table 3.1-1: Sampling Requirements and Selected Number of Samples Based on Mine Plan Lithological Tonnages

| Material | Lithocode (lithology) | Tonnage | # of samples from regression | Selected # of samples |
|---|---|---|---|---|
| Ore | DZ0 | 990,000 | 26 | 25 |
| Mine rock | Total mine rock | 3,990,000 | 51 | 57 |
| | SLG (Granite) | 96% | 49 | 50 |
| | TFS (Tuffisite) | 4% | 2 | 7 |
| Overburden | OB (Overburden) | 710,000 | 22 | 26 |
| Total | | 5,690,000 | 99 | 112 |
| Historical tailings | | N/A | | 4 |

## 3.2 TESTING PROGRAM

The geochemical testing program described below was conducted with all samples simultaneously for Acid Base Accounting (ABA), Shake Flask Extraction (SFE), and total metal content. Net Acid Generation (NAG) testing was conducted on a subset of samples after reviewing the ABA results. A further subset of samples was selected for mineralogical and long-term leach testing.

### 3.2.1 Acid Base Accounting

All samples (Table 3.1-1) were crushed, pulverized, and analyzed for ABA, which comprised:

- Paste pH was analyzed by inserting a combination pH electrode into a water-to-solid solution 1:2. Paste pH results are used to assess the stored acidity generated from the dissolution of soluble minerals in a sample. Typically, the pH accuracy of pH measurement is ± 0.1 unit, which is important for interpretating and comparing to thresholds.
- Total sulfur and total carbon, analyzed by the Leco Induction Furnace.
- Total Inorganic Carbon was determined by $HClO_4$ leaching, with the evolved $CO_2$ analyzed using a coulometer.

- Sulphate sulfur extracted by dilute hydrochloric acid digestion method (MEND 1991). The extracted S is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).
- Modified ABA (Sobek) Neutralization Potential was determined by reacting the sample with a known excess of standardized hydrochloric acid. After slight heating, the remaining acid was back-titrated with standardized sodium hydroxide to a pH endpoint of 8.3. Neutralization Potential was calculated from the amount of acid consumed and reported as kg $CaCO_3$/t (MEND 1991).

The following equations were used for calculated ABA parameters:

Sulphide Sulphur ($S_{Sulphide}$, wt%) = Total Sulphur (wt%) - Sulphate Sulphur (wt%); (1)

Acid Generation Potential (AP, kg $CaCO_3$/1000t) = Sulphide sulfur (wt%) x 31.25 (2)

Carbonate Neutralization Potential ($NP_{Carb}$, kg $CaCO_3$/1000t) = TIC (wt%) x 88.3 (3)

Sobek Neutralization Potential Ratio ($NPR_{Sobek}$) = $NP_{Sobek}$/AP) (4)

Carbonate Neutralization Potential Ratio ($NPR_{CaCO3}$) = $NP_{CaCO3}$ /AP (5)

*Notes:*
*(1) Where sulphate sulphur concentrations were below the RDL, total sulphur was assumed to represent sulphide sulphur.*
*(3) Where the TIC was greater than the Total Carbon value, the Total Carbon value was used to calculate carbonate NP.*

In the equations above and in the calculation of summary statistics, if the measured values are less than the reporting detection limit (RDL), the RDL value was used.

The Neutralization Potential Ratio (eq. 4) is a generic criterion used to classify the potential of sulfide materials to produce acid drainage (Price 2009). Materials with NPR greater than 2 are considered Non-Potentially Acid Generating (NPAG), less than 2 and greater than 1 are Uncertain Rock Type, and less than 1 are Potentially Acid Generating (PAG) (Price 2009). For ARD assessment, this assessment used both carbonate NPR and Sobek NPR to evaluate effects of different NP inputs on ARD classification.

Table 3.2-1: Material Classification Based on NPR Criteria

| NPR Criteria | Material Classification |
|---|---|
| NPR > 2 | Non-Potentially Acid Generating (Non-PAG) |
| 2 > NPR > 1 | Uncertain Rock Type |
| NPR < 1 | Potentially Acid Generating (PAG) or Acid Generating (AG) |

### 3.2.2 Net Acid Generation Testing

Samples with NPR<2 were submitted for NAG testing, conducted according to the protocols in Price 2009. The purpose of the NAG test is to completely oxidize the sulphide minerals with hydrogen peroxide ($H_2O_2$) in a pulverized sample. After digestion with the peroxide solution, the mixture was brought back to its original volume of 250 mL using deionized water, and both the NAG pH and method blank pH were measured. This single test demonstrates whether a sample contains sufficient internal capacity to neutralize acidity caused by sulphide oxidation (Table 3.2-2).

Table 3.2-2: Material Classification Based on Net Acid Generation

| NAG pH | NAG Criteria for Acid Generation Potential |
|---|---|
| ≥ 4.5 | Non-Potentially Acid Generating (Non-PAG) |
| <4.5 | Potentially Acid Generating (PAG) |

### 3.2.3 Short-Term Leach Tests

All samples from Table 3.1-1 underwent Shake Flask Extraction (SFE), a short-term leach test used as a qualitative screening tool to identify elements of potential environmental concern and to support the selection of samples for kinetic testing. Although SFE tests have limitations, they provide an indication of metals and constituents that are readily soluble in water.

The SFE leach method is described in Price (2009), involves continuous mixing of 250 g of a crushed sample (85% passing 1/4 inch - i.e. 6.3 mm) with 750 mL of deionized water for 24 ± 2 hours under gentle agitation. Samples are mixed with deionized water at 3:1 liquid ratio in an extraction vessel. Initial and final pH values were recorded. Following extraction, the leachate is filtered and analyzed for pH, electrical conductivity, acidity, and alkalinity. They were also analysed for sulphate using turbidimetric analysis, and for chloride, fluoride, nitrate, nitrate, nitrite + nitrite and phosphorus using ion chromatography. The following dissolved elements were measured by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): Hardness, aluminum, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, phosphorus, potassium, selenium, silicon, silver, sodium, strontium, sulphur, tellurium, thallium, thorium, tin, titanium, tungsten, uranium, vanadium, zinc, zirconium.

#### 3.2.3.1 Comparison to Regulatory Limits and Guidelines

Concentration of elements in SFEs were compared to Newfoundland and Labrador Regulation 65/03 (NFLD 2003) prescribing effluent limits, as well as acute and chronic Canadian Water Quality Guidelines (CCME 2025) to identify potential parameters of concern which might affect receiving water bodies. The hardness and other toxicity modifying factors that were used in calculating some CCME guidelines were calculated using background receiving environment concentrations rather than potential effluent water chemistry. This approach includes lower hardness value used in guideline derivation, representing a more conservative approach to evaluating the toxicity of certain metals. Guideline for both total and dissolved metals were applied to SFE leachates, which were filtered and represent dissolved fraction. Although SFE results are compared to regulatory thresholds, it is important to note that these thresholds do not apply to any leach tests and should generally not be interpreted within a regulatory context. SFE results qualitatively identify parameters in the leachate that occur at concentrations potentially requiring further environmental evaluation.

### 3.2.4 Metal Content

Metals in solids were analysed by aqua regia digest followed by ICP-MS. Sample preparation prior to ICP-MS consists of heating 0.5 g of pulp sample in 3:1 aqua regia digest. These results can be used along with shake flask results for management of potential metal leaching materials if required (e.g. segregation of mine materials based on total metal content determined at the site).

### 3.2.5 Mineralogy

Six samples were prepared to a fine grain size (<10 µm) and analyzed by X-ray powder diffraction (XRD). The six samples were selected because they were PAG or uncertain samples of ore and mine rock. Diffraction data were collected using a Bruker D8 Endeavor diffractometer with CoKα radiation. Mineral phases were identified using standard diffraction databases, and quantitative phase analysis was completed using Rietveld refinement.

### 3.2.6 Long-Term Leach Tests

Kinetic testing is used to verify ARD and ML classification derived from static tests. Laboratory kinetic testing was initiated in December 2025 on two samples with carbonate NPR < 2 to assess sulphide oxidation, alkalinity generation and metal leaching rates, and associated trends. This program included two humidity cells operated in accordance with Sobek et al. (1978): one containing ore (Composite-5; DS147_33.4-35.4) and one containing St. Lawrence granite (Composite-37; DS157_6.41-7.0).

In addition, a mine rock composite totalling 250 kg was prepared and shipped to site to establish a field kinetic test. These tests typically provide leachate chemistry resembling seepage from full-scale mine rock storage facilities. As the kinetic testing program is in its early stages, results are not discussed in this report. Interpretation of data will be provided in amendments to this report once sufficient results become available.

### 3.2.7 Water Sampling from Historical Tailings

CFI personnel collected five water quality samples from pools around the historical Director's tailings, which are assumed to the best analog of tailings drainage. The samples were and submitted to AGAT Laboratory and analyzed for pH, alkalinity, major ions, nutrients, total and dissolved metals, including mercury. The results were screened against NFLD Regulation 65/03 limits and CCME guidelines to be consistent with the SFE leachate assessment.

# 4 RESULTS

The following sections discuss the static testing results carried out for the samples from the ore, the mine rock lithological units, the overburden, and the historical tailings. As the kinetic testing program is in its early stages, results are not discussed in this report. Interpretation of data will be provided in amendments to this report once sufficient results become available.

Appendix D contains certificates of analyses for all samples analyzed in this study including details on methods and Quality Assurance/Quality Control of the analyses.

## 4.1 ORE

The ore was represented by drill core samples logged as Director Zone Ore (DZO) and confirmed by $CaF_2$ assays being over 5.7%. Twenty-five ore samples were analysed for ABA and short-term leach testing Table 4.4-1, Table 4.4-2). The paste pH values range from 5.6 to 8.2, while SFE pH values range from 5.8 to 6.3 in the ore. No samples are below the criteria of pH 5.5 NFLD Regulation 65/03. Calculated sulphide

content in the ore ranges from 0.01 to 0.09 wt%, with an average concentration of 0.024 wt%. Sulphate concentrations are below RDL. Sobek NP values vary from 1.8 to 70 kg $CaCO_3$/tonne, with an average of 16 kg $CaCO_3$/tonne. Carbonate NP values are typically lower than Sobek NP and vary from 1.7 to 60 kg $CaCO_3$/tonne, with an average of 12 kg $CaCO_3$/tonne. AP values range from 0.3 to 2.8 kg $CaCO_3$/tonne averaging at 0.73. Three samples out of 25 have carbonate NPR values between 2 and 1, classifying them as uncertain. The remainder are classified as NPAG. Uncertain ore samples underwent NAG testing showing pH values ranging from 7.23 to 7.61 and classified as NPAG (Table 4.4-6). Sobek NPR values for all samples are greater than 2, supporting NPAG classification. The approach of using the carbonate NPR is therefore more conservative and may overestimate ARD risks.

Shake flask test results were compared to the NFLD Regulation 65/03 Criteria, CCME long-term and short-term criteria (Table 4.4-3, Table 4.4-4). All SFE test results for the ore were compliant with the NFLD Regulation 65/03 Criteria. A total of six cadmium and five zinc exceedances of CCME short-term criteria were identified. All samples exceed fluoride CCME long-term criteria. CCME long-term criteria exceedances were also observed for Cadmium (96% of samples), copper (96% of samples), zinc (48% of samples), lead (40% of samples), manganese (16% of samples), mercury (16% of samples), aluminum (12% of samples), and silver (4% of samples).

In terms of mineralogy, quartz is the principal gangue mineral. Minor potential constituents include illite–muscovite (≤2.5 wt.%), clinochlore (≤0.3 wt.%), and hematite (≤0.2 wt.%), with trace illite–smectite present in Composite 15; DS148_67.46-71.31. Feldspars are sparse in the ore, and no sulphides or carbonates were observed.

## 4.2 MINE ROCK

### 4.2.1 Tuffisite

In seven samples of TFS, the paste pH values range from 6.2 to 8.8 in TFS. The SFE pH ranges from 5.9 to 6.4. No samples are below the criteria of paste and SFE pH 5.5. Four samples (57%) have total sulphur content > RDL of 0.01 wt%. The calculated sulphide contents of tuffisite range from 0.01 to 0.09 wt%, and an average value of 0.026 wt%. Sulphate concentrations vary from below detection limit to 0.03 wt%, and an average concentration of 0.013 wt%. Sobek NP values vary from 5.2 to 60 kg $CaCO_3$/tonne, with an average of 20 kg $CaCO_3$/tonne. Carbonate NP values vary from 2.5 to 53 kg $CaCO_3$/tonne, with an average of 12.6 kg $CaCO_3$/tonne. AP values range from 0.3 to 2.8 kg $CaCO_3$/tonne averaging at 0.79 $CaCO_3$/tonne. Based on the more conservative carbonate NPR values, none of the samples are classified as PAG or uncertain.

All SFE results for tuffisite were compliant with the NFLD Regulation 65/03 Criteria (Table 4.4-3). Exceedances of CCME short-term criteria for cadmium and zinc were identified in one sample. All seven samples exceed fluoride CCME long-term criteria. CCME long-term criteria exceedances were also observed for cadmium (71% of samples), copper (71% of samples), aluminum (43% of samples), lead (29% of samples), zinc (29% of samples), and mercury (14% of samples).

### 4.2.2 Saint-Lawrence Granite

The paste pH values range from 6.6 to 8.5. The SFE pH ranges from 5.8 to 6.4. No samples are below the criteria of paste or SFE pH 5.5. The calculated sulphide content of Saint-Lawrence granite ranges from 0.01 to 0.03 wt%, and an average value of 0.011 wt%. Sulphate concentrations vary from below detection limit to 0.16 wt%, and an average concentration of 0.02 wt%. From fifty samples of SLG, only nineteen samples (38%) have total sulphur content > 0.01 wt%. Sobek NP values vary from 2.5 to 69 kg $CaCO_3$/tonne, with an average of 13 kg $CaCO_3$/tonne. Carbonate NP values vary from 1.7 to 68 kg $CaCO_3$/tonne, with an average of 10.4 kg $CaCO_3$/tonne. AP values range from 0.3 to 5.0 kg $CaCO_3$/tonne. Based on carbonate NPR values, two samples out of fifty are classified as PAG (Composite-4; DS147_31-33.4, Composite-37; DS157_6.41-7.0) and two samples are classified as uncertain (Composite-38; DS157_7-21, Composite-48; DS154_6-21). Two samples conservatively classified as PAG, along with one classified as uncertain, underwent NAG testing. These had NAG pH values ranging from 5.73 to 7.42 (Table 4.4-6). No samples required NaOH addition to reach pH 4.5, resulting in NPAG classification for all cases. One composite sample had an uncertain carbonate NPR value (Composite-48; DS154_6-21), and was not tested with NAG, but considering that its marginal carbonate NPR value of 1.9 and Sobek NPR of 4.5, the sample is likely NPAG.

SLG composites (Composite-4; DS147_31-33.4, Composite-37; DS157_6.41-7.0, Composite-38; DS157_7-21) are silicate-dominated, with quartz (43–49 wt.%) and feldspars as the major phases. K-feldspar is abundant (15–32 wt.%), and plagioclase is significant in Composites 37 and 38 (≈19–9 wt.%). Clay minerals include illite–muscovite (3.2–4 wt.%), illite–smectite, and kaolinite (≈0.4 wt.%). Several additional phases (e.g., hematite, apatite, calcite, barite, pyrite and chlorite) are reported at trace concentrations near the detection limit of quantitative XRD and may therefore represent analytical artifacts or very minor constituents. Barite, which is not fully extracted during sulphate leach and reported as sulphide sulfur in PAG composite 4, but it does not contribute to ARD. Therefore, PAG classification of this sample might be incorrect. Apatite was detected in composites 37 and 38 classified as PAG and uncertain respectively. Apatite is not included into $NP_{CaCO3}$, but it can neutralize acid while dissolving at rates faster or similar to pyrite oxidation. This is supported by NAG pH test and Sobek NPR. Therefore, use of might $NPR_{CaCO3}$ is too conservative for St. Lawrence granite.

All SFE test results were compared to the NFLD Regulation 65/03 Criteria, CCME long-term and short-term criteria ( Table 4.4-3, Table 4.4-4). All SFE test results for St. Lawrence granite were compliant with the NFLD Regulation 65/03 Criteria. Three cadmium and two zinc exceedances of CCME short-term criteria were identified. All samples exceed fluoride CCME long-term criteria. CCME long-term criteria exceedances were also observed for copper (60% of samples), cadmium (56% of samples), lead (20% of samples), manganese (14% of samples), aluminum (18% of samples), zinc (14% of samples), arsenic (2% of samples), mercury (6% of samples).

## 4.3 OVERBURDEN

In twenty-five samples of overburden the paste pH values range from 5.2 to 7.0 in the overburden with 7 samples being below pH of 5.5. However, paste pH in those samples are at or above the pH of the blank sample (pH = 5.3±0.1) showing no immediate acid generation. And SFE pH values range from 5.5 to 6.1 and are above or at criteria of 5.5. This exceedance is addressed in the discussion. Seventeen samples (68%) have total sulphur content > RDL of 0.01 wt%. The calculated sulphide contents of overburden range

from 0.01 to 0.04 wt% and have an average value of 0.017 wt%. Sulphate concentrations are all at or below RDL. Sobek NP values vary from 2.7 to 16 kg $CaCO_3$/tonne, with an average of 5.6 kg $CaCO_3$/tonne. Carbonate NP values vary from 1.7 to 10 kg $CaCO_3$/tonne, with an average of 3.6 kg $CaCO_3$/tonne. AP values range from 0.31 to 1.3 kg $CaCO_3$/tonne, with an average of 0.54 kg $CaCO_3$/tonne. Based on the carbonate NPR values, one sample out of 26 is classified as uncertain. This sample has a Sobek NPR of 4.9 and is unlikely to generate acid.

All SFE test results for overburden were compliant with the NFLD Regulation 65/03 Criteria. No exceedances of CCME short-term criteria were identified. Fluoride CCME long-term criteria was exceeded in 22 samples (88 %). CCME long-term criteria exceedances were also observed for aluminum (84% of samples), copper (52% of samples), lead (48% of samples), cadmium (8% of samples), iron (8% of samples), chromium (4% of samples), and manganese (4% of samples).

## 4.4 HISTORICAL TAILINGS

In four samples of historical tailings paste pH values range from 7.30 to 7.48 in the historic tailings. The SFE pH values range from 5.9 to 6.2. No samples are below the criteria of pH 5.5. The sulphide contents of the historical tailings range from 0.07 to 0.19 wt%, with an average of 0.11 wt%. Of the four samples, two have sulphate concentrations below the RDL, whereas the other two have concentrations of 0.03 and 0.05 wt%. Four samples have total sulfur greater than 0.01 wt%. Sobek NP values vary from 43 to 55 kg $CaCO_3$/tonne, with an average value of 48 kg $CaCO_3$/tonne. Carbonate NP values range from 20 to 35 kg $CaCO_3$/tonne, with an average value of 26 kg $CaCO_3$/tonne. AP values range from 2.2 to 4.8. The highest NP and AP values are both found in in sample 262349. None of the samples are PAG based on any NPR criteria.

All SFE test results were compared to the NFLD Regulation 65/03 Criteria, CCME long-term and short-term criteria ( Table 4.4-3, Table 4.4-4). All SFE test results for historical tailings were compliant with the NFLD Regulation 65/03 Criteria. Four cadmium and two zinc exceedances of CCME short-term criteria were identified. All samples exceeded fluoride, cadmium, lead, mercury, and zinc CCME long-term criteria. CCME long-term criteria exceedances were also observed for aluminum and copper in one and three samples respectivly.

Concentrations of respective parameters in contact water are lower than SFE in samples from the same historical tailings indicating that SFE likely overestimate metal leaching potential (Table 4.4-4 and Table 4.4-7).

Table 4.4-1: ABA Classification Summary Table.

| Parameter | Units | Criteria | Ore | | Tuffisite | | St-Lawrence Granite | | Overburden | | Historical Tailings | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | Ore | % | n | % | n | % |
| Total sample count | | | 25 | 100 | 7 | 100 | 50 | 100 | 25 | 100 | 4 | 100 |
| Paste pH | pH unit | <5.5 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 28 | 0 | 0 |
| SFE pH | pH unit | <5.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Parameter | Units | Criteria | Ore | | Tuffisite | | St-Lawrence Granite | | Overburden | | Historical Tailings | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | Ore | % | n | % | n | % |
| Sobek NPR | ratio | <2 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 |
| Sobek NPR | ratio | <1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Carbonate NPR | ratio | <2 | 3 | 12 | 0 | 0 | 4 | 8 | 1 | 4 | 0 | 0 |
| Carbonate NPR | ratio | <1 | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 0 |
| TIC | wt % | <0.02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| STotal | wt % | > 0.01 | 20 | 80 | 4 | 57 | 19 | 38 | 17 | 68 | 4 | 100 |

Table 4.4-2: Summary of ABA Statistics for CFI South Ridge Project Selected Geochemical Samples.

| Sample Type | Parameter | Paste pH | $C_{Total}$ | TIC | $S_{Total}$ | $S_{Sulphide}$ | $S_{Sulphate}$ | AP | $NP_{Sobek}$ | $NP_{CaCO3}$ | $NNP_{Sobek}$ | $NPR_{Sobek}$ | $NPR_{CaCO3}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Units | pH units | wt. % | wt. % | wt. % | wt. % | wt. % | kg $CaCO_3$/tonne | | | | | |
| Ore | Minimum | 5.6 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.3 | 1.8 | 1.7 | 1.2 | 2.7 | 1.0 |
| | P10 | 7.9 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.3 | 4.7 | 1.7 | 3.7 | 4.8 | 2.3 |
| | Median | 7.3 | 0.06 | 0.06 | 0.02 | 0.02 | 0.01 | 0.6 | 10 | 5.0 | 9 | 20 | 6 |
| | P90 | 6.5 | 0.37 | 0.43 | 0.036 | 0.036 | 0.01 | 1.1 | 39 | 36 | 38 | 53 | 42 |
| | Maximum | 8.2 | 0.75 | 0.72 | 0.09 | 0.09 | 0.01 | 2.8 | 70 | 60 | 67 | 145 | 119 |
| | Average | 6.7 | 0.13 | 0.14 | 0.024 | 0.024 | 0.01 | 0.73 | 16 | 12 | 16 | 28 | 17 |
| | Standard Deviation | 0.86 | 0.18 | 0.17 | 0.016 | 0.02 | 0.00 | 0.51 | 15 | 15 | 15 | 29 | 25 |
| Tuffisite | Minimum | 6.2 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 0.3 | 5.2 | 2.5 | 4.8 | 9.0 | 2.8 |
| | P10 | 8.1 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.3 | 5.3 | 1.7 | 4.9 | 12.4 | 1.9 |
| | Median | 6.9 | 0.03 | 0.04 | 0.02 | 0.02 | 0.01 | 0.6 | 17 | 3.3 | 17 | 22 | 6 |
| | P90 | 6.4 | 0.31 | 0.3 | 0.06 | 0.048 | 0.018 | 1.48 | 38 | 25 | 36 | 63 | 37 |
| | Maximum | 8.8 | 0.65 | 0.63 | 0.12 | 0.09 | 0.03 | 2.8 | 60 | 53 | 58 | 75 | 42 |
| | Average | 6.8 | 0.15 | 0.15 | 0.03 | 0.0257 | 0.013 | 0.79 | 20 | 12.6 | 19 | 33 | 15 |
| | Standard Deviation | 0.94 | 0.193 | 0.183 | 0.037 | 0.0 | 0.007 | 0.83 | 17.8 | 15.2 | 17.0 | 23 | 14 |
| Saint Lawrence Granite | Minimum | 6.6 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.3 | 2.5 | 1.7 | 1.9 | 1 | 0.3 |
| | P10 | 8.1 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.3 | 3.6 | 1.7 | 3.2 | 6.3 | 4.2 |
| | Median | 7.9 | 0.06 | 0.06 | 0.01 | 0.01 | 0.01 | 0.3 | 9.2 | 5.0 | 8.9 | 20 | 9 |
| | P90 | 6.9 | 0.32 | 0.35 | 0.031 | 0.011 | 0.031 | 0.94 | 24 | 29 | 23 | 74 | 54 |
| | Maximum | 8.5 | 0.78 | 0.81 | 0.16 | 0.03 | 0.16 | 5.0 | 69 | 68 | 69 | 170 | 147 |
| | Average | 7.5 | 0.12 | 0.12 | 0.021 | 0.011 | 0.02 | 0.62 | 13 | 10.4 | 12 | 31 | 22 |
| | Standard Deviation | 0.67 | 0.15 | 0.16 | 0.028 | 0.0038 | 0.026 | 0.81 | 13 | 13 | 13 | 33 | 29 |
| Overburden | Minimum | 5.2 | 0.05 | 0.02 | 0.01 | 0.01 | 0.01 | 0.31 | 2.7 | 1.7 | 2.3 | 4.4 | 1.8 |
| | P10 | 6.3 | 0.055 | 0.025 | 0.01 | 0.01 | 0.01 | 0.31 | 2.9 | 2.1 | 2.4 | 4.8 | 3.2 |
| | Median | 5.7 | 0.12 | 0.04 | 0.02 | 0.02 | 0.01 | 0.63 | 5.3 | 3.3 | 4.5 | 9.0 | 6.6 |
| | P90 | 5.3 | 0.31 | 0.06 | 0.025 | 0.02 | 0.01 | 0.63 | 8.8 | 5.0 | 8.4 | 23 | 15 |
| | Maximum | 7.0 | 0.36 | 0.12 | 0.04 | 0.04 | 0.01 | 1.3 | 16 | 10 | 15 | 35 | 19 |
| | Average | 5.6 | 0.15 | 0.043 | 0.018 | 0.017 | 0.01 | 0.54 | 5.6 | 3.6 | 5.1 | 12 | 7.4 |
| | Standard Deviation | 0.34 | 0.097 | 0.02 | 0.0073 | 7.2E-03 | 0.000 | 0.23 | 2.9 | 1.7 | 2.9 | 8.4 | 4.6 |
| Historical Tailings | Minimum | 7.3 | 0.31 | 0.24 | 0.07 | 0.07 | 0.01 | 2.2 | 43 | 20 | 39 | 11 | 5.3 |
| | P10 | 7.5 | 0.33 | 0.24 | 0.082 | 0.082 | 0.01 | 2.6 | 43 | 20 | 39 | 12 | 5.6 |
| | Median | 7.4 | 0.41 | 0.3 | 0.13 | 0.115 | 0.02 | 3.6 | 47 | 25 | 44 | 12 | 7.1 |
| | P90 | 7.3 | 0.48 | 0.4 | 0.18 | 0.134 | 0.04 | 4.2 | 53 | 33 | 50 | 20 | 12 |
| | Maximum | 7.48 | 0.5 | 0.42 | 0.19 | 0.14 | 0.05 | 4.4 | 55 | 35 | 50 | 23 | 13 |
| | Average | 7.4 | 0.41 | 0.31 | 0.13 | 0.11 | 0.03 | 3.4 | 48 | 26 | 44 | 15 | 8.2 |
| | Standard Deviation | 0.066 | 0.069 | 0.072 | 0.045 | 0.025 | 0.019 | 0.8 | 5.1 | 6.0 | 5.0 | 4.7 | 3.0 |

*Notes: see section 3.2.1 on Abbreviation and calculation details*

*Sulphate Sulphur - $S_{Sulphate}$; Sulphide Sulphur - $S_{Sulphide;}$*

Table 4.4-3 Metal Leaching Screening Summary Table.

| Parameter | Units | Criteria | Ore | | Tuffisite | | Saint Lawrence Granite | | Overburden | | Historical Tailings | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | n | % | n | % | n | % |
| Shake Flask Extraction (SFE) | | | | | | | | | | | | |
| | | | 25 | 100 | 7 | 100 | 50 | 100 | 25 | 100 | 4 | 100 |
| SFE - NFLD Regulation 65/03 Criteria | | | | | | | | | | | | |
| $NO_3$+$NO_2$ | mg-N/L | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| As | mg/L | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ba | mg/L | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B | mg/L | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cd | mg/L | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cr | mg/L | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cu | mg/L | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fe | mg/L | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pb | mg/L | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hg | mg/L | 0.005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ni | mg/L | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Se | mg/L | 0.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ag | mg/L | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zn | mg/L | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SFE - CCME Short Term Criteria | | | | | | | | | | | | |
| Cl- | mg/L | 640 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $NO_3$ | mg-N/L | 124 | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| B | mg/L | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cd | mg/L | 0.00068 | 6 | 24 | 1 | 14 | 3 | 6 | 0 | 0 | 4 | 100 |
| Mn | mg/L | 2.51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| U | mg/L | 0.033 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zn | mg/L | 0.051 | 5 | 20 | 1 | 14 | 2 | 4 | 0 | 0 | 2 | 50 |
| SFE - CCME Long Term Criteria | | | | | | | | | | | | |
| Cl- | mg/L | 120 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| F- | mg/L | 0.12 | 25 | 100 | 7 | 100 | 50 | 100 | 22 | 88 | 4 | 100 |
| $NO_3$ | mg-N/L | 2.93 | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| $NO_2$ | mg-N/L | 0.06 | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Al | mg/L | 0.1 | 3 | 12 | 3 | 43 | 9 | 18 | 21 | 84 | 1 | 25 |
| As | mg/L | 0.005 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 8 | 0 | 0 |
| B | mg/L | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cd | mg/L | 0.00006 | 24 | 96 | 5 | 71 | 28 | 56 | 2 | 8 | 4 | 100 |
| Cr | mg/L | 0.001 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 |
| Cu | mg/L | 0.0020 | 24 | 96 | 5 | 71 | 30 | 60 | 13 | 52 | 3 | 75 |
| Fe | mg/L | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 0 | 0 |
| Pb | mg/L | 0.0010 | 10 | 40 | 2 | 29 | 10 | 20 | 12 | 48 | 4 | 100 |
| Mn | mg/L | 0.38 | 4 | 16 | 0 | 0 | 7 | 14 | 1 | 4 | 0 | 0 |
| Hg | mg/L | 0.000026 | 4 | 16 | 1 | 14 | 3 | 6 | 0 | 0 | 4 | 100 |
| Mo | mg/L | 0.073 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ni | mg/L | 0.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Se | mg/L | 0.001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ag | mg/L | 0.00025 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tl | mg/L | 0.0008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| U | mg/L | 0.015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zn | mg/L | 0.018 | 12 | 48 | 2 | 29 | 7 | 14 | 0 | 0 | 4 | 100 |

*Notes:*

*Screening Criteria are for the total fraction*

*Chromium guideline is for hexavlaent chromium*

*Cells showing "-" indicate that no measurements were taken for the corresponding sample and parameter.*

Table 4.4-4: Shake Flask Extraction Summary Table

| Parameter | pH | $Cl^-$ | $F^-$ | $NO_3$ | $NO_2$ | $NO_3+NO_2$ | Al | As | Ba | B | Cd | Cr | Co | Cu | Fe | Pb | Mn | Hg | Mo | Ni | Se | Ag | Sr | Tl | U | V | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | - | mg/L | mg/L | mg-N/L | mg-N/L | mg-N/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| CCME Short Term | - | 640 | - | 124 | - | - | - | - | - | 29 | 0.00068 | - | - | - | - | - | 2.51 | - | - | - | - | - | - | - | 0.033 | - | 0.051 |
| CCME Long Term | 6.5-9.0 | 120 | 0.12 | 2.93 | 0.06 | - | 0.1 | 0.005 | - | 2 | 0.00006 | 0.001 | - | 0.0020 | 0.3 | 0.0010 | 0.38 | 0.000026 | 0.073 | 0.03 | 0.001 | 0.00025 | - | 0.0008 | 0.015 | - | 0.018 |
| NFLD Criteria | 5.5-9.0 | - | - | - | - | 10 | - | 0.5 | 5 | 5 | 0.05 | 0.05 | - | 0.3 | 10 | 0.2 | - | 0.005 | - | 0.5 | 0.01 | 0.05 | - | - | - | - | 0.5 |
| Historical Tailings – 4 samples | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min | 5.9 | 1.1 | 2.5 | 0.056 | 0.01 | 0.056 | 0.069 | 0.0001 | 0.22 | 0.0029 | *0.0015* | 0.0005 | 0.0000082 | 0.0012 | 0.014 | 0.0063 | 0.014 | 0.00003 | 0.013 | 0.000045 | 0.0001 | 0.000038 | 0.019 | 0.000013 | 0.00049 | 0.001 | 0.036 |
| P10 | 6.0 | 1.5 | 2.6 | 0.057 | 0.01 | 0.057 | 0.072 | 0.00011 | 0.26 | 0.0029 | *0.0015* | 0.0005 | 0.00001 | 0.0017 | 0.016 | 0.007 | 0.019 | 0.00003 | 0.017 | 0.00005 | 0.0001 | 0.000039 | 0.021 | 0.000016 | 0.00049 | 0.001 | 0.036 |
| Median | 6.1 | 2.6 | 2.8 | 0.065 | 0.01 | 0.065 | 0.078 | 0.0002 | 0.38 | 0.0034 | *0.0015* | 0.00065 | 0.000017 | 0.0033 | 0.023 | 0.011 | 0.036 | 0.000033 | 0.029 | 0.000067 | 0.0001 | 0.000042 | 0.046 | 0.000025 | 0.00081 | 0.001 | 0.045 |
| P90 | 6.2 | 6.3 | 3.4 | 0.23 | 0.011 | 0.23 | 0.16 | 0.00037 | 0.49 | 0.0048 | *0.0022* | 0.00087 | 0.00004 | 0.0046 | 0.057 | 0.016 | 0.059 | 0.000038 | 0.042 | 0.000085 | 0.00011 | 0.000063 | 0.091 | 0.000033 | 0.0033 | 0.001 | *0.053* |
| Max | 6.2 | 7.7 | 3.6 | 0.3 | 0.012 | 0.3 | 0.19 | 0.00041 | 0.52 | 0.0052 | *0.0024* | 0.00091 | 0.00005 | 0.0051 | 0.07 | 0.018 | 0.066 | 0.000039 | 0.048 | 0.000091 | 0.00012 | 0.000071 | 0.1 | 0.000035 | 0.0043 | 0.001 | *0.054* |
| Average | 6.1 | 3.5 | 2.9 | 0.12 | 0.011 | 0.12 | 0.1 | 0.00023 | 0.38 | 0.0037 | *0.0017* | 0.00068 | 0.000023 | 0.0032 | 0.033 | 0.011 | 0.038 | 0.000034 | 0.03 | 0.000067 | 0.00011 | 0.000048 | 0.053 | 0.000025 | 0.0016 | 0.001 | 0.045 |
| Std Dev | 0.1 | 2.9 | 0.5 | 0.12 | 0.001 | 0.12 | 0.059 | 0.00014 | 0.13 | 0.0011 | 0.00046 | 0.00021 | 0.000018 | 0.0016 | 0.025 | 0.0049 | 0.022 | 0.0000044 | 0.014 | 0.000019 | 0.000010 | 0.000015 | 0.039 | 0.0000093 | 0.0018 | 0 | 0.0096 |
| Overburden – 25 samples | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min | 5.5 | 0.48 | 0.1 | 0.011 | 0.01 | 0.011 | 0.02 | 0.00005 | 0.00066 | 0.002 | 0.0000037 | 0.0005 | 0.0000095 | 0.00021 | 0.0038 | 0.000097 | 0.004 | 0.00002 | 0.00001 | 0.00004 | 0.0001 | 0.00001 | 0.00056 | 0.000004 | 0.000021 | 0.001 | 0.001 |
| P10 | 5.6 | 0.61 | 0.15 | 0.013 | 0.01 | 0.013 | 0.034 | 0.0001 | 0.00073 | 0.0027 | 0.0000051 | 0.0005 | 0.00004 | 0.0007 | 0.0055 | 0.00012 | 0.0066 | 0.00002 | 0.000038 | 0.000077 | 0.0001 | 0.00001 | 0.00082 | 0.0000051 | 0.00003 | 0.001 | 0.0012 |
| Median | 5.8 | 0.81 | 0.58 | 0.017 | 0.01 | 0.017 | 0.32 | 0.0003 | 0.0022 | 0.0033 | 0.000019 | 0.0005 | 0.00013 | 0.0025 | 0.074 | 0.00072 | 0.028 | 0.00002 | 0.000083 | 0.00017 | 0.0001 | 0.00001 | 0.0016 | 0.0000088 | 0.00015 | 0.001 | 0.0023 |
| P90 | 5.9 | 1.2 | 1.1 | 0.046 | 0.01 | 0.046 | 0.83 | 0.0017 | 0.0063 | 0.0042 | 0.000049 | 0.00072 | 0.00062 | 0.0051 | 0.26 | 0.0042 | 0.2 | 0.00002 | 0.00037 | 0.00048 | 0.00011 | 0.00001 | 0.0034 | 0.000023 | 0.00086 | 0.0011 | 0.0061 |
| Max | 6.1 | 1.7 | 1.8 | 0.21 | 0.01 | 0.21 | 1.0 | 0.0056 | 0.014 | 0.0044 | 0.00016 | 0.0021 | 0.0009 | 0.0071 | 0.37 | 0.0082 | 0.39 | 0.00002 | 0.0015 | 0.00063 | 0.00045 | 0.000013 | 0.008 | 0.000035 | 0.001 | 0.0084 | 0.0086 |
| Average | 5.8 | 0.88 | 0.62 | 0.03 | 0.01 | 0.03 | 0.38 | 0.00089 | 0.0033 | 0.0034 | 0.000029 | 0.00061 | 0.00024 | 0.0025 | 0.11 | 0.0017 | 0.064 | 0.00002 | 0.00018 | 0.00022 | 0.00012 | 0.00001 | 0.0021 | 0.000013 | 0.00033 | 0.0014 | 0.003 |
| Std Dev | 0.1 | 0.26 | 0.42 | 0.04 | 1.8E-18 | 0.04 | 0.3 | 0.0015 | 0.0032 | 0.00061 | 0.000038 | 0.00032 | 0.00026 | 0.0018 | 0.11 | 0.002 | 0.092 | 0 | 0.00033 | 0.00017 | 0.000074 | 0.00000062 | 0.0015 | 0.0000084 | 0.00033 | 0.0015 | 0.0021 |
| St. Lawrence Granite (SLG) – 50 samples | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min | 5.8 | 4.1 | 0.71 | - | - | 0.01 | 0.034 | 0.00017 | 0.0052 | 0.0049 | 0.0000093 | 0.0005 | 0.000005 | 0.00057 | 0.0055 | 0.000061 | 0.03 | 0.00002 | 0.00019 | 0.00004 | 0.0001 | 0 | 0.0049 | 0.000011 | 0.00013 | 0.001 | 0.001 |
| P10 | 6.0 | 6.6 | 1.0 | - | - | 0.01 | 0.04 | 0.00028 | 0.014 | 0.0063 | 0.000016 | 0.0005 | 0.0000073 | 0.0011 | 0.0084 | 0.00013 | 0.047 | 0.00002 | 0.00044 | 0.000049 | 0.0001 | 0.00001 | 0.012 | 0.000021 | 0.00069 | 0.001 | 0.0014 |
| Median | 6.2 | 9.2 | 1.7 | - | - | 0.013 | 0.073 | 0.00062 | 0.034 | 0.0089 | 0.000085 | 0.0005 | 0.000058 | 0.0034 | 0.019 | 0.00037 | 0.11 | 0.00002 | 0.00081 | 0.00018 | 0.0001 | 0.000014 | 0.02 | 0.000065 | 0.0015 | 0.001 | 0.003 |
| P90 | 6.3 | 15 | 3.2 | - | - | 0.033 | 0.12 | 0.0012 | 0.21 | 0.012 | 0.00036 | 0.0005 | 0.00033 | 0.011 | 0.056 | 0.0015 | 0.42 | 0.000025 | 0.0023 | 0.00059 | 0.00011 | 0.000036 | 0.029 | 0.00016 | 0.0031 | 0.001 | 0.022 |
| Max | 6.4 | 18 | 4.7 | - | - | 0.48 | 0.26 | 0.24 | 0.28 | 0.022 | *0.0035* | 0.00056 | 0.0029 | 0.028 | 0.1 | 0.01 | 1.7 | 0.000032 | 0.0099 | 0.0026 | 0.0004 | 0.00022 | 0.047 | 0.00023 | 0.0095 | 0.001 | *0.091* |
| Average | 6.1 | 9.8 | 2.0 | - | - | 0.026 | 0.079 | 0.0054 | 0.065 | 0.0092 | 0.00025 | 0.0005 | 0.00017 | 0.0049 | 0.028 | 0.00089 | 0.2 | 0.000021 | 0.0013 | 0.00029 | 0.00012 | 0.000023 | 0.02 | 0.000076 | 0.0019 | 0.001 | 0.0097 |
| Std Dev | 0.1 | 3.4 | 0.92 | - | - | 0.066 | 0.039 | 0.034 | 0.074 | 0.0028 | 0.00056 | 0.0000085 | 0.00043 | 0.0053 | 0.022 | 0.0018 | 0.26 | 0.0000029 | 0.0017 | 0.0004 | 0.000054 | 0.000032 | 0.008 | 0.000053 | 0.0016 | 6.6E-19 | 0.016 |
| Ore – 25 samples | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min | 5.8 | 3.8 | 2.8 | - | - | 0.011 | 0.0074 | 0.000065 | 0.024 | 0.0021 | 0.000047 | 0.0005 | 0.000011 | 0.0015 | 0.002 | 0.000087 | 0.032 | 0.00002 | 0.000038 | 0.00004 | 0.0001 | 0.00001 | 0.0067 | 0.000013 | 0.00031 | 0.001 | 0.0013 |
| P10 | 5.9 | 6.4 | 3.1 | - | - | 0.019 | 0.026 | 0.0001 | 0.033 | 0.0046 | 0.000083 | 0.0005 | 0.00004 | 0.0033 | 0.002 | 0.00015 | 0.049 | 0.00002 | 0.00016 | 0.000086 | 0.0001 | 0.00001 | 0.012 | 0.000024 | 0.00058 | 0.001 | 0.0027 |
| Median | 6.2 | 12 | 3.6 | - | - | 0.029 | 0.056 | 0.00024 | 0.082 | 0.0075 | 0.00026 | 0.0005 | 0.00024 | 0.014 | 0.0052 | 0.00055 | 0.12 | 0.00002 | 0.00065 | 0.00042 | 0.0001 | 0.00001 | 0.019 | 0.000075 | 0.0015 | 0.001 | 0.016 |
| P90 | 6.3 | 22 | 4.7 | - | - | 0.038 | 0.1 | 0.00038 | 0.45 | 0.01 | *0.0012* | 0.0005 | 0.0014 | 0.043 | 0.015 | 0.0081 | 0.73 | 0.000031 | 0.0014 | 0.0011 | 0.0001 | 0.000089 | 0.044 | 0.00013 | 0.0062 | 0.001 | *0.074* |
| Max | 6.3 | 27 | 5.1 | - | - | 0.079 | 0.22 | 0.00048 | 0.58 | 0.012 | *0.0031* | 0.00051 | 0.005 | 0.069 | 0.027 | 0.056 | 0.94 | 0.000036 | 0.0018 | 0.0028 | 0.0001 | 0.00084 | 0.083 | 0.00038 | 0.014 | 0.001 | *0.095* |
| Average | 6.1 | 13 | 3.8 | - | - | 0.03 | 0.066 | 0.00024 | 0.16 | 0.0075 | 0.00051 | 0.0005 | 0.00059 | 0.02 | 0.007 | 0.0044 | 0.24 | 0.000022 | 0.00075 | 0.00065 | 0.00010 | 0.000059 | 0.026 | 0.000088 | 0.0026 | 0.001 | 0.026 |
| Std Dev | 0.2 | 6.1 | 0.66 | - | - | 0.013 | 0.043 | 0.00011 | 0.17 | 0.0024 | 0.00066 | 0.000002 | 0.001 | 0.018 | 0.0061 | 0.011 | 0.27 | 0.0000049 | 0.00047 | 0.00065 | 1.4E-20 | 0.00017 | 0.017 | 0.000076 | 0.0034 | 6.6E-19 | 0.028 |
| Tuffisite (TFS) – 7 samples | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min | 5.9 | 2.9 | 2.2 | - | - | 0.01 | 0.055 | 0.00013 | 0.027 | 0.0053 | 0.000039 | 0.0005 | 0.000005 | 0.0011 | 0.002 | 0.000095 | 0.04 | 0.00002 | 0.000098 | 0.00004 | 0.0001 | 0.00001 | 0.0077 | 0.000022 | 0.00085 | 0.001 | 0.001 |
| P10 | 6.0 | 7.5 | 2.2 | - | - | 0.012 | 0.066 | 0.00017 | 0.031 | 0.006 | 0.00005 | 0.0005 | 0.000005 | 0.0012 | 0.0024 | 0.0001 | 0.043 | 0.00002 | 0.00023 | 0.00004 | 0.0001 | 0.00001 | 0.0082 | 0.000023 | 0.00085 | 0.001 | 0.0013 |
| Median | 6.2 | 15 | 2.5 | - | - | 0.032 | 0.086 | 0.0004 | 0.083 | 0.0091 | 0.00008 | 0.0005 | 0.00035 | 0.019 | 0.011 | 0.0005 | 0.079 | 0.00002 | 0.00094 | 0.00043 | 0.0001 | 0.000011 | 0.018 | 0.000089 | 0.0017 | 0.001 | 0.0048 |
| P90 | 6.3 | 20 | 3.1 | - | - | 0.075 | 0.12 | 0.00092 | 0.42 | 0.01 | *0.001* | 0.0005 | 0.0016 | 0.036 | 0.012 | 0.0048 | 0.23 | 0.00003 | 0.0021 | 0.00094 | 0.0001 | 0.000019 | 0.041 | 0.00021 | 0.005 | 0.001 | *0.069* |
| Max | 6.4 | 23 | 3.4 | - | - | 0.083 | 0.14 | 0.0012 | 0.65 | 0.011 | *0.0016* | 0.0005 | 0.0034 | 0.053 | 0.013 | 0.0066 | 0.25 | 0.000039 | 0.0028 | 0.00097 | 0.0001 | 0.000026 | 0.044 | 0.0003 | 0.007 | 0.001 | *0.12* |
| Average | 6.1 | 14 | 2.6 | - | - | 0.038 | 0.092 | 0.00051 | 0.17 | 0.0083 | 0.00037 | 0.0005 | 0.00066 | 0.017 | 0.0078 | 0.0017 | 0.11 | 0.000023 | 0.001 | 0.00041 | 0.0001 | 0.000014 | 0.023 | 0.0001 | 0.0027 | 0.001 | 0.025 |
| Std Dev | 0.2 | 6.4 | 0.41 | - | - | 0.028 | 0.026 | 0.00036 | 0.23 | 0.0021 | 0.00059 | 0 | 0.0012 | 0.018 | 0.0048 | 0.0025 | 0.084 | 0.0000071 | 0.00093 | 0.00041 | 1.5E-20 | 0.0000058 | 0.015 | 0.000098 | 0.0022 | 0 | 0.045 |

*Notes:*

*Screening Criteria are for the total fraction*

*Chromium guideline is for hexavlaent chromium*

*Concentration > CCME Short Term*

*Concentration > CCME Long Term*

*Concentration > NFLD Criteria*

Table 4.4-5: Mineralogical Results of Quantitative Phase Analysis (wt%)

| Mineral/Sample ID | | Composite # (see full sample ID in Table 4.4-6) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4 | 5 | 15 | 21 | 37 | 38 |
| | | SLG | Ore | Ore | Ore | SLG | SLG |
| Apatite | $Ca_5(PO_4)_3(F,Cl,OH)$ | n.d. | | | | 0.2 (?) | 0.1 (?) |
| Barite | $BaSO_4$ | n.d. | n.d. | n.d. | n.d. | 0.2 (?) | 0.1 (?) |
| Calcite | $CaCO_3$ | 0.5 | n.d. | n.d. | n.d. | n.d. | n.d. |
| Clinochlore | $(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$ | n.d. | n.d. | n.d. | n.d. | n.d. | 0.2 (?) |
| Fluorite | $CaF_2$ | 0.2 (?) | n.d. | 0.3 (?) | n.d. | n.d. | n.d. |
| Hematite | $\alpha$-$Fe_2O_3$ | 25.3 | 72.2 | 26.1 | 92.8 | 1.1 | 0.7 |
| Illite-Muscovite | $\sim K_{0.65}Al_{2.0}(Al_{0.65}Si_{3.35}O_{10})(OH)_2$ – $KAl_2(AlSi_3O_{10})(OH)_2$ | 1.3 | n.d. | 0.2 | n.d. | 0.8 | 1.1 |
| Illite-Smectite | $\sim K_{0.65}Al_{2.0}(Al_{0.65}Si_{3.35}O_{10})(OH)_2$ – $(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot nH_2O$ | 3.2 | 0.3 | 2.5 | 0.1 (?) | 3.4 | 4.0 |
| Kaolinite | $Al_2Si_2O_5(OH)_4$ | 2.6 | n.d. | 1.6 | n.d. | n.d. | n.d. |
| K-feldspar | $KAlSi_3O_8$ | n.d. | n.d. | n.d. | n.d. | 0.4 (?) | 0.4 (?) |
| Plagioclase | $NaAlSi_3O_8$ – $CaAl_2Si_2O_8$ | 15.4 | n.d. | 8.9 | n.d. | 31.6 | 28.6 |
| Pyrite | $FeS_2$ | 2.5 | n.d. | n.d. | n.d. | 19.0 | 19.8 |
| Quartz | $SiO_2$ | n.d. | n.d. | n.d. | n.d. | 0.2 | 0.1 |
| Total | | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Note: See full sample ID in Table 4.4-6.*
*(?): These values are at the RDL.*
*n.d. not detected*

Table 4.4-6: NAG pH Measurements

| Sample ID | Lithology | Pulp Sample Weight | Vol. of 15% $H_2O_2$ | NAG pH |
|---|---|---|---|---|
| | | g | mL | |
| Composite-4; DS147_31-33.4 | SLG | 2.5 | 250 | 6.52 |
| Composite-5; DS147_33.4-35.4 | DZO | 2.5 | 250 | 7.23 |
| Composite-15; DS148_67.46-71.31 | DZO | 2.5 | 250 | 7.26 |
| Composite-21; DS150_23.3-25.7 | DZO | 2.5 | 250 | 7.61 |
| Composite-21-DUP; DS150_30.5-32 | DZO | 2.5 | 250 | 10.25 |
| Composite-37; DS157_6.41-7.0 | SLG | 2.5 | 250 | 5.73 |
| Composite-38; DS157_7-21 | SLG | 2.5 | 250 | 7.42 |

Table 4.4-7: Historical Tailings Contact Water Quality

| Parameter | pH | $Cl^-$ | $F^-$ | $NO_3$ | $NO_2$ | $NO_3$+$NO_2$ | Al | As | Ba | B | Cd | Cr | Co | Cu | Fe | Pb | Mn | Hg | Mo | Ni | Se | Ag | Sr | Tl | U | V | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | - | mg/L | mg/L | mg-N/L | mg-N/L | mg-N/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | ug/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| CCME Short Term | - | 640 | - | 124 | - | - | - | - | - | 29 | 0.00068 | - | - | - | - | - | 2.51 | - | - | - | - | - | - | - | 0.033 | - | 0.051 |
| CCME Long Term | 6.5 to 9.0 | 120 | 0.12 | 2.93 | 0.06 | - | 0.1 | 0.005 | - | 2 | 0.00006 | 0.001 | - | 0.0020 | 0.3 | 0.0010 | 0.38 | 0.026 | 0.073 | 0.03 | 0.001 | 0.00025 | - | 0.0008 | 0.015 | - | 0.018 |
| NFLD Criteria | 5.5 to 9.0 | - | - | - | - | 10 | - | 0.5 | 5 | 5 | 0.05 | 0.05 | - | 0.3 | 10 | 0.2 | - | 5 | - | 0.5 | 0.01 | 0.05 | - | - | - | - | 0.5 |
| DIRECTOR-HISTORIC-01 | 7.51 | 21 | 1.29 | 0.25 | 0.49 | 0.74 | 0.208 | <0.002 | 0.031 | <0.05 | <0.00009 | <0.001 | <0.001 | <0.002 | 0.299 | <0.0005 | 0.152 | <0.026 | <0.002 | <0.002 | <0.001 | <0.0001 | 0.025 | <0.0001 | <0.0001 | <0.002 | 0.005 |
| DIRECTOR-HISTORIC-02 | 5.77 | 14 | 1.77 | 0.83 | <0.05 | 0.83 | 0.162 | <0.002 | 0.087 | <0.05 | 0.00017 | <0.001 | <0.001 | <0.002 | <0.05 | 0.002 | 0.006 | <0.026 | <0.002 | <0.002 | <0.001 | <0.0001 | 0.042 | <0.0001 | 0.0002 | <0.002 | 0.013 |
| DIRECTOR-HISTORIC-03 | 5.74 | 19 | 2.02 | 0.7 | 0.48 | 1.18 | 0.067 | <0.002 | 0.129 | <0.05 | 0.00036 | <0.001 | <0.001 | 0.002 | <0.05 | 0.0054 | 0.013 | <0.026 | <0.002 | <0.002 | <0.001 | <0.0001 | 0.039 | <0.0001 | 0.0007 | <0.002 | 0.011 |
| DIRECTOR-HISTORIC-04 | 5.94 | 72 | 1.67 | 0.8 | 0.33 | 1.13 | 0.038 | <0.002 | 0.342 | <0.05 | *0.00122* | <0.001 | <0.001 | 0.007 | <0.05 | 0.013 | 0.032 | <0.026 | 0.004 | <0.002 | <0.001 | <0.0001 | 0.058 | <0.0001 | 0.0028 | <0.002 | 0.039 |
| DIRECTOR-HISTORIC-05 | 5.41 | 13 | 0.29 | 0.17 | 0.41 | 0.58 | 0.108 | <0.002 | 0.012 | <0.05 | <0.00009 | <0.001 | <0.001 | <0.002 | 0.414 | <0.0005 | 0.048 | <0.026 | <0.002 | <0.002 | <0.001 | <0.0001 | 0.01 | <0.0001 | <0.0001 | <0.002 | <0.005 |

*Notes:*
Screening Criteria are for the total fraction
Chromium guideline is for hexavalent chromium
*Concentration > CCME Short Term*
Concentration > CCME Long Term
Concentration > NFLD Criteria

# 5 DISCUSSION

## 5.1 ACID DRAINAGE POTENTIAL

Current acid generation was assessed by paste pH and pH of SFE leachates. These measurements were compared to reference value of 5.5 of pH units, per NFL Regulation 65/03, and to DI water after blank tests (pH ~5.3 for SFE). In some instances, SFE pH were below 5.5, but all of those were at/or above the pH of the blank tests indicating that solids are not generating acidity but increasing the pH of leachates instead. Unless the pH from the various tests falls significantly (more than 0.2 pH units) below the blank pH, there is no concern for acidity being instantly generated from the materials interaction with water.

For this report, materials with a carbonate NPR (i.e. those calculated with the carbonate NP) less than 1.0 have been classified as PAG and materials, and those with a NPR greater than 2.0 have been classified as NPAG. Materials with a carbonate NPR between 1.0 and 2.0 can generate acidic drainage under certain conditions (Price 2009). Results in Table 4.4-2 demonstrate that the use of carbonate NPR is more conservative and leads to more samples being classified as PAG and uncertain. The mineralogical analysis indicates a presence of apatite in SLG rock. Apatite contributes to fast reacting NP, which is unaccounted for in the carbonate NP measurement, resulting in a conservative classification using carbonate NPR.

Based on the current ARD classification, all samples from historical tailings and tuffisite mine rock are NPAG (carbonate NPR > 2) and are not expected to generate ARD. Only 4% of SLG samples, representing mine rock, are conservatively classified as PAG (carbonate NPR < 1). This classification discounts the neutralization potential contribution of apatite in one sample and conservatively assumes that sulfur associated with barite contributes to acid potential in another sample. Both samples represent relatively short intervals 0.6 m and 2.4 m suggesting a localized rock chemistry/mineralogy. A few samples representing SLG mine rock, ore and overburden are classified as uncertain (1 < carbonate NPR <2) and underwent additional NAG test to confirm ARD related risk. The NAG pH was > 4.5 in all samples, indicating that they will not produce acidic leachate. The materials are therefore classified as NPAG, indicating a low risk of acidic drainage under oxidizing conditions. This finding is further supported by contact water monitoring data from Blue Bay Beach, Tarefare, Director and AGS mines, which show no indications of ARD, and by previous geochemical assessments done in the area.

Considering the low proportion and localized distribution of PAG material within mine rock, the risk of ARD is predicted to be low and can be passively mitigated through mixing with NPAG rock during blasting, excavation, and stockpiling. Ore, overburden, and tailings are classified as NPAG and do not require specific ARD management measures.

## 5.2 METAL LEACHING POTENTIAL

Screening of metals for potential metal leaching using SFE was conducted using Regulation 65/03, short-term and long-term CCME that may apply to effluent. Exceedance of short-term guidelines may be indicative of acute toxicity of the effluent and may not be accepted by regulators. The concentrations of all elements in SFE from all samples comply with NFL Regulation 65/03 limits. Cadmium and zinc exceeded short-term CCME guidelines in SFE from for all materials but overburden. The frequency of exceedances for these parameters is low in ore (up to 24% of samples), SLG (up to 6% of samples) and in TFS (up to 14% of samples) indicating for low risk of acute toxicity of Zn and Cd in water draining these materials. In tailings, cadmium and zinc short-term CCME guidelines are exceeded in 100% and 50% of SFE tests

respectively, while only 20% water samples associated with historical tailings exceeded thresholds for both metals. Concentration of these metals in SFE leachates were higher than those in contact water from historical tailings indicating that SFE concentrations may overestimate ML potential (Figure 5.2-1). Future tailings are not part of the South Ride project and are managed under AGS Project Certificate of Approval which mirrors effluent limits of NFL Regulation 65/03. It should be kept in mind that the SFE do not represent element concentration in drainage from project components and their results here are used for qualitative assessment. Further kinetic testing and evaluations that consider storage methods along with local hydrologic conditions will be needed.

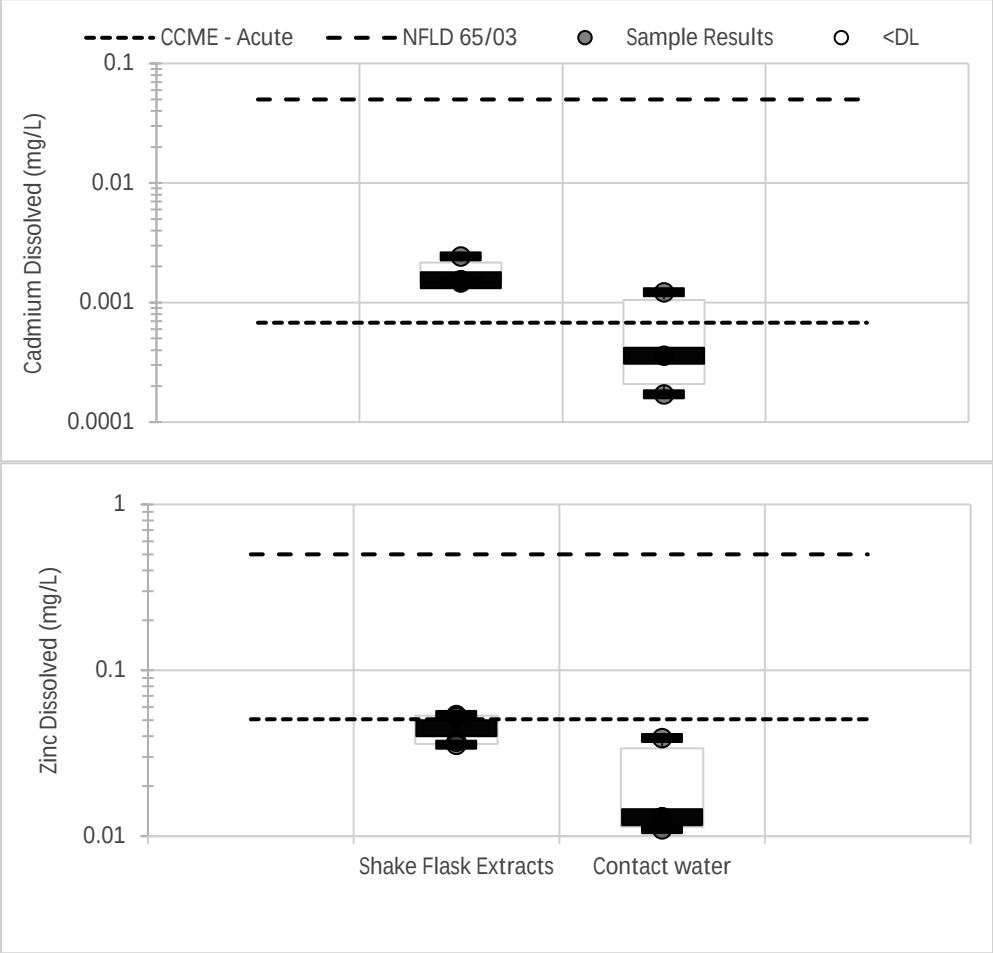


Figure 5.2-1: Box Plots for Cd and Zn in solutions from Historical Tailings

Exceedances of long-term or chronic CCME 2025 guidelines were used to identify elements of interest leaching of which might affect receiving water bodies. For all materials, there exceedance for long-term CCME guidelines for fluoride, copper, cadmium, lead, aluminum, and zinc. Iron and chromium exceedances were only observed in overburden samples. Arsenic exceedances are present in SLG and overburden samples. Manganese exceedances were observed in overburden, SLG and ore samples. Mercury and zinc exceedances were observed in all sample types except for overburden. In order to confirm whether screened parameters pose environmental risks, water quality predictions and subsequent aquatic effect assessment should be conducted for the receiving environment prior considering mitigation of metal leaching.

# 6 CONCLUSIONS

Based on results of ABA and NAG tests we can conclude that:

- Ore, overburden, and tailings are classified as NPAG and do not require ARD mitigation.
- Low (less than 4%) fraction of mine rock samples conservatively classified as PAG indicate that risk of ARD is low. This low risk can be further reduced through mixing with NPAG rock, which has excess neutralization potential. This mixing will occur as part of normal mining activities during blasting, excavation, and stockpiling.
- Contact water monitoring data from several operating and historical fluorite mines on the St. Lawrence peninsula show no indications of acid drainage supporting overall risk of ARD associated with the project.

Short-term leaching SFE tests indicate following:

- Concentrations of elements in all samples are bellow effluent limits listed in the NFL Regulation 65/03.
- Cadmium and zinc exceeded short-term (acute) CCME guidelines in ore (24% of SFE tests), historical tailings (20% of water samples), granite (6% of tests) and in tuffisite (14% of tests), showing low probability of acute toxicity of Zn and Cd in water draining these materials.
- Potential elements of interest which might affect receiving water bodies are listed below in overall frequency of exceeding long-term CCME 2025 guidelines:
  - Fluoride
  - Copper
  - Cadmium
  - Lead
  - Aluminum
  - Zinc
- It must be noted that CCME thresholds do not apply to any leach tests and should not be interpreted within a regulatory context. In order to confirm whether screened parameters pose environmental risks, water quality predictions and subsequent aquatic effect assessment should be done for the receiving environment prior considering any mitigation of metal leaching.

# 7 RECOMMENDATIONS

- Continue recently initiated kinetic testing program and interpret the results when data become available.
- Predict water quality in effluent(s) and receptors with the development of a water quality model.
- Conduct subsequent aquatic effect assessment and select mitigation if required.

# 8 CLOSURE

We trust this Report meets your present requirements. Please do not hesitate to contact the undersigned should you have any questions.

Prepared by:

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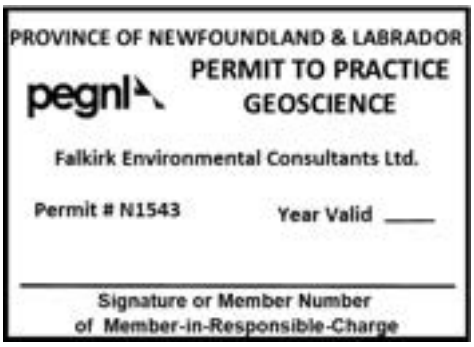
Principal Geochemist

Reviewed by:

Jacob MacLaine, B.Sc., P.Geo.
Geochemist and Water Quality Modeler



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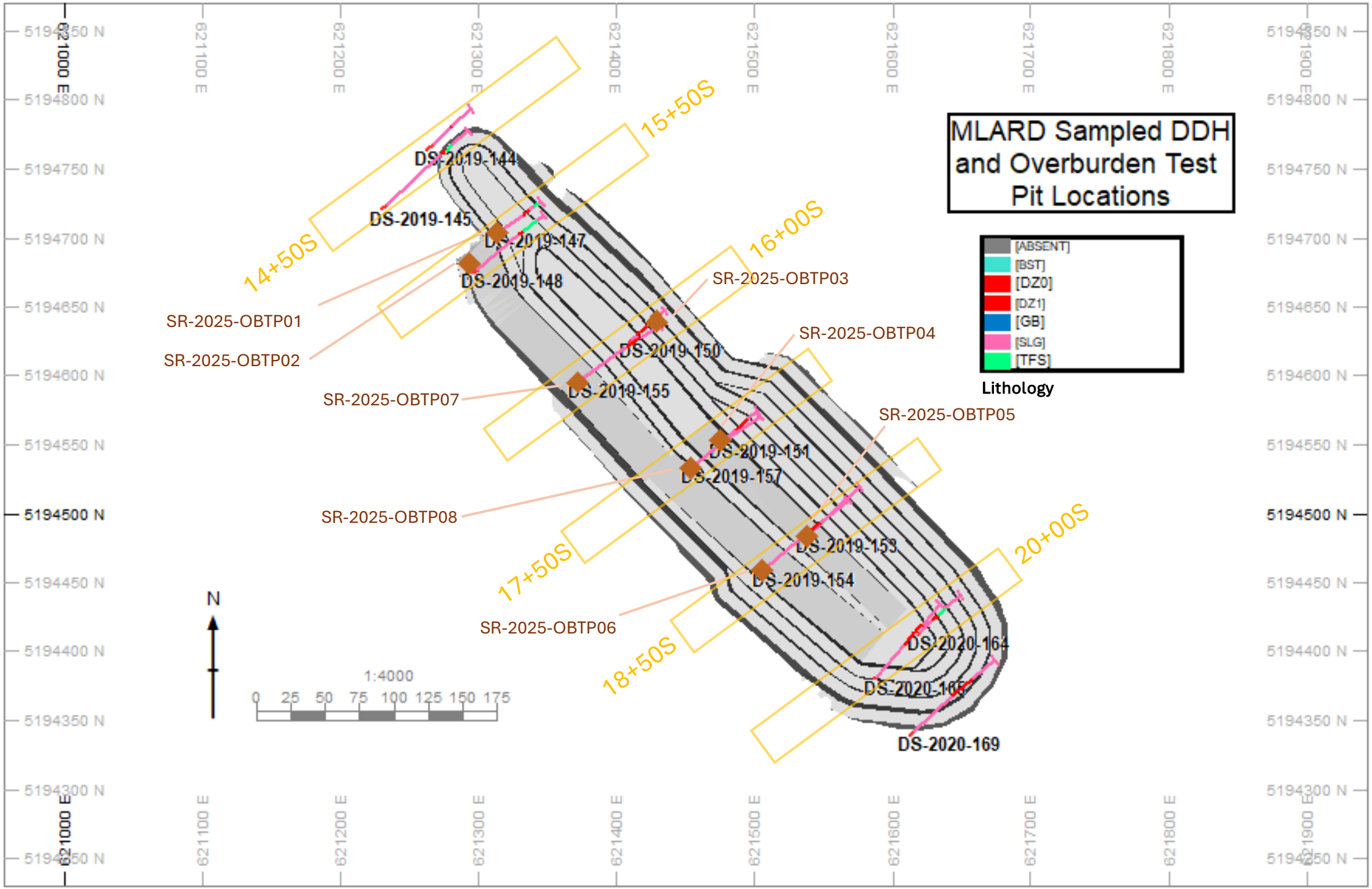
# APPENDIX A. SAMPLING LOCATIONS

CFI
CANADA FLUORSPAR INC.

# South Ridge View Map and Cross-Sections & Plan

Generated: December 15, 2025
(version 2)
By: Brad Smith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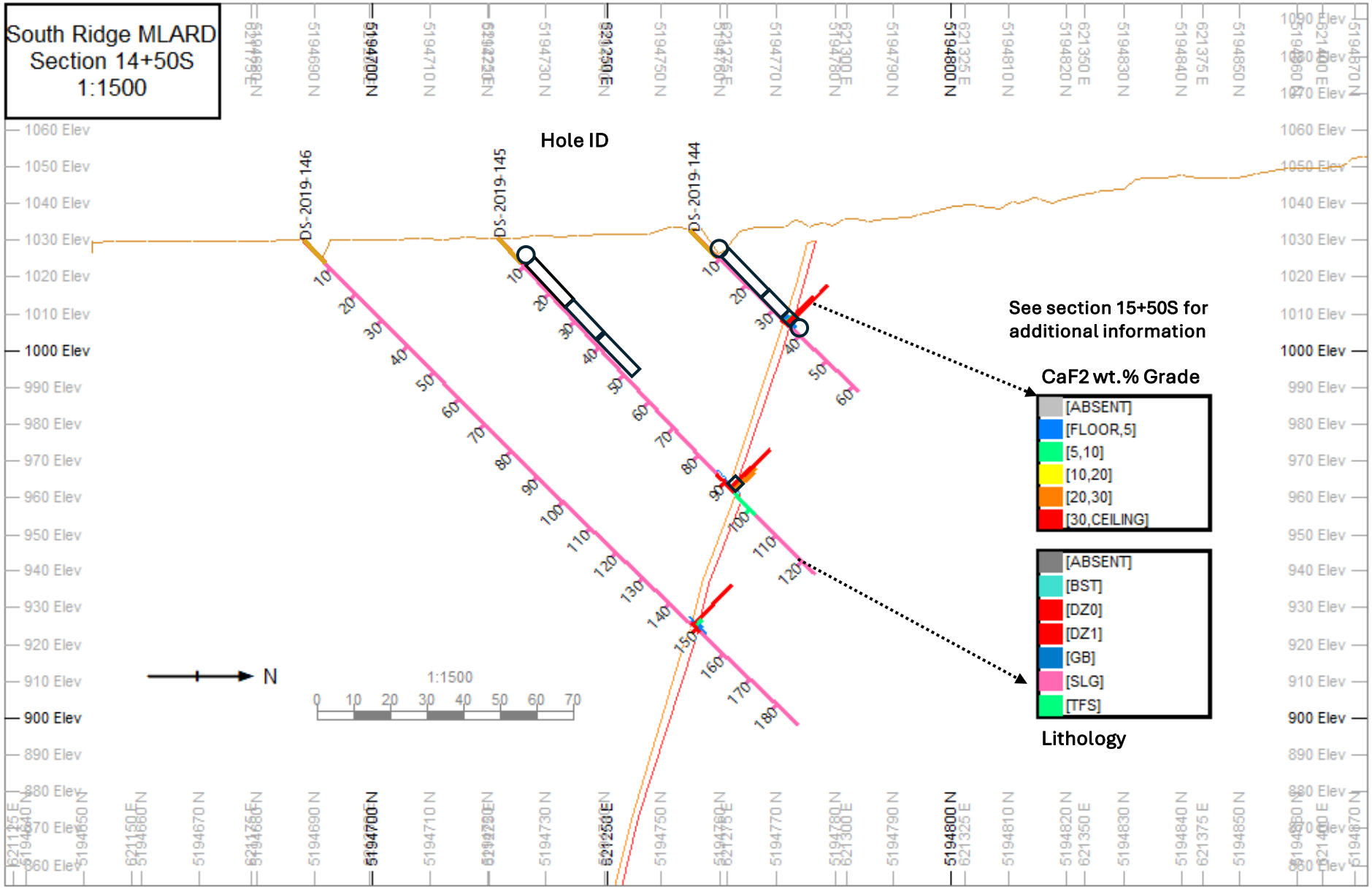
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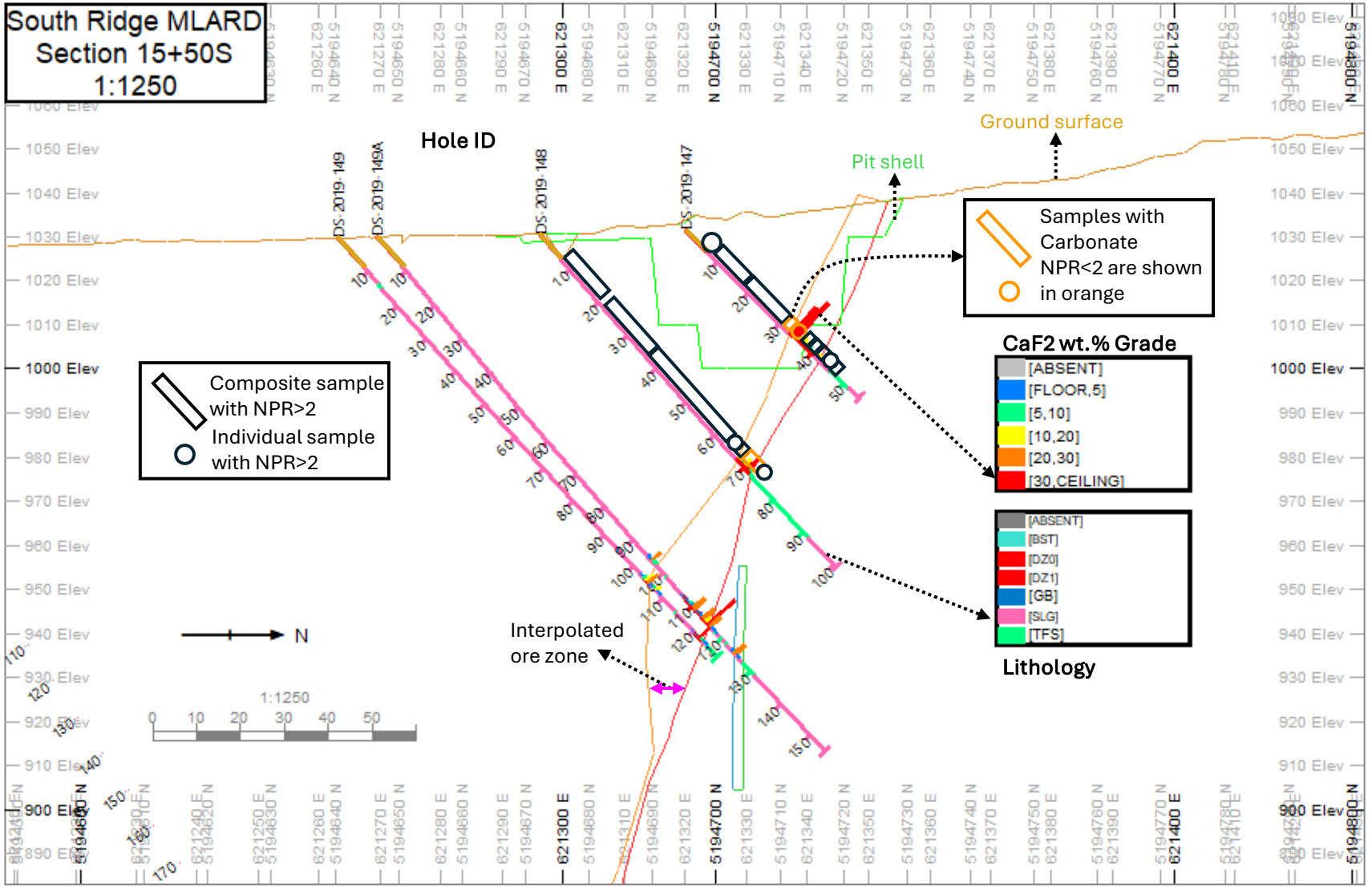
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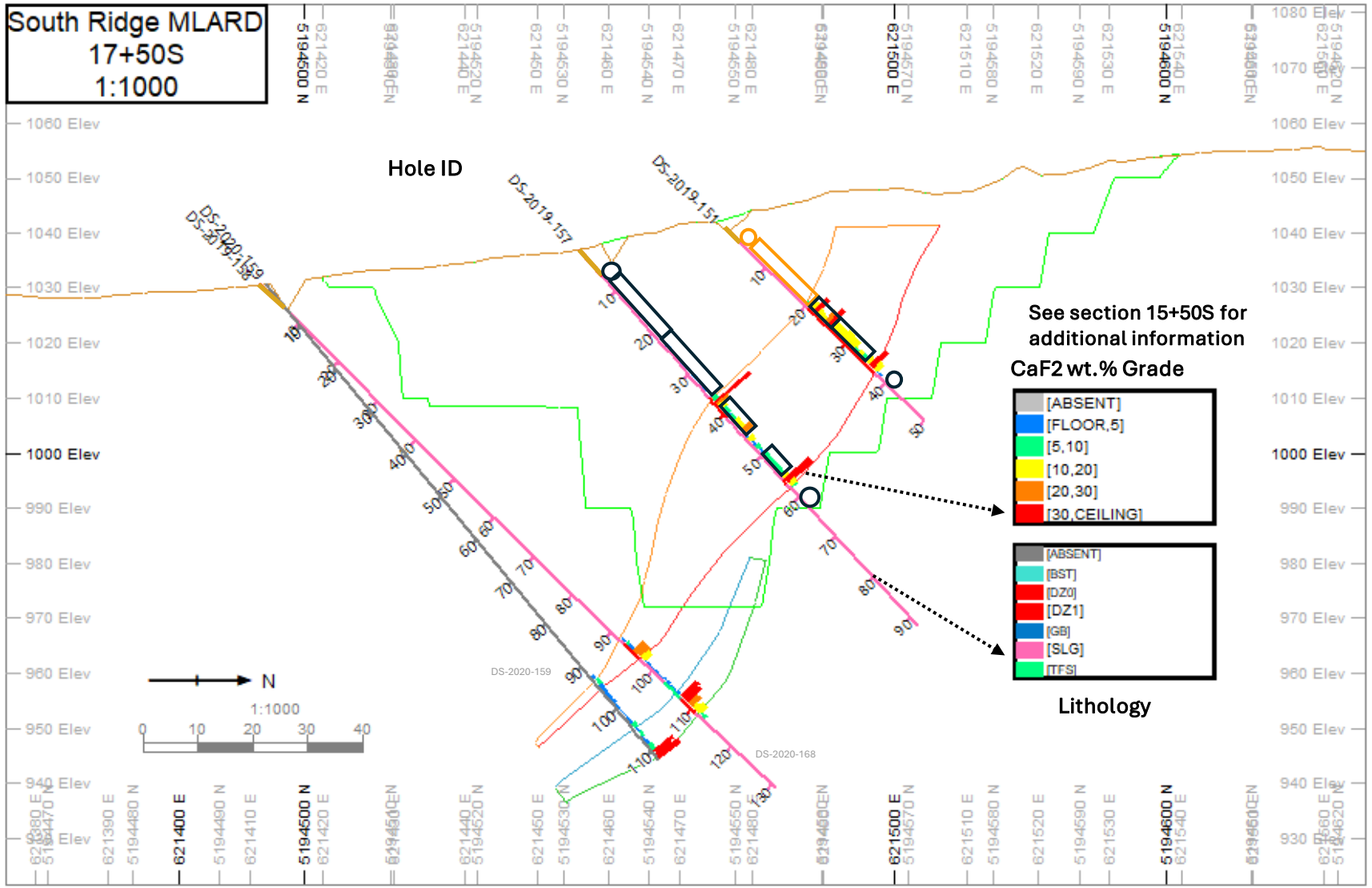
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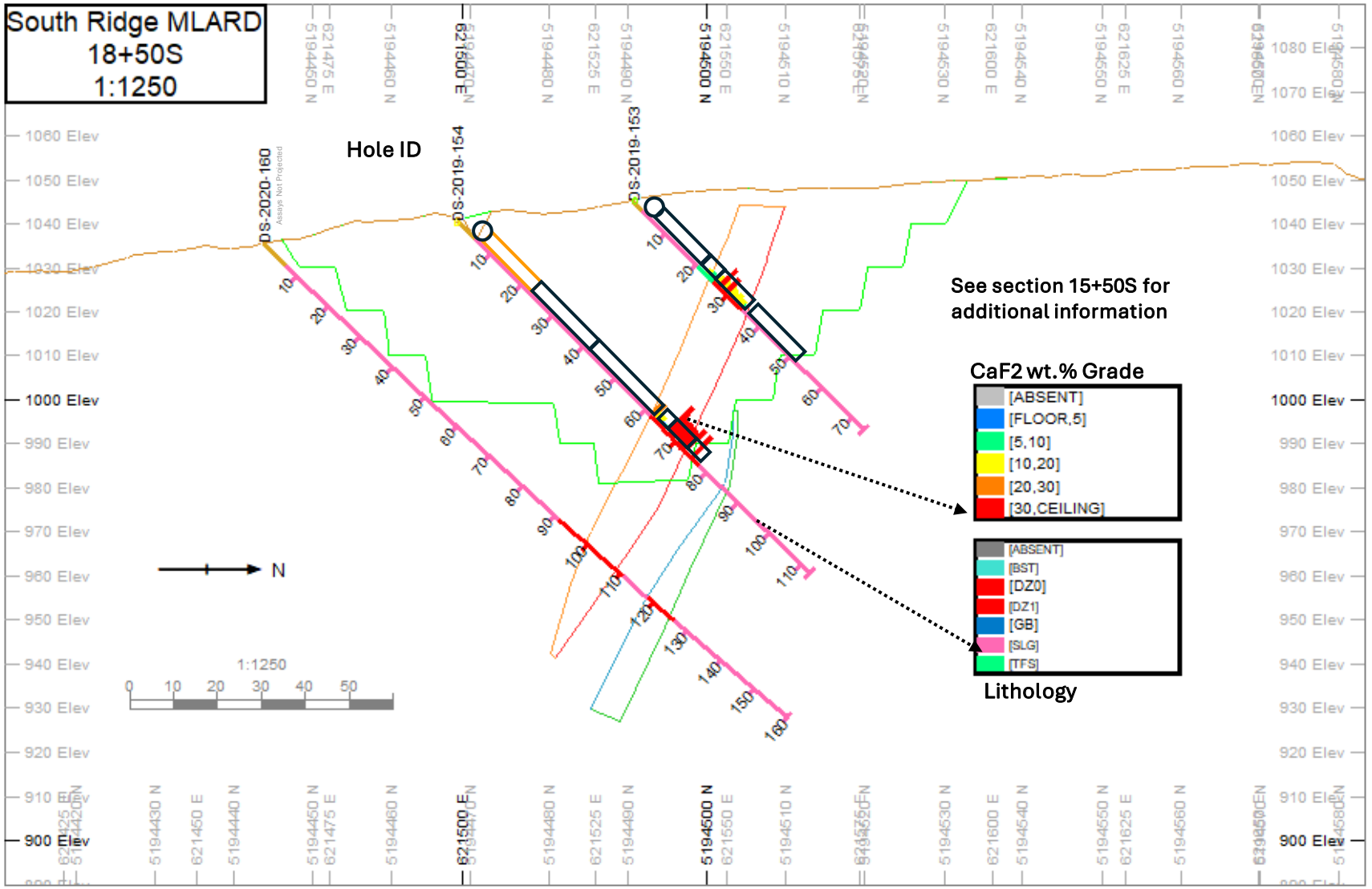
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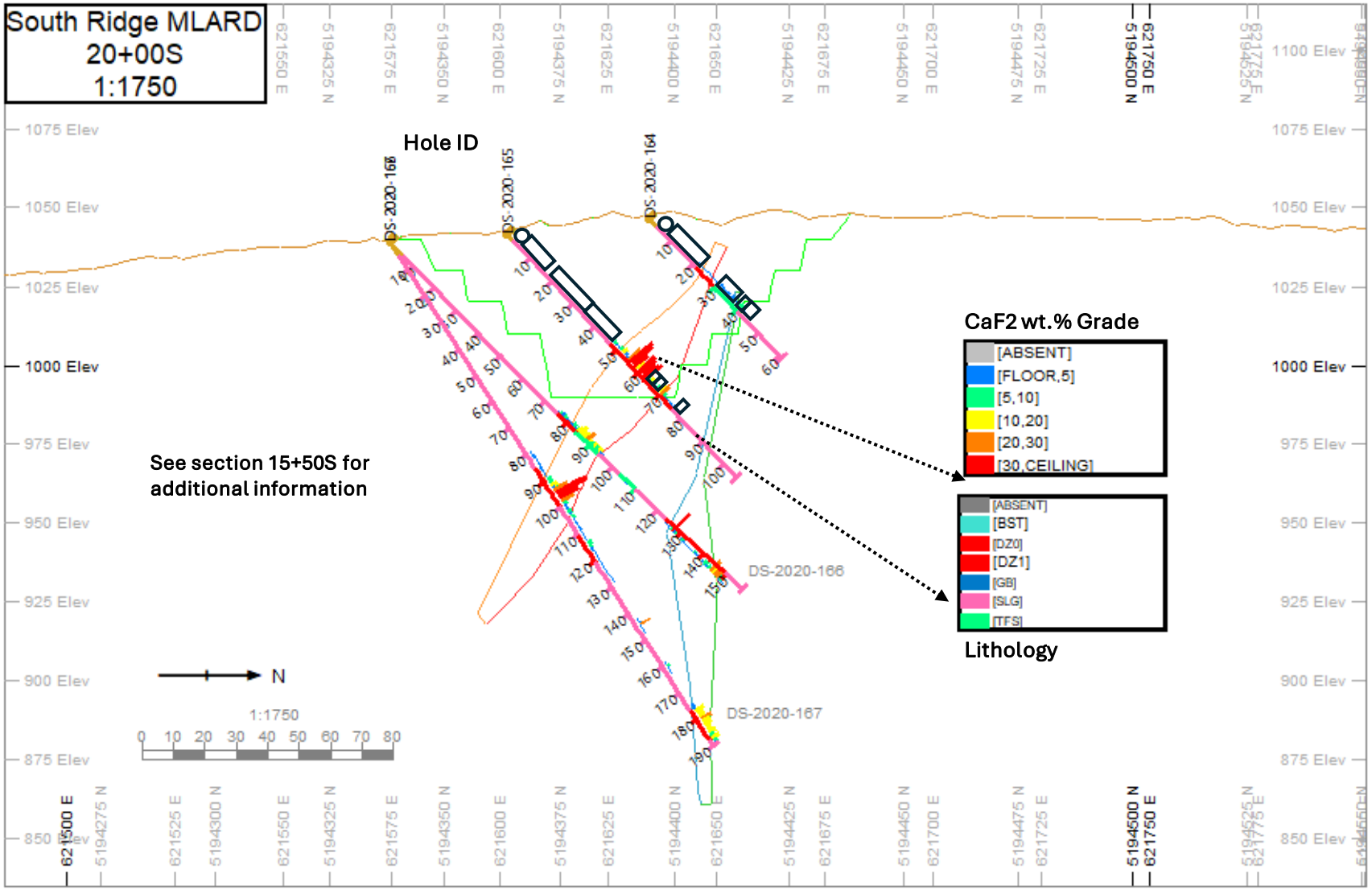
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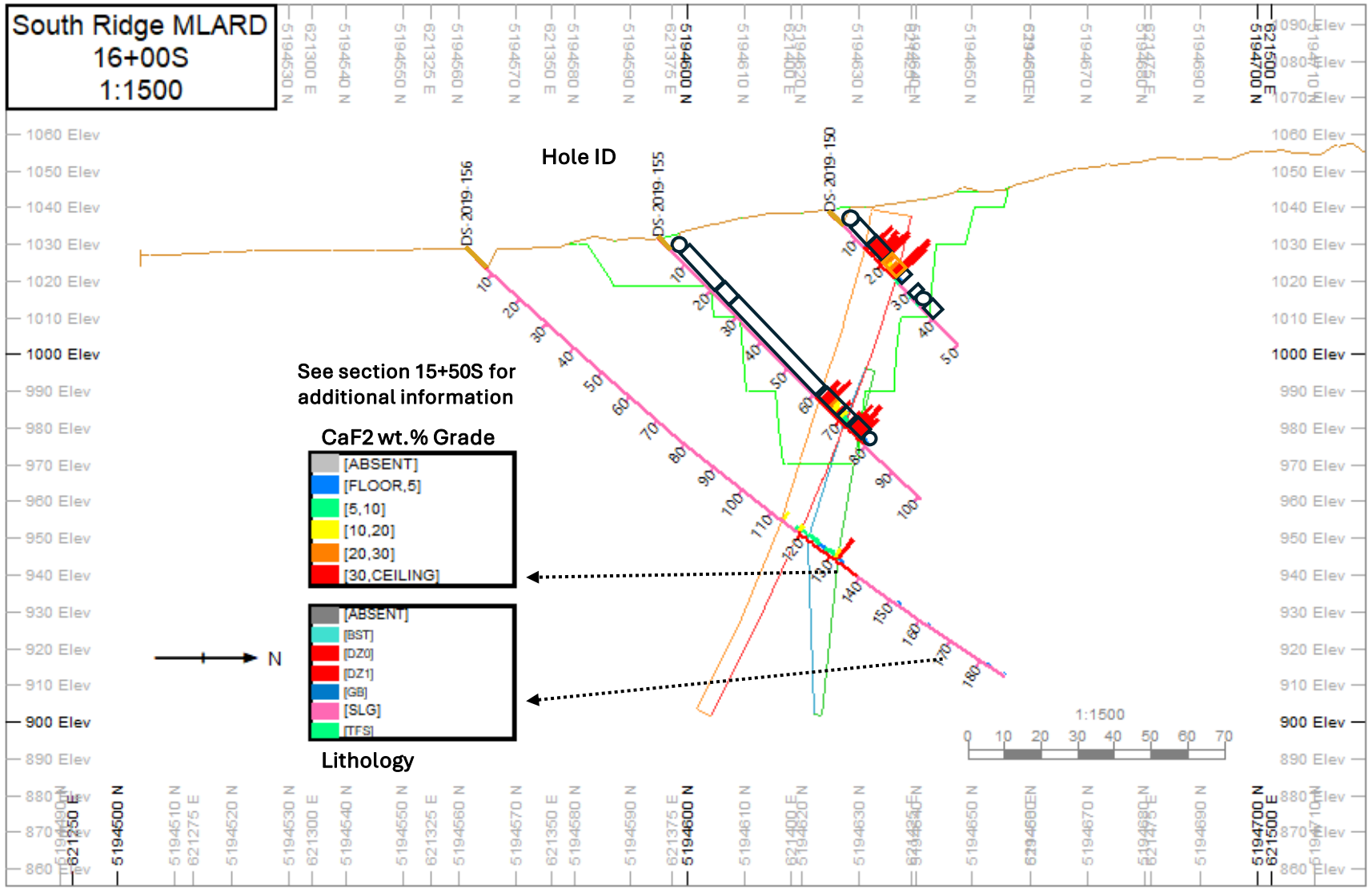
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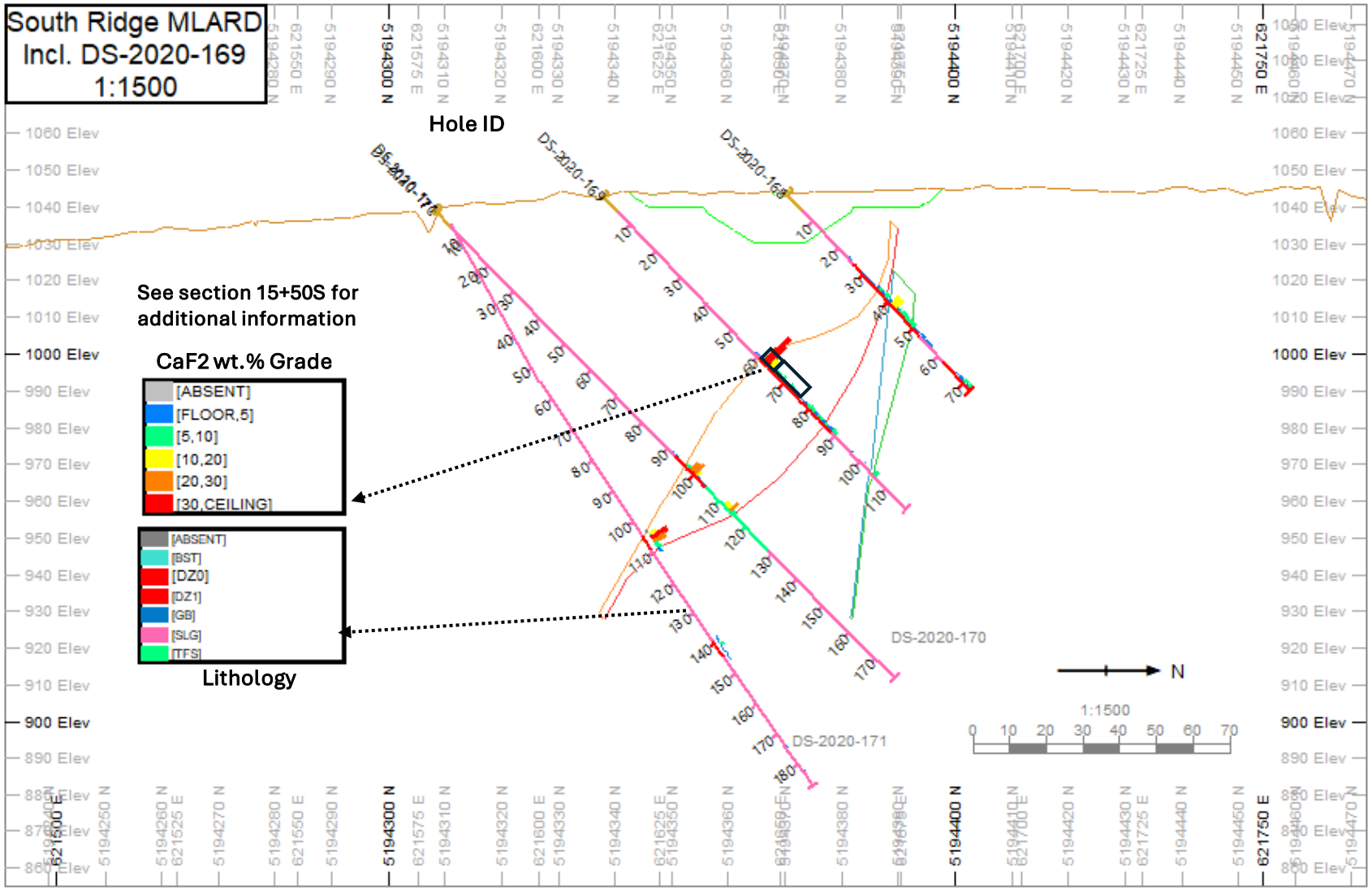
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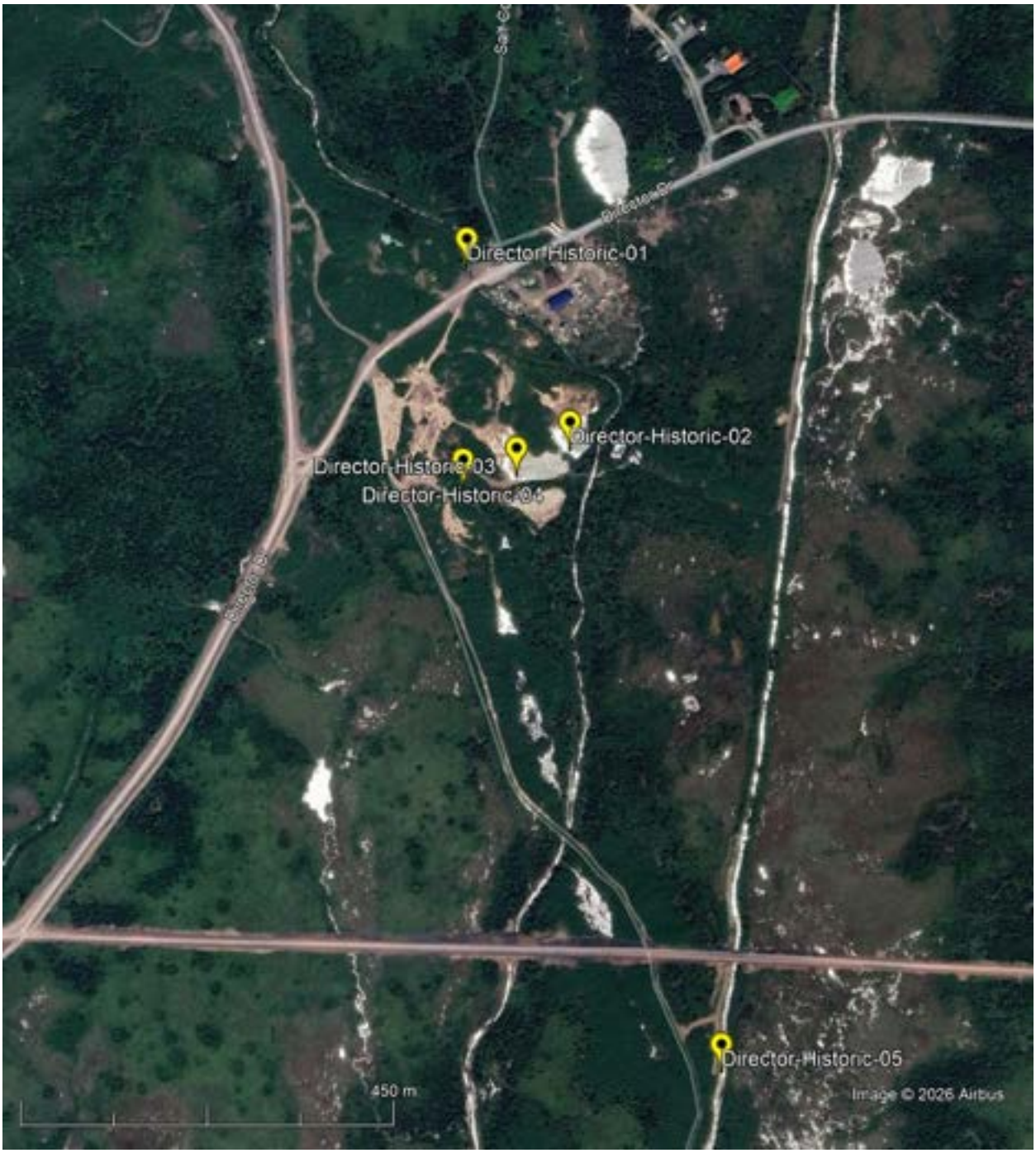
**Appendix A2: Tailings Sampling Locations**

**HISTORICAL DIRECTOR TAILINGS SOLIDS SAMPLING LOCATIONS**

**Appendix A2: Tailings Sampling Locations**




**DIRECTOR TAILINGS WATER SAMPLING LOCATIONS**

# APPENDIX B. SAMPLE LOGS AND PHOTOGRAPHS

| HOLE-ID | Litho | Composite | Comp SAMPLE ID | CFI Sample ID | From | To | Mass (kg) |
|---|---|---|---|---|---|---|---|
| DS-2019-147 | SLG | Composite-1 | DS147_7.23-7.5 | 261731 | 7.23 | 7.5 | 1.18 |
| DS-2019-147 | SLG | Composite-2 | DS147_7.5-18 | 261732 | 7.5 | 8.5 | 4.4 |
| DS-2019-147 | | | | 261733 | 14 | 15 | 4.4 |
| DS-2019-147 | | | | 261841 | 17 | 18 | 4.4 |
| DS-2019-147 | SLG | Composite-3 | DS147_18-32 | 261842 | 18 | 19 | 4.4 |
| DS-2019-147 | | | | 261736 | 25 | 26 | 4.4 |
| DS-2019-147 | | | | 261737 | 31 | 32 | 4.4 |
| DS-2019-147 | SLG | Composite-4 | DS147_32-33.4 | 261738 | 32 | 33.39 | 1.52 |
| DS-2019-147 | Ore | Composite-5 | DS147_33.4-35.4 | 261739 | 33.39 | 34.4 | 1.11 |
| DS-2019-147 | | | | 261740 | 34.4 | 35.42 | 1.12 |
| DS-2019-147 | Ore | Composite-6 | DS147_35.4-38.3 | 261741 | 35.42 | 36.39 | 1.06 |
| DS-2019-147 | | | | 261742 | 36.39 | 37.37 | 1.07 |
| DS-2019-147 | | | | 261743 | 37.37 | 38.34 | 1.06 |
| DS-2019-147 | Ore | Composite-7 | DS147_38.3-41.3 | 261744 | 38.34 | 39.32 | 1.07 |
| DS-2019-147 | | | | 261745 | 39.32 | 40.29 | 1.06 |
| DS-2019-147 | | | | 261746 | 40.29 | 41.27 | 1.07 |
| DS-2019-147 | SLG | Composite-8 | DS147_42-43 | 261747 | 42 | 43 | 4.4 |
| DS-2019-147 | TFS | Composite-8-DUP | DS147_46-47 | 261748/261749 | 46 | 47 | 4.4 |
| DS-2019-148 | SLG | Composite-9 | DS148_7-7.5 | 261713 | 7 | 7.5 | 2.2 |
| DS-2019-148 | SLG | Composite-10 | DS148_7.5-20 | 261714 | 7.5 | 8.5 | 4.4 |
| DS-2019-148 | | | | 261715 | 13 | 14 | 4.4 |
| DS-2019-148 | | | | 261716 | 19 | 20 | 4.4 |
| DS-2019-148 | SLG | Composite-11 | DS148_21-35 | 261717 | 21 | 22 | 4.4 |
| DS-2019-148 | | | | 261718 | 29 | 30 | 4.4 |
| DS-2019-148 | | | | 261719 | 34 | 35 | 4.4 |
| DS-2019-148 | SLG | Composite-12 | DS148_35-64 | 261720 | 35 | 36 | 4.4 |
| DS-2019-148 | | | | 261721 | 49 | 50 | 4.4 |
| DS-2019-148 | | | | 261722 | 63 | 64 | 4.4 |
| DS-2019-148 | SLG | Composite-13 | DS148_66.6-67.54 | 261723 | 66.6 | 67.54 | 1.03 |
| DS-2019-148 | TFS | Composite-16 | DS148_72.11-73.06 | 261728 | 72.11 | 73.06 | 1.04 |
| DS-2019-148 | TFS | Composite-16-DUP | DS148_82-83 | 261729/261730 | 82 | 83 | 4.4 |
| DS-2019-150 | Ore | Composite-19 | DS150_14.25-20 | 261694 | 14.25 | 15 | 0.82 |
| DS-2019-150 | | | | 261695 | 15 | 16 | 1.1 |
| DS-2019-150 | | | | 261696 | 16 | 17 | 1.1 |
| DS-2019-150 | | | | 261697 | 17 | 18 | 1.1 |
| DS-2019-150 | | | | 261698 | 18 | 19 | 1.1 |
| DS-2019-150 | | | | 261699 | 19 | 20 | 1.1 |

| HOLE-ID | Litho | Composite | Comp SAMPLE ID | CFI Sample ID | From | To | Mass (kg) |
|---|---|---|---|---|---|---|---|
| DS-2019-150 | Ore | Composite-20 | DS150_20-23.3 | 261700 | 20 | 21 | 1.1 |
| DS-2019-150 | | | | 261701 | 21 | 21.75 | 0.82 |
| DS-2019-150 | | | | 261702 | 21.75 | 22.5 | 0.82 |
| DS-2019-150 | | | | 261703 | 22.5 | 23.28 | 0.85 |
| DS-2019-150 | Ore | Composite-21 | DS150_23.3-25.7 | 261704 | 23.28 | 24.21 | 1.02 |
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| DS-2019-150 | SLG | Composite-21-DUP | DS150_30.5-32 | 261707/261708 | 30.5 | 32 | 6.6 |
| DS-2019-150 | SLG | Composite-22 | DS150_30.07-33.96 | 261709 | 32.07 | 33.96 | 8.31 |
| DS-2019-150 | SLG | Composite-23 | DS150_35.3-40 | 261710 | 35.27 | 36.27 | 4.4 |
| DS-2019-150 | | | | 261711 | 37.635 | 38.635 | 4.4 |
| DS-2019-150 | | | | 261712 | 40 | 41 | 4.4 |
| DS-2019-155 | SLG | Composite-24 | DS155_4-4.5 | 261663 | 3.95 | 4.5 | 2.42 |
| DS-2019-155 | SLG | Composite-25 | DS155_5-21 | 261664 | 5 | 6 | 4.4 |
| DS-2019-155 | | | | 261665 | 12.5 | 13.5 | 4.4 |
| DS-2019-155 | | | | 261666 | 20 | 21 | 4.4 |
| DS-2019-155 | SLG | Composite-26 | DS155_21-25 | 261667 | 21 | 22 | 4.4 |
| DS-2019-155 | | | | 261668 | 24 | 25 | 4.4 |
| DS-2019-155 | SLG | Composite-27 | DS155_25-60 | 261669 | 25 | 26 | 4.4 |
| DS-2019-155 | | | | 261670 | 42 | 43 | 4.4 |
| DS-2019-155 | | | | 261671 | 59 | 60 | 4.4 |
| DS-2019-155 | Ore | Composite-28 | DS155_62.2-69.2 | 261672 | 62.24 | 63.24 | 1.1 |
| DS-2019-155 | | | | 261673 | 63.24 | 64.24 | 1.1 |
| DS-2019-155 | | | | 261674 | 64.24 | 65.24 | 1.1 |
| DS-2019-155 | | | | 261675 | 65.24 | 66.24 | 1.1 |
| DS-2019-155 | | | | 261676 | 66.24 | 67.24 | 1.1 |
| DS-2019-155 | | | | 261677 | 67.24 | 68.24 | 1.1 |
| DS-2019-155 | | | | 261678 | 68.24 | 69.24 | 1.1 |
| DS-2019-155 | Ore | Composite-30 | DS155_72.3-78 | 261682 | 72.23 | 73.24 | 1.111 |
| DS-2019-155 | | | | 261683 | 73.24 | 74.24 | 1.1 |
| DS-2019-155 | | | | 261684 | 74.24 | 75.24 | 1.1 |
| DS-2019-155 | | | | 261685 | 75.24 | 76.24 | 1.1 |
| DS-2019-155 | | | | 261686 | 76.24 | 77 | 0.83 |
| DS-2019-155 | | | | 261687 | 77 | 78 | 1.1 |
| DS-2019-155 | TFS | Composite-31 | DS155_78-79.7 | 261688 | 78 | 79.02 | 1.12 |
| DS-2019-155 | | | | 261689 | 79.02 | 79.74 | 0.79 |
| DS-2019-151 | SLG | Composite-32 | DS151_3.4-4 | 261600 | 3.37 | 4 | 2.77 |

| HOLE-ID | Litho | Composite | Comp SAMPLE ID | CFI Sample ID | From | To | Mass (kg) |
|---|---|---|---|---|---|---|---|
| DS-2019-151 | Ore | Composite-35 | DS151_19.8-26.12 | 261604 | 19.8 | 20.8 | 1.1 |
| DS-2019-151 | | | | 261605 | 20.8 | 21.76 | 1.05 |
| DS-2019-151 | | | | 261606 | 21.76 | 22.62 | 0.94 |
| DS-2019-151 | | | | 261607 | 22.62 | 23.6 | 1.07 |
| DS-2019-151 | | | | 261608 | 23.6 | 24.56 | 1.05 |
| DS-2019-151 | | | | 261609 | 24.56 | 25.3 | 0.81 |
| DS-2019-151 | | | | 261610 | 25.3 | 26.12 | 0.90 |
| DS-2019-151 | Ore | Composite-36 | DS151_26.12-35 | 261611 | 26.12 | 29 | 3.16 |
| DS-2019-151 | | | | 261612 | 29 | 32 | 3.3 |
| DS-2019-151 | | | | 261613 | 32 | 33 | 1.1 |
| DS-2019-151 | | | | 261614 | 33 | 34 | 1.1 |
| DS-2019-151 | | | | 261615 | 34 | 35 | 1.1 |
| DS-2019-157 | SLG | Composite-37 | DS157_6.41-7.0 | 261773 | 6.41 | 7 | 2.59 |
| DS-2019-157 | SLG | Composite-38 | DS157_7-21 | 261774 | 7 | 8 | 4.4 |
| DS-2019-157 | | | | 261775 | 14 | 15 | 4.4 |
| DS-2019-157 | | | | 261776 | 20 | 21 | 4.4 |
| DS-2019-157 | SLG | Composite-39 | DS157_21-36 | 261777 | 21 | 22 | 4.4 |
| DS-2019-157 | | | | 261778 | 28 | 29 | 4.4 |
| DS-2019-157 | | | | 261779 | 35 | 36 | 4.4 |
| DS-2019-153 | SLG | Composite-43 | DS153_3.5-20.9 | 261622 | 3.5 | 4.5 | 4.4 |
| DS-2019-153 | | | | 261623 | 11.75 | 12.75 | 4.4 |
| DS-2019-153 | | | | 261624 | 20 | 20.91 | 4.0 |
| DS-2019-153 | Ore | Composite-44 | DS153_23-26 | 261625 | 22.9 | 23.9 | 1.1 |
| DS-2019-153 | | | | 261626 | 23.9 | 26 | 2.31 |
| DS-2019-153 | Ore | Composite-45 | DS153_26_34.4 | 261627 | 26 | 27 | 1.1 |
| DS-2019-153 | | | | 261628 | 27 | 28 | 1.1 |
| DS-2019-153 | | | | 261629 | 28 | 29 | 1.1 |
| DS-2019-153 | | | | 261630 | 29 | 30 | 1.1 |
| DS-2019-153 | | | | 261631 | 30 | 31 | 1.1 |
| DS-2019-153 | | | | 261632 | 31 | 32 | 1.1 |
| DS-2019-153 | | | | 261633 | 32 | 32.8 | 0.88 |
| DS-2019-153 | | | | 261634 | 32.8 | 33.78 | 1.07 |
| DS-2019-153 | | | | 261635 | 33.78 | 34.4 | 0.68 |
| DS-2019-153 | SLG | Composite-46 | DS153_36_51 | 261636 | 36 | 37 | 4.4 |
| DS-2019-153 | | | | 261637 | 43 | 44 | 4.4 |
| DS-2019-153 | | | | 261638 | 50 | 51 | 4.4 |
| DS-2019-154 | SLG | Composite-47 | DS154_5.4-6 | 261639 | 5.37 | 6 | 2.77 |
| DS-2019-154 | SLG | Composite-48 | DS154_6-21 | 261640 | 6 | 7 | 4.4 |
| DS-2019-154 | | | | 261641 | 13 | 14 | 4.4 |
| DS-2019-154 | | | | 261642 | 20 | 21 | 4.4 |

| HOLE-ID | Litho | Composite | Comp SAMPLE ID | CFI Sample ID | From | To | Mass (kg) |
|---|---|---|---|---|---|---|---|
| DS-2019-154 | SLG | Composite-49 | DS154_21-41 | 261643 | 21 | 22 | 4.4 |
| DS-2019-154 | | | | 261644 | 30.5 | 31.5 | 4.4 |
| DS-2019-154 | | | | 261645 | 40 | 41 | 4.4 |
| DS-2019-154 | SLG | Composite-50 | DS154_41-61 | 261646 | 41 | 42 | 4.4 |
| DS-2019-154 | | | | 261647 | 50.5 | 51.5 | 4.4 |
| DS-2019-154 | | | | 261648 | 60 | 61 | 4.4 |
| DS-2019-154 | Ore | Composite-51 | DS154_61.5-67 | 261649 | 61.5 | 62.15 | 0.71 |
| DS-2019-154 | | | | 261650 | 62.15 | 63 | 0.93 |
| DS-2019-154 | | | | 261651 | 63 | 64 | 1.1 |
| DS-2019-154 | | | | 261652 | 64 | 65 | 1.1 |
| DS-2019-154 | | | | 261653 | 65 | 66 | 1.1 |
| DS-2019-154 | | | | 261654 | 66 | 67 | 1.1 |
| DS-2019-154 | Ore | Composite-52 | DS154_67-72.6 | 261655 | 67 | 68 | 1.1 |
| DS-2019-154 | | | | 261656 | 68 | 69 | 1.1 |
| DS-2019-154 | | | | 261657 | 69 | 70 | 1.1 |
| DS-2019-154 | | | | 261658 | 70 | 71 | 1.1 |
| DS-2019-154 | | | | 261659 | 71 | 72 | 1.1 |
| DS-2019-154 | | | | 261660 | 72 | 72.6 | 0.66 |
| DS-2019-154 | SLG | Composite-53 | DS154_72.6-75.62 | 261661 | 72.6 | 73.6 | 1.1 |
| DS-2019-154 | | | | 261662 | 74.84 | 75.62 | 0.85 |
| DS-2020-164 | SLG | Composite-54 | DS164_3.86-4.36 | 261798 | 3.86 | 4.36 | 2.2 |
| DS-2020-164 | SLG | Composite-55 | DS164_5-21 | 261799 | 5 | 6 | 4.4 |
| DS-2020-164 | | | | 261800 | 12.5 | 13.5 | 4.4 |
| DS-2020-164 | | | | 261801 | 20 | 21 | 4.4 |
| DS-2020-164 | Ore | Composite-57 | DS164_39.0-41.08 | 261809 | 39 | 40 | 1.1 |
| DS-2020-164 | | | | 261810 | 40 | 40.5 | 0.55 |
| DS-2020-164 | | | | 261811 | 40.5 | 41.08 | 0.63 |
| DS-2020-164 | SLG | Composite-58 | DS164_41.08-43.0 | 261812 | 41.08 | 42 | 1.01 |
| DS-2020-164 | | | | 261813 | 42 | 43 | 1.1 |
| DS-2020-165 | SLG | Composite-60 | DS165_3.35_17.0 | 261815 | 3.35 | 4.35 | 4.4 |
| DS-2020-165 | | | | 261816 | 10 | 11 | 4.4 |
| DS-2020-165 | | | | 261817 | 16 | 17 | 4.4 |
| DS-2020-165 | SLG | Composite-61 | DS165_18_32.0 | 261818 | 18 | 19 | 4.4 |
| DS-2020-165 | | | | 261819 | 25 | 26 | 4.4 |
| DS-2020-165 | | | | 261820 | 31 | 32 | 4.4 |
| DS-2020-165 | SLG | Composite-62 | DS165_32.0-48.0 | 261821 | 32 | 33 | 4.4 |
| DS-2020-165 | | | | 261822 | 39 | 40 | 4.4 |
| DS-2020-165 | | | | 261823 | 47 | 48 | 4.4 |
| DS-2020-165 | Ore | Composite-64 | DS165_64.0-67.0 | 261835 | 64 | 65 | 1.1 |
| DS-2020-165 | | | | 261836 | 65 | 66 | 1.1 |
| DS-2020-165 | | | | 261837 | 66 | 67 | 1.1 |

| HOLE-ID | Litho | Composite | Comp SAMPLE ID | CFI Sample ID | From | To | Mass (kg) |
|---|---|---|---|---|---|---|---|
| DS-2020-165 | SLG | Composite-65 | DS165_76.42-79.0 | 261838 | 76.42 | 77.42 | 1.1 |
| DS-2020-165 | | | | 261839 | 77.42 | 78.07 | 0.71 |
| DS-2020-165 | | | | 261840 | 78.07 | 79 | 1.02 |
| DS-2020-169 | Ore | Composite-66 | DS169_62-65 | 261843 | 62 | 63 | 1.1 |
| DS-2020-169 | | | | 261844 | 63 | 64 | 1.1 |
| DS-2020-169 | | | | 261845 | 64 | 65 | 1.1 |
| DS-2020-169 | TFS | Composite-67 | DS169_65-75 | 261846 | 65 | 66 | 1.1 |
| DS-2020-169 | | | | 261847 | 66 | 67 | 1.1 |
| DS-2020-169 | | | | 261848 | 67 | 68 | 1.1 |
| DS-2020-169 | | | | 261849 | 68 | 69 | 1.1 |
| DS-2020-169 | | | | 261850 | 69 | 70 | 1.1 |
| DS-2020-169 | | | | 261851 | 70 | 71 | 1.1 |
| DS-2020-169 | | | | 261852 | 71 | 72 | 1.1 |
| DS-2020-169 | | | | 261853 | 72 | 73 | 1.1 |
| DS-2020-169 | | | | 261854 | 73 | 74 | 1.1 |
| DS-2020-169 | | | | 261855 | 74 | 75 | 1.1 |
| DS-2019-144 | SLG | Composite-68 | DS144_9.65_10.0 | 261750 | 9.65 | 10 | 1.54 |
| DS-2019-144 | SLG | Composite-69 | DS144_10.0_24.0 | 261751 | 10 | 11 | 4.4 |
| DS-2019-144 | | | | 261752 | 16 | 17 | 4.4 |
| DS-2019-144 | | | | 261753 | 23 | 24 | 4.4 |
| DS-2019-144 | SLG | Composite-70 | DS144_24.0-33.0 | 261754 | 24 | 25 | 4.4 |
| DS-2019-144 | | | | 261755 | 28 | 29 | 4.4 |
| DS-2019-144 | | | | 261756 | 32 | 33 | 4.4 |
| DS-2019-144 | Ore | Composite-71 | DS144_34.44-36.42 | 261757 | 34.44 | 35 | 0.61 |
| DS-2019-144 | | | | 261758 | 35 | 35.71 | 0.78 |
| DS-2019-144 | | | | 261759 | 35.71 | 36.42 | 0.78 |
| DS-2019-144 | SLG | Composite-72 | DS144_37.0_38.0 | 261760 | 37 | 38 | 4.4 |
| DS-2019-145 | SLG | Composite-76 | DS145_38.0-52.0 | 261768 | 38 | 39 | 4.4 |
| DS-2019-145 | | | | 261769 | 44 | 45 | 4.4 |
| DS-2019-145 | | | | 261770 | 51 | 52 | 4.4 |
| DS-2019-145 | Ore | Composite-77 | DS145_91.48-93.52 | 261771 | 91.84 | 92.87 | 1.13 |
| DS-2019-145 | | | | 261772 | 92.87 | 93.52 | 0.71 |

# Test Pit : SR-2025-OBTP01

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | **621313**<br>**5194703**<br>**31m MSL** | Excavation Method: | Excavator |
| Start Time: | 7:45 | Temperature: | aprox. 12° C | Operator: | Derick Slaney |
| End Time: | 8:10 | Weather: | Mostly cloudy, light variable wind | Consumables: | 3x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 0.5 | Peat/Organics (O) | | | |
| 0.5 | 1.5 | Dry till (B-C), grey-bwn, copper-or oxide at top, coarse sand with <5% sbrndd peb/cobbles | 261552 | 1.5 | |
| 1.5 | 4 | Wet till (C), beige, v. sandy with >15% sbrndd peb., rare clay nodules | 261551 | 2.5 | |
| 4 | 4.5 | Wet (saturated) till (C), beige, v. sandy with >15% sbrndd peb. | 261550 | 4.4 | |
| 4.5 | | End of Test Pit | | | Bedrock |
| | | | | | |
| | | **DUPLICATE OF 261551** | **261573** | **2.5** | **DUP** |
| | | | | | |

**Test Pit Photo:**

| | |
|---|---|
| **Water Level:** | 4.5m |

Misc. Notes:

Located in bog, poorly developed peat layer ~0.5m thick

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 1.4 x 3x 4.5 |

# Test Pit : SR-2025-OBTP02

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | **621293**<br>**5194681**<br>**30m MSL** | Excavation Method: | Excavator |
| Start Time: | 8:12 | Temperature: | aprox. 13° C | Operator: | Derick Slaney |
| End Time: | 8:40 | Weather: | Mostly cloudy, light variable wind | Consumables: | 3x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 1 | Peat/Organics (O), sharp contact with substrate | | | |
| 1 | 2.2 | Dry to moist till (A?), mottled grey-brn, amorphous, firm, >10% clay, 5-10% ang-sbrndd gran/peb | 261555 | 2 | |
| | | a/a (as above) | 261554 | 3 | |
| 2.2 | 4.5 | Wet/saturated till (C), brn, sandy, friable, abundant ang-sbrndd peb, wet | 261553 | 4.2 | |
| 4.5 | | End of Test Pit | | | Bedrock |
| | | | | | |
| | | | | | |
| | | | | | |

**Test Pit Photo:**

**Water Level:** 4.25m

Misc. Notes:

Located in bog, dense peat layer ~1.0m thick with sharp lower contact with till

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 3 x 3.5 x 4.5 |

# Test Pit : SR-2025-OBTP03

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | **621429**<br>**5194639**<br>**39m MSL** | Excavation Method: | Excavator |
| Start Time: | 10:05 | Temperature: | aprox. 14° C | Operator: | Derick Slaney |
| End Time: | 10:25 | Weather: | Mostly cloudy, light variable wind | Consumables: | 3x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 0.5 | Organics(O) | | | |
| 0.5 | 1.5 | Dry till (A-B?), or-brn oxide layer, friable, predom. sand w >10% sbang gran/peb | 261563 | 1.5 | |
| 1.5 | 3.25 | Dry till (C), gy-brn, amorphous, compacted/firm, >10% ang gran | 261562 | 2.25 | |
| | | a/a | 261561 | 3.2 | |
| | 3.25 | End of Test Pit | | | Bedrock |
| | | | | | |
| | | | | | |
| | | | | | |

**Test Pit Photo:**

| | |
|---|---|
| **Water Level:** | n/a |

Misc. Notes:

dry bottom, moved from original co-ordinates to avoid collar

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 2.25 x 3.3 x 3.25 |

# Test Pit : SR-2025-OBTP04

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | **621475**<br>**5194553**<br>**41m MSL** | Excavation Method: | Excavator |
| Start Time: | 10:05 | Temperature: | aprox. 15° C | Operator: | Derick Slaney |
| End Time: | 10:25 | Weather: | Mostly cloudy, light variable wind | Consumables: | 3x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 0.3 | Organics (O) | | | |
| 0.3 | 2 | Dry till (A-B?), brn-gry, firm, weakly stratified or nodular (?) profile, bimodal sand/cobbles | 261566 | 0.75 | |
| | | a/a | 261565 | 1.8 | |
| 2 | 2.4 | Dry till (C), brn to brn-gy i/p, sandy, >10% clay, rare ang cobbles | 261564 | 2.3 | |
| | | End of Test Pit | | | Bedrock |
| | | | | | |
| | | | | | |
| | | | | | |

**Test Pit Photo:**

| | |
|---|---|
| **Water Level:** | n/a |

Misc. Notes:

Dry bottom

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 2.4 x 2.25 x 3.5 |

# Test Pit : SR-2025-OBTP05

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | **621538**<br>**5194483**<br>**45m MSL** | Excavation Method: | Excavator |
| Start Time: | 9:40 | Temperature: | aprox. 15° C | Operator: | Derick Slaney |
| End Time: | 9:55 | Weather: | Mostly cloudy, light variable wind | Consumables: | 2x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 0.5 | Organics (O) | | | |
| 0.5 | 1.2 | Dry till, mixed organics and amorphous till, possible anthopogenic influence,wispy organics/oxide stratum at base, minor cob/boulders; sand>clay>cobbles | 261560 | 1 | |
| 1.2 | 1.5 | Dry till (C), brn-gy, cg sand to ang-sbrndd granules, >10% clay, compact | 261559 | 1.35 | |
| 1.5 | | End of Test Pit | | | Bedrock |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Test Pit Photo:**

| | |
|---|---|
| **Water Level:** | n/a |

Misc. Notes:

dry bottom, lacks secondary till horizon

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 2.2 x 2.7 x 1.5 |

# Test Pit : SR-2025-OBTP06

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | **621506**<br>**5194458**<br>**40m MSL** | Excavation Method: | Excavator |
| Start Time: | 9:15 | Temperature: | aprox. 15° C | Operator: | Derick Slaney |
| End Time: | 9:40 | Weather: | Mostly cloudy, light variable wind | Consumables: | 3x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 0.2 | Organics (O) | | | |
| 0.2 | 1.5 | Dry till (B) , brn, amorphous, sandy w elevated clay content (>15%), rootlets thru unit | 261558 | 1.5 | |
| 1.5 | 3.1 | Dry till (B-C?), dk gy-brn, abundant granules w lesser cg sand, minor clay, possible subglacial till - questionable deformation or re-working (?), local cobbles and boulders | 261557 | 2 | |
| | | a/a | 261558 | 2.9 | |
| 3.1 | | End of Test Pit | | | Bedrock |
| | | | | | |
| | | | | | |
| | | | | | |

**Test Pit Photo:**

| | |
|---|---|
| **Water Level:** | 3.0 |

Misc. Notes:

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 3.0 x 2.5 x 3.0 |

# Test Pit : SR-2025-OBTP07

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | 621372<br>5194595<br>32m MSL | Excavation Method: | Excavator |
| Start Time: | 11:28 | Temperature: | aprox. 15° C | Operator: | Derick Slaney |
| End Time: | 11:50 | Weather: | Mostly cloudy, light variable wind | Consumables: | 3x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 0.45 | Organics (O) | | | |
| 0.45 | 1 | Wet till (A-B), brn-grey, predom. clay w minor sbrndd-sbang granules | 261572 | 1.25 | |
| 1 | 2.85 | Dry till (C), gy-brn, bimodal mg-cg sand and ang-sbrndd granules (>30%), minor clay (<5%), very dense/heavy (high fluorspar content?) | 261571 | 2 | |
| | | Same as above, but wet | 261570 | 2.85 | |
| 2.85 | | End of Test Pit | | | Bedrock |
| | | | | | |
| | | **DUPLICATE OF 261571** | **261574** | **2** | **DUP** |
| | | | | | |

**Test Pit Photo:**

**Water Level:** 2.85

Misc. Notes:

Strong groundwater seepage into test pit, water table appears consistent with nearby bogs.
Note; top layer wet, dry middle layer and wet at base; may be due to pooled surface water

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 2.25 x 3.6 x 2.85 |

# Test Pit : SR-2025-OBTP08

| | | | | | |
|---|---|---|---|---|---|
| Date: | 2025-09-24 | Client: | Canada Fluorspar Inc. | Contractor: | TR Excavating Inc. |
| Project: | South Ridge | Location:<br>NAD 83-Z21 N [m] | **621454**<br>**5194533**<br>**37m MSL** | Excavation Method: | Excavator |
| Start Time: | 10:55 | Temperature: | aprox. 15° C | Operator: | Derick Slaney |
| End Time: | 11:20 | Weather: | Mostly cloudy, light variable wind | Consumables: | 3x Sample Bags |

| Depth (m) | | Soil Description | Samples | | Notes: |
|---|---|---|---|---|---|
| Start | End | | Sample_ID | Depth (m) | |
| 0 | 0.2 | Organics (O) | | | |
| 0.2 | 1.2 | Dry till (A-B?), gy with local or, oxide layer, gradational (?), sandy with clay nodules, rare ang cobbles to granules | 261569 | 1 | |
| 1.2 | 1.85 | Wet (B [?]-C), brn, sandy clay, minor ang granules | 261568 | 1.4 | |
| | | Wet till (C), brn, clay with lesser cg sand and ang granules | 261567 | 1.8 | |
| 1.85 | | End of Test Pit | | | Bedrock |
| | | | | | |
| | | | | | |
| | | | | | |

**Test Pit Photo:**

| | |
|---|---|
| **Water Level:** | 1.85 |

Misc. Notes:

| | |
|---|---|
| **Test Pit Dimensions (L x W x H) [m]** | 3.5 x 1.9 x 1.85 |

# HISTORICAL DIRECTOR MINE TAILINGS PHOTOS

# HISTORICAL DIRECTOR MINE TAILINGS PHOTOS

B4 - TAILINGS SAMPLING LOCATIONS PHOTOS

OVERVIEW OF THE TAILINGS. ARROW SHOWS PHOTO DIRECTION.

LOCATION DIRECTOR-HISTORIC-01

B4 - TAILINGS SAMPLING LOCATIONS PHOTOS

LOCATION DIRECTOR-HISTORIC-02

LOCATION DIRECTOR-HISTORIC-03

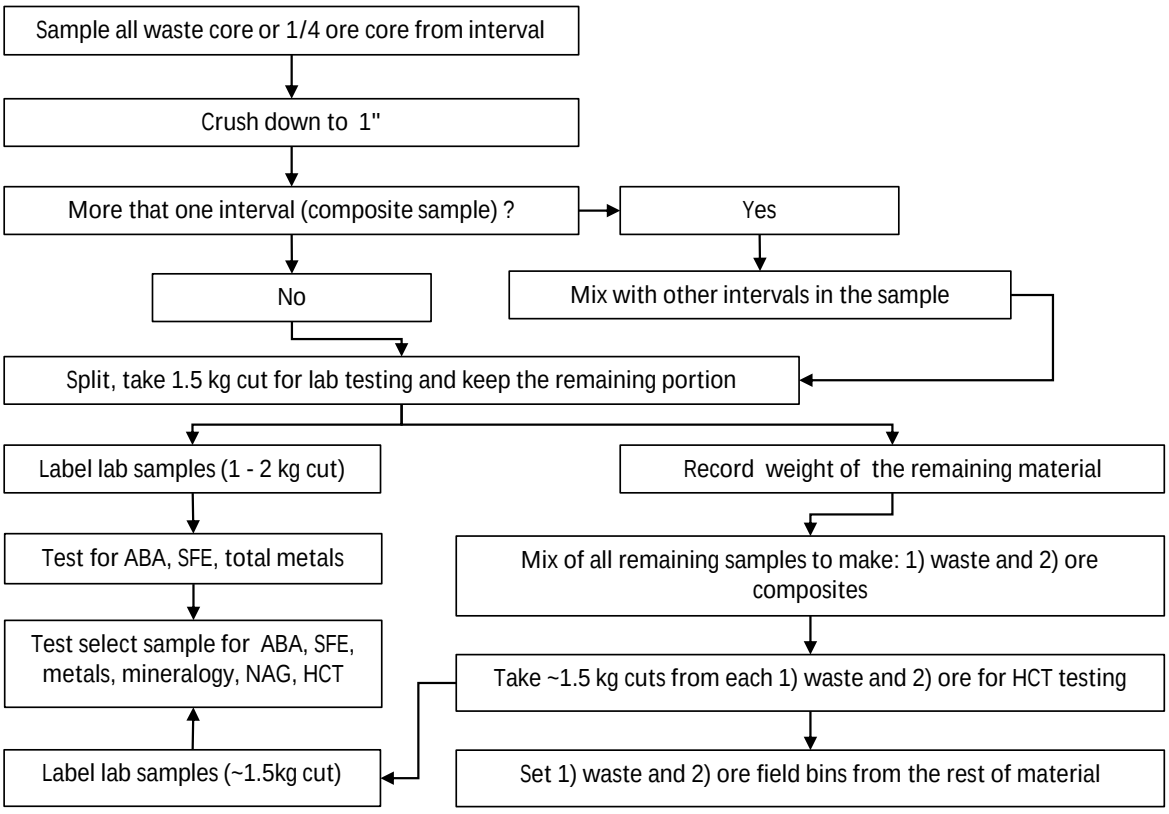
B4 - TAILINGS SAMPLING LOCATIONS PHOTOS

LOCATION DIRECTOR-HISTORIC-04

LOCATION DIRECTOR-HISTORIC-05

# APPENDIX C. SAMPLE PREPARATION DIAGRAM

Appendix C: Sample Prep



# APPENDIX D. CERTIFICATES OF ANALYSIS

# CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

| CLIENT INFORMATION | |
|---|---|
| **Client:** | Canada Fluorspar (NL) Inc. |
| | |
| **Project Manager:** | Melissa Lambert |
| | |
| **Mailing Address** | 1 Clarke's Pond Road |
| | St. Lawrence, NL, CA A0E 2V0 |
| | |
| **Contact No:** | 1(709) 702-5960 |
| | |

| COMPANY INFORMATION | |
|---|---|
| **Legal Name:** | Global ARD Testing Services Inc. |
| | |
| **Mailing Address:** | 6891 Antrim Avenue |
| | Burnaby, BC |
| | V5J 4M5 |
| **Contact No:** | |
| | Main: (604) 428-2730 |
| | Alternate: (604) 603-1359 |
| | |

| PROJECT INFORMATION | |
|---|---|
| **Project Name:** | South Ridge |
| **Project Number:** | 2025 Geochemical Sampling |

| REPORTING | |
|---|---|
| **Global Project No:** | 2577 (B1) |
| **Report Version:** | 3 |
| **Pages (Including Cover):** | 9 |
| **Report Title:** | COA (B1) x 246 South Ridge Samples (rec'd 27-Oct25) |
| | |
| **Analysis Reviewed By:** | Prab Bhatia (Pbhatia@globalARDtesting.com) |
| **Position:** | Project Manager |
| **Report Certified By:** | Prab Bhatia |
| **Signature:** | |

| RESULTS | | |
|---|---|---|
| **Reported To:** | **1** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **2** | Nikolay Sidenko (NIKOLAY@FALKIRK.CA) |
| | **3** | Inaara Hassan (ihassan@canadafluorspar.com) |
| | **4** | Brad Smith (bsmith@canadafluorspar.com) |
| **Date Reported:** | **Version-1:** | November 17, 2025 |
| | **Version-2:** | November 28, 2025 |
| | **Version-3:** | December 11, 2025 |

| INVOICE | | |
|---|---|---|
| **Submitted To:** | **1** | Accounts Payable (ap@canadafluorspar.com) |
| | **2** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **3** | |
| | **4** | |
| | | |
| **Client PO No:** | | |
| **Global Invoice No:** | | ARD2577-1125A |
| **Date Submitted:** | | December 11, 2025 |

| NOTES |
|---|
| All samples and pulps are stored at no charge for 90 days past reporting date. |
| Please contact the lab if you would like to continue storage past 90 days. |
| Storage charges will apply. |
| |
| VERSIONS: |
| Version-1: TS/TC - Partial |
| Version-2: ABA, SFE Results |
| Version-3: Sample #4, 5 TC/TIC Recheck Updated, NAG Results Added |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 1 | 261731 | Composite-1 | DS147_7.23-7.5 | 261731 | CORE | Dry | 1.10 | |
| 2 | 261732 | Composite-2 | DS147_7.5-18 | 261732 | CORE | Dry | 3.80 | |
| 3 | 261733 | | | 261733 | CORE | Dry | 4.30 | |
| 4 | 261841 | | | 261841 | CORE | Dry | 3.60 | |
| 5 | 261842 | Composite-3 | DS147_18-32 | 261842 | CORE | Dry | 4.65 | |
| 6 | 261736 | | | 261736 | CORE | Dry | 4.50 | |
| 7 | 261737 | | | 261737 | CORE | Dry | 4.00 | |
| 8 | 261738 | Composite-4 | DS147_31-33.4 | 261738 | CORE | Dry | 0.395 | |
| 9 | 261739 | Composite-5 | DS147_33.4-35.4 | 261739 | CORE | Dry | 0.880 | |
| 10 | 261740 | | | 261740 | CORE | Dry | 0.820 | |
| 11 | 261741 | Composite-6 | DS147_35.4-38.3 | 261741 | CORE | Dry | 0.905 | |
| 12 | 261742 | | | 261742 | CORE | Dry | 0.930 | |
| 13 | 261743 | | | 261743 | CORE | Dry | 0.670 | |
| 14 | 261744 | Composite-7 | DS147_38.3-41.3 | 261744 | CORE | Dry | 0.870 | |
| 15 | 261745 | | | 261745 | CORE | Dry | 0.860 | |
| 16 | 261746 | | | 261746 | CORE | Dry | 0.895 | |
| 17 | 261747 | Composite-8 | DS147_42-43 | 261747 | CORE | Dry | 1.800 | |
| 18 | 261748 | Composite-8-DUP | DS147_46-47 | 261748/261749 | CORE | Dry | 1.950 | |
| 19 | 261749 | | | | CORE | Dry | 2.00 | |
| 20 | 261713 | Composite-9 | DS148_7-7.5 | 261713 | CORE | Dry | 2.05 | |
| 21 | 261714 | Composite-10 | DS148_7.5-20 | 261714 | CORE | Dry | 4.50 | |
| 22 | 261715 | | | 261715 | CORE | Dry | 4.20 | |
| 23 | 261716 | | | 261716 | CORE | Dry | 4.65 | |
| 24 | 261717 | Composite-11 | DS148_21-35 | 261717 | CORE | Dry | 4.65 | |
| 25 | 261718 | | | 261718 | CORE | Dry | 3.45 | |
| 26 | 261719 | | | 261719 | CORE | Dry | 4.50 | |
| 27 | 261720 | Composite-12 | DS148_35-64 | 261720 | CORE | Dry | 4.65 | |
| 28 | 261721 | | | 261721 | CORE | Dry | 2.70 | |
| 29 | 261722 | | | 261722 | CORE | Dry | 4.40 | |
| 30 | 261723 | Composite-13 | DS148_66.6-67.54 | 261723 | CORE | Dry | 0.880 | |
| 31 | 261724 | Composite-14 | DS148_67.54-69.46 | 261724 | CORE | Dry | 0.950 | |
| 32 | 261725 | | | 261725 | CORE | Dry | 0.921 | |
| 33 | 261726 | Composite-15 | DS148_67.46-71.31 | 261726 | CORE | Dry | 0.745 | |
| 34 | 261727 | | | 261727 | CORE | Dry | 0.510 | |
| 35 | 261728 | Composite-16 | DS148_72.11-73.06 | 261728 | CORE | Dry | 0.410 | |
| 36 | 261729 | Composite-16-DUP | DS148_82-83 | 261729/261730 | CORE | Dry | 1.65 | |
| 37 | 261730 | | | | CORE | Dry | 2.00 | |
| 38 | 261691 | Composite-17 | DS150_4.4-5 | 261691 | CORE | Dry | 2.65 | |
| 39 | 261692 | Composite-18 | DS150_5-13 | 261692 | CORE | Dry | 3.40 | |
| 40 | 261693 | | | 261693 | CORE | Dry | 1.00 | |
| 41 | 261694 | Composite-19 | DS150_14.25-20 | 261694 | CORE | Dry | 0.755 | |
| 42 | 261695 | | | 261695 | CORE | Dry | 0.380 | |
| 43 | 261696 | | | 261696 | CORE | Dry | 0.400 | |
| 44 | 261697 | | | 261697 | CORE | Dry | 0.480 | |
| 45 | 261698 | | | 261698 | CORE | Dry | 0.245 | |
| 46 | 261699 | | | 261699 | CORE | Dry | 0.625 | |
| 47 | 261700 | Composite-20 | DS150_20-23.3 | 261700 | CORE | Dry | 0.205 | |
| 48 | 261701 | | | 261701 | CORE | Dry | 0.470 | |
| 49 | 261702 | | | 261702 | CORE | Dry | 0.620 | |
| 50 | 261703 | | | 261703 | CORE | Dry | 0.695 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| 51 | 261704 | Composite-21 | DS150_23.3-25.7 | 261704 | CORE | Dry | 1.05 | |
| 52 | 261705 | | | 261705 | CORE | Dry | 0.895 | |
| 53 | 261706 | | | 261706 | CORE | Dry | 0.695 | |
| 54 | 261707 | Composite-21-DUP | DS150_30.5-32 | 261707/261708 | CORE | Dry | 6.05 | |
| 55 | 261708 | | | | CORE | Dry | 5.65 | |
| 56 | 261709 | Composite-22 | DS150_30.07-33.96 | 261709 | CORE | Dry | 2.10 | |
| 57 | 261710 | Composite-23 | DS150_35.3-40 | 261710 | CORE | Dry | 4.55 | |
| 58 | 261711 | | | 261711 | CORE | Dry | 4.45 | |
| 59 | 261712 | | | 261712 | CORE | Dry | 4.20 | |
| 60 | 261663 | Composite-24 | DS155_4-4.5 | 261663 | CORE | Dry | 2.30 | |
| 61 | 261664 | Composite-25 | DS155_5-21 | 261664 | CORE | Dry | 4.50 | |
| 62 | 261665 | | | 261665 | CORE | Dry | 4.30 | |
| 63 | 261666 | | | 261666 | CORE | Dry | 4.50 | |
| 64 | 261667 | Composite-26 | DS155_21-25 | 261667 | CORE | Dry | 4.70 | |
| 65 | 261668 | | | 261668 | CORE | Dry | 4.35 | |
| 66 | 261669 | Composite-27 | DS155_25-60 | 261669 | CORE | Dry | 3.45 | |
| 67 | 261670 | | | 261670 | CORE | Dry | 4.45 | |
| 68 | 261671 | | | 261671 | CORE | Dry | 4.50 | |
| 69 | 261672 | Composite-28 | DS155_62.2-69.2 | 261672 | CORE | Dry | 0.550 | |
| 70 | 261673 | | | 261673 | CORE | Dry | 0.515 | |
| 71 | 261674 | | | 261674 | CORE | Dry | 0.795 | |
| 72 | 261675 | | | 261675 | CORE | Dry | 0.900 | |
| 73 | 261676 | | | 261676 | CORE | Dry | 0.480 | |
| 74 | 261677 | | | 261677 | CORE | Dry | 0.690 | |
| 75 | 261678 | | | 261678 | CORE | Dry | 1.15 | |
| 76 | 261679 | Composite-29 | DS155_69.2-72.3 | 261679 | CORE | Dry | 0.705 | |
| 77 | 261680 | | | 261680 | CORE | Dry | 0.815 | |
| 78 | 261681 | | | 261681 | CORE | Dry | 0.860 | |
| 79 | 261682 | Composite-30 | DS155_72.3-78 | 261682 | CORE | Dry | 0.930 | |
| 80 | 261683 | | | 261683 | CORE | Dry | 0.540 | |
| 81 | 261684 | | | 261684 | CORE | Dry | 0.580 | |
| 82 | 261685 | | | 261685 | CORE | Dry | 0.620 | |
| 83 | 261686 | | | 261686 | CORE | Dry | 0.705 | |
| 84 | 261687 | | | 261687 | CORE | Dry | 0.915 | |
| 85 | 261688 | Composite-31 | DS155_78-79.7 | 261688 | CORE | Dry | 0.795 | |
| 86 | 261689 | | | 261689 | CORE | Dry | 0.575 | |
| 87 | 261690 | Composite-32 | DS151_3.4-4 | 261690 | CORE | Dry | 0.985 | Same Drill-Hole ID |
| 88 | 261600 | Composite-33 | DS151_3.4-4 | 261600 | CORE | Dry | 2.90 | for these composites |
| 89 | 261601 | Composite-34 | DS151_4-19.8 | 261601 | CORE | Dry | 4.10 | |
| 90 | 261602 | | | 261602 | CORE | Dry | 3.70 | |
| 91 | 261603 | | | 261603 | CORE | Dry | 0.795 | |
| 92 | 261604 | Composite-35 | DS151_19.8-26.12 | 261604 | CORE | Dry | 0.625 | |
| 93 | 261605 | | | 261605 | CORE | Dry | 0.870 | |
| 94 | 261606 | | | 261606 | CORE | Dry | 0.840 | |
| 95 | 261607 | | | 261607 | CORE | Dry | 0.790 | |
| 96 | 261608 | | | 261608 | CORE | Dry | 0.505 | |
| 97 | 261609 | | | 261609 | CORE | Dry | 0.870 | |
| 98 | 261610 | | | 261610 | CORE | Dry | 0.570 | |
| 99 | 261611 | | | 261611 | CORE | Dry | 0.360 | |
| 100 | 261612 | | | 261612 | CORE | Dry | 0.380 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| 101 | 261613 | Composite-36 | DS151_26.12-35 | 261613 | CORE | Dry | 0.570 | |
| 102 | 261614 | | | 261614 | CORE | Dry | 0.630 | |
| 103 | 261615 | | | 261615 | CORE | Dry | 0.945 | |
| 104 | 261616 | All for metallurgical testing - sending to SGS | | 261616 | CORE | Dry | 0.980 | |
| 105 | 261617 | | | 261617 | CORE | Dry | 0.710 | |
| 106 | 261618 | | | 261618 | CORE | Dry | 0.700 | |
| 107 | 261619 | Composite-36-DUP | DS151_40-41 | 261619/261620 | CORE | Dry | 2.35 | |
| 108 | 261620 | | | | CORE | Dry | 1.75 | |
| 109 | 261773 | Composite-37 | DS157_6.41-7.0 | 261773 | CORE | Dry | 2.65 | |
| 110 | 261774 | Composite-38 | DS157_7-21 | 261774 | CORE | Dry | 4.45 | |
| 111 | 261775 | | | 261775 | CORE | Dry | 4.55 | |
| 112 | 261776 | | | 261776 | CORE | Dry | 4.10 | |
| 113 | 261777 | Composite-39 | DS157_21-36 | 261777 | CORE | Dry | 4.35 | |
| 114 | 261778 | | | 261778 | CORE | Dry | 1.95 | |
| 115 | 261779 | | | 261779 | CORE | Dry | 1.00 | |
| 116 | 261780 | All for metallurgical testing - sending to SGS | | 261780 | CORE | Dry | 0.445 | |
| 117 | 261781 | | | 261781 | CORE | Dry | 0.430 | |
| 118 | 261782 | | | 261782 | CORE | Dry | 0.651 | |
| 119 | 261783 | Composite-40 | DS157_39-45.0 | 261783 | CORE | Dry | 0.750 | |
| 120 | 261784 | | | 261784 | CORE | Dry | 0.490 | |
| 121 | 261785 | | | 261785 | CORE | Dry | 0.818 | |
| 122 | 261786 | | | 261786 | CORE | Dry | 0.585 | |
| 123 | 261787 | | | 261787 | CORE | Dry | 0.595 | |
| 124 | 261788 | | | 261788 | CORE | Dry | 0.940 | |
| 125 | 261789 | Composite-41 | DS157_50-55 | 261789 | CORE | Dry | 0.660 | |
| 126 | 261790 | | | 261790 | CORE | Dry | 0.345 | |
| 127 | 261791 | | | 261791 | CORE | Dry | 0.696 | |
| 128 | 261792 | | | 261792 | CORE | Dry | 0.800 | |
| 129 | 261793 | All for metallurgical testing - sending to SGS | | 261793 | CORE | Dry | 0.660 | |
| 130 | 261794 | | | 261794 | CORE | Dry | 0.380 | |
| 131 | 261795 | | | 261795 | CORE | Dry | 1.15 | |
| 132 | 261796 | Composite-41-DUP | DS157_60-61 | 261796/261798 | CORE | Dry | 1.80 | 261797 or 261798 sample ID? |
| 133 | 261797 | | | | CORE | Dry | 2.10 | |
| 134 | 261621 | Composite-42 | DS153_3-3.5 | 261621 | CORE | Dry | 2.05 | |
| 135 | 261622 | Composite-43 | DS153_3-20.9 | 261622 | CORE | Dry | 4.25 | |
| 136 | 261623 | | | 261623 | CORE | Dry | 4.70 | |
| 137 | 261624 | | | 261624 | CORE | Dry | 0.805 | |
| 138 | 261625 | Composite-44 | DS153_23-26 | 261625 | CORE | Dry | 0.530 | |
| 139 | 261626 | | | 261626 | CORE | Dry | 0.420 | |
| 140 | 261627 | Composite-45 | DS153_26_34.4 | 261627 | CORE | Dry | 0.525 | |
| 141 | 261628 | | | 261628 | CORE | Dry | 0.405 | |
| 142 | 261629 | | | 261629 | CORE | Dry | 0.600 | |
| 143 | 261630 | | | 261630 | CORE | Dry | 0.740 | |
| 144 | 261631 | | | 261631 | CORE | Dry | 0.580 | |
| 145 | 261632 | | | 261632 | CORE | Dry | 0.300 | |
| 146 | 261633 | | | 261633 | CORE | Dry | 0.440 | |
| 147 | 261634 | | | 261634 | CORE | Dry | 0.705 | |
| 148 | 261635 | | | 261635 | CORE | Dry | 0.380 | |
| 149 | 261636 | Composite-46 | DS153_36_51 | 261636 | CORE | Dry | 0.890 | |
| 150 | 261637 | | | 261637 | CORE | Dry | 1.25 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 151 | 261638 | | | 261638 | CORE | Dry | 1.25 | |
| 152 | 261639 | Composite-47 | DS154_5.4-6 | 261639 | CORE | Dry | 2.65 | |
| 153 | 261640 | Composite-48 | DS154_6-21 | 261640 | CORE | Dry | 4.50 | |
| 154 | 261641 | | | 261641 | CORE | Dry | 4.15 | |
| 155 | 261642 | | | 261642 | CORE | Dry | 4.35 | |
| 156 | 261643 | Composite-49 | DS154_21-41 | 261643 | CORE | Dry | 4.25 | |
| 157 | 261644 | | | 261644 | CORE | Dry | 4.35 | |
| 158 | 261645 | | | 261645 | CORE | Dry | 4.45 | |
| 159 | 261646 | Composite-50 | DS154_41-61 | 261646 | CORE | Dry | 4.55 | |
| 160 | 261647 | | | 261647 | CORE | Dry | 4.55 | |
| 161 | 261648 | | | 261648 | CORE | Dry | 2.80 | |
| 162 | 261649 | Composite-51 | DS154_61.5-67 | 261649 | CORE | Dry | 0.450 | |
| 163 | 261650 | | | 261650 | CORE | Dry | 0.370 | |
| 164 | 261651 | | | 261651 | CORE | Dry | 0.425 | |
| 165 | 261652 | | | 261652 | CORE | Dry | 0.740 | |
| 166 | 261653 | | | 261653 | CORE | Dry | 0.515 | |
| 167 | 261654 | | | 261654 | CORE | Dry | 0.685 | |
| 168 | 261655 | Composite-52 | DS154_67-72.6 | 261655 | CORE | Dry | 0.790 | |
| 169 | 261656 | | | 261656 | CORE | Dry | 1.00 | |
| 170 | 261657 | | | 261657 | CORE | Dry | 1.15 | |
| 171 | 261658 | | | 261658 | CORE | Dry | 0.725 | |
| 172 | 261659 | | | 261659 | CORE | Dry | 0.855 | |
| 173 | 261660 | | | 261660 | CORE | Dry | 0.850 | |
| 174 | 261661 | Composite-53 | DS154_72.6-75.62 | 261661 | CORE | Dry | 0.840 | |
| 175 | 261662 | | | 261662 | CORE | Dry | 0.590 | |
| 176 | 261798 | Composite-54 | DS164_3.86-4.36 | 261798 | CORE | Dry | 2.15 | |
| 177 | 261799 | Composite-55 | DS164_5-21 | 261799 | CORE | Dry | 4.00 | |
| 178 | 261800 | | | 261800 | CORE | Dry | 4.45 | |
| 179 | 261801 | | | 261801 | CORE | Dry | 0.720 | |
| 180 | 261802 | Composite-56 | DS164_31-38 | 261802 | CORE | Dry | 0.616 | |
| 181 | 261803 | | | 261803 | CORE | Dry | 0.480 | |
| 182 | 261804 | | | 261804 | CORE | Dry | 0.680 | |
| 183 | 261805 | | | 261805 | CORE | Dry | 0.670 | |
| 184 | 261806 | | | 261806 | CORE | Dry | 0.940 | |
| 185 | 261807 | | | 261807 | CORE | Dry | 0.61 | |
| 186 | 261808 | | | 261808 | CORE | Dry | 0.88 | |
| 187 | 261809 | Composite-57 | DS164_39.0-41.08 | 261809 | CORE | Dry | 0.75 | |
| 188 | 261810 | | | 261810 | CORE | Dry | 0.73 | |
| 189 | 261811 | | | 261811 | CORE | Dry | 0.48 | |
| 190 | 261812 | Composite-58 | DS164_41.08-43.0 | 261812 | CORE | Dry | 1.85 | |
| 191 | 261813 | | | 261813 | CORE | Dry | 1.60 | |
| 192 | 261814 | Composite-59 | DS165_2.85-3.35 | 261814 | CORE | Dry | 1.80 | |
| 193 | 261815 | Composite-60 | DS165_3.35_17.0 | 261815 | CORE | Dry | 4.45 | |
| 194 | 261816 | | | 261816 | CORE | Dry | 4.65 | |
| 195 | 261817 | | | 261817 | CORE | Dry | 4.40 | |
| 196 | 261818 | Composite-61 | DS165_18_32.0 | 261818 | CORE | Dry | 4.15 | |
| 197 | 261819 | | | 261819 | CORE | Dry | 4.55 | |
| 198 | 261820 | | | 261820 | CORE | Dry | 4.50 | |
| 199 | 261821 | Composite-62 | DS165_32.0-48.0 | 261821 | CORE | Dry | 4.60 | |
| 200 | 261822 | | | 261822 | CORE | Dry | 4.65 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| 201 | 261823 | | | 261823 | CORE | Dry | 1.95 | |
| 202 | 261832 | Composite-63 | DS165_61.90-64 | 261832 | CORE | Dry | 1.20 | Send to SGS after compositing |
| 203 | 261833 | | | 261833 | CORE | Dry | 0.900 | |
| 204 | 261834 | | | 261834 | CORE | Dry | 0.500 | |
| 205 | 261835 | Composite-64 | DS165_64.0-67.0 | 261835 | CORE | Dry | 1.15 | Send to SGS after compositing |
| 206 | 261836 | | | 261836 | CORE | Dry | 1.10 | |
| 207 | 261837 | | | 261837 | CORE | Dry | 1.00 | |
| 208 | 261838 | Composite-65 | DS165_76.42-79.0 | 261838 | CORE | Dry | 1.10 | Send to SGS after compositing |
| 209 | 261839 | | | 261839 | CORE | Dry | 0.800 | |
| 210 | 261840 | | | 261840 | CORE | Dry | 1.25 | |
| 211 | 261843 | Composite-66 | DS169_62-65 | 261843 | CORE | Dry | 0.328 | Send to SGS after compositing |
| 212 | 261844 | | | 261844 | CORE | Dry | 0.300 | |
| 213 | 261845 | | | 261845 | CORE | Dry | 0.630 | |
| 214 | 261846 | Composite-67 | DS169_65-75 | 261846 | CORE | Dry | 0.800 | Send to SGS after compositing |
| 215 | 261847 | | | 261847 | CORE | Dry | 1.15 | |
| 216 | 261848 | | | 261848 | CORE | Dry | 1.10 | |
| 217 | 261849 | | | 261849 | CORE | Dry | 1.30 | |
| 218 | 261850 | | | 261850 | CORE | Dry | 1.00 | |
| 219 | 261851 | | | 261851 | CORE | Dry | 1.05 | |
| 220 | 261852 | | | 261852 | CORE | Dry | 1.05 | |
| 221 | 261853 | | | 261853 | CORE | Dry | 1.10 | |
| 222 | 261854 | | | 261854 | CORE | Dry | 1.00 | |
| 223 | 261855 | | | 261855 | CORE | Dry | 1.00 | |
| 224 | 261750 | Composite-68 | DS144_9.65_10.0 | 261750 | CORE | Dry | 1.65 | |
| 225 | 261751 | Composite-69 | DS144_10.0_24.0 | 261751 | CORE | Dry | 4.40 | |
| 226 | 261752 | | | 261752 | CORE | Dry | 3.10 | |
| 227 | 261753 | | | 261753 | CORE | Dry | 3.95 | |
| 228 | 261754 | Composite-70 | DS144_24.0-33.0 | 261754 | CORE | Dry | 3.45 | |
| 229 | 261755 | | | 261755 | CORE | Dry | 4.65 | |
| 230 | 261756 | | | 261756 | CORE | Dry | 1.70 | |
| 231 | 261757 | Composite-71 | DS144_34.44-36.42 | 261757 | CORE | Dry | 0.950 | |
| 232 | 261758 | | | 261758 | CORE | Dry | 0.335 | |
| 233 | 261759 | | | 261759 | CORE | Dry | 0.701 | |
| 234 | 261760 | Composite-72 | DS144_37.0_38.0 | 261760 | CORE | Dry | 1.05 | |
| 235 | 261761 | Composite-73 | DS145_9.33_10.0 | 261761 | CORE | Dry | 3.10 | |
| 236 | 261762 | Composite-74 | DS145_10.0_24 | 261762 | CORE | Dry | 4.65 | |
| 237 | 261763 | | | 261763 | CORE | Dry | 4.15 | |
| 238 | 261764 | | | 261764 | CORE | Dry | 4.45 | |
| 239 | 261765 | Composite-75 | DS145_24.0-38.0 | 261765 | CORE | Dry | 4.65 | |
| 240 | 261766 | | | 261766 | CORE | Dry | 4.30 | |
| 241 | 261767 | | | 261767 | CORE | Dry | 4.50 | |
| 242 | 261768 | Composite-76 | DS145_38.0-52.0 | 261768 | CORE | Dry | 4.35 | |
| 243 | 261769 | | | 261769 | CORE | Dry | 4.65 | |
| 244 | 261770 | | | 261770 | CORE | Dry | 4.55 | |
| 245 | 261771 | Composite-77 | DS145_91.48-93.52 | 261771 | CORE | Dry | 1.00 | Send to SGS after Compositing |
| 246 | 261772 | | | 261772 | CORE | Dry | 0.725 | |

**Total wt of sample rec'd (kg):** **467.27**

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 1 | 261731 | Composite-1 | DS147_7.23-7.5 | 261731 | CORE | Dry | 1.10 | |
| 2 | 261732 | Composite-2 | DS147_7.5-18 | 261732 | CORE | Dry | 3.80 | |
| 3 | 261733 | | | 261733 | CORE | Dry | 4.30 | |
| 4 | 261841 | | | 261841 | CORE | Dry | 3.60 | |
| 5 | 261842 | Composite-3 | DS147_18-32 | 261842 | CORE | Dry | 4.65 | |
| 6 | 261736 | | | 261736 | CORE | Dry | 4.50 | |
| 7 | 261737 | | | 261737 | CORE | Dry | 4.00 | |
| 8 | 261738 | Composite-4 | DS147_31-33.4 | 261738 | CORE | Dry | 0.395 | |
| 9 | 261739 | Composite-5 | DS147_33.4-35.4 | 261739 | CORE | Dry | 0.880 | |
| 10 | 261740 | | | 261740 | CORE | Dry | 0.820 | |
| 11 | 261741 | Composite-6 | DS147_35.4-38.3 | 261741 | CORE | Dry | 0.905 | |
| 12 | 261742 | | | 261742 | CORE | Dry | 0.930 | |
| 13 | 261743 | | | 261743 | CORE | Dry | 0.670 | |
| 14 | 261744 | Composite-7 | DS147_38.3-41.3 | 261744 | CORE | Dry | 0.870 | |
| 15 | 261745 | | | 261745 | CORE | Dry | 0.860 | |
| 16 | 261746 | | | 261746 | CORE | Dry | 0.895 | |
| 17 | 261747 | Composite-8 | DS147_42-43 | 261747 | CORE | Dry | 1.800 | |
| 18 | 261748 | Composite-8-DUP | DS147_46-47 | 261748/261749 | CORE | Dry | 1.950 | |
| 19 | 261749 | | | | CORE | Dry | 2.00 | |
| 20 | 261713 | Composite-9 | DS148_7-7.5 | 261713 | CORE | Dry | 2.05 | |
| 21 | 261714 | Composite-10 | DS148_7.5-20 | 261714 | CORE | Dry | 4.50 | |
| 22 | 261715 | | | 261715 | CORE | Dry | 4.20 | |
| 23 | 261716 | | | 261716 | CORE | Dry | 4.65 | |
| 24 | 261717 | Composite-11 | DS148_21-35 | 261717 | CORE | Dry | 4.65 | |
| 25 | 261718 | | | 261718 | CORE | Dry | 3.45 | |
| 26 | 261719 | | | 261719 | CORE | Dry | 4.50 | |
| 27 | 261720 | Composite-12 | DS148_35-64 | 261720 | CORE | Dry | 4.65 | |
| 28 | 261721 | | | 261721 | CORE | Dry | 2.70 | |
| 29 | 261722 | | | 261722 | CORE | Dry | 4.40 | |
| 30 | 261723 | Composite-13 | DS148_66.6-67.54 | 261723 | CORE | Dry | 0.880 | |
| 31 | 261724 | Composite-14 | DS148_67.54-69.46 | 261724 | CORE | Dry | 0.950 | |
| 32 | 261725 | | | 261725 | CORE | Dry | 0.921 | |
| 33 | 261726 | Composite-15 | DS148_67.46-71.31 | 261726 | CORE | Dry | 0.745 | |
| 34 | 261727 | | | 261727 | CORE | Dry | 0.510 | |
| 35 | 261728 | Composite-16 | DS148_72.11-73.06 | 261728 | CORE | Dry | 0.410 | |
| 36 | 261729 | Composite-16-DUP | DS148_82-83 | 261729/261730 | CORE | Dry | 1.65 | |
| 37 | 261730 | | | | CORE | Dry | 2.00 | |
| 38 | 261691 | Composite-17 | DS150_4.4-5 | 261691 | CORE | Dry | 2.65 | |
| 39 | 261692 | Composite-18 | DS150_5-13 | 261692 | CORE | Dry | 3.40 | |
| 40 | 261693 | | | 261693 | CORE | Dry | 1.00 | |
| 41 | 261694 | Composite-19 | DS150_14.25-20 | 261694 | CORE | Dry | 0.755 | |
| 42 | 261695 | | | 261695 | CORE | Dry | 0.380 | |
| 43 | 261696 | | | 261696 | CORE | Dry | 0.400 | |
| 44 | 261697 | | | 261697 | CORE | Dry | 0.480 | |
| 45 | 261698 | | | 261698 | CORE | Dry | 0.245 | |
| 46 | 261699 | | | 261699 | CORE | Dry | 0.625 | |
| 47 | 261700 | Composite-20 | DS150_20-23.3 | 261700 | CORE | Dry | 0.205 | |
| 48 | 261701 | | | 261701 | CORE | Dry | 0.470 | |
| 49 | 261702 | | | 261702 | CORE | Dry | 0.620 | |
| 50 | 261703 | | | 261703 | CORE | Dry | 0.695 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| 51 | 261704 | Composite-21 | DS150_23.3-25.7 | 261704 | CORE | Dry | 1.05 | |
| 52 | 261705 | | | 261705 | CORE | Dry | 0.895 | |
| 53 | 261706 | | | 261706 | CORE | Dry | 0.695 | |
| 54 | 261707 | Composite-21-DUP | DS150_30.5-32 | 261707/261708 | CORE | Dry | 6.05 | |
| 55 | 261708 | | | | CORE | Dry | 5.65 | |
| 56 | 261709 | Composite-22 | DS150_30.07-33.96 | 261709 | CORE | Dry | 2.10 | |
| 57 | 261710 | Composite-23 | DS150_35.3-40 | 261710 | CORE | Dry | 4.55 | |
| 58 | 261711 | | | 261711 | CORE | Dry | 4.45 | |
| 59 | 261712 | | | 261712 | CORE | Dry | 4.20 | |
| 60 | 261663 | Composite-24 | DS155_4-4.5 | 261663 | CORE | Dry | 2.30 | |
| 61 | 261664 | Composite-25 | DS155_5-21 | 261664 | CORE | Dry | 4.50 | |
| 62 | 261665 | | | 261665 | CORE | Dry | 4.30 | |
| 63 | 261666 | | | 261666 | CORE | Dry | 4.50 | |
| 64 | 261667 | Composite-26 | DS155_21-25 | 261667 | CORE | Dry | 4.70 | |
| 65 | 261668 | | | 261668 | CORE | Dry | 4.35 | |
| 66 | 261669 | Composite-27 | DS155_25-60 | 261669 | CORE | Dry | 3.45 | |
| 67 | 261670 | | | 261670 | CORE | Dry | 4.45 | |
| 68 | 261671 | | | 261671 | CORE | Dry | 4.50 | |
| 69 | 261672 | Composite-28 | DS155_62.2-69.2 | 261672 | CORE | Dry | 0.550 | |
| 70 | 261673 | | | 261673 | CORE | Dry | 0.515 | |
| 71 | 261674 | | | 261674 | CORE | Dry | 0.795 | |
| 72 | 261675 | | | 261675 | CORE | Dry | 0.900 | |
| 73 | 261676 | | | 261676 | CORE | Dry | 0.480 | |
| 74 | 261677 | | | 261677 | CORE | Dry | 0.690 | |
| 75 | 261678 | | | 261678 | CORE | Dry | 1.15 | |
| 76 | 261679 | Composite-29 | DS155_69.2-72.3 | 261679 | CORE | Dry | 0.705 | |
| 77 | 261680 | | | 261680 | CORE | Dry | 0.815 | |
| 78 | 261681 | | | 261681 | CORE | Dry | 0.860 | |
| 79 | 261682 | Composite-30 | DS155_72.3-78 | 261682 | CORE | Dry | 0.930 | |
| 80 | 261683 | | | 261683 | CORE | Dry | 0.540 | |
| 81 | 261684 | | | 261684 | CORE | Dry | 0.580 | |
| 82 | 261685 | | | 261685 | CORE | Dry | 0.620 | |
| 83 | 261686 | | | 261686 | CORE | Dry | 0.705 | |
| 84 | 261687 | | | 261687 | CORE | Dry | 0.915 | |
| 85 | 261688 | Composite-31 | DS155_78-79.7 | 261688 | CORE | Dry | 0.795 | |
| 86 | 261689 | | | 261689 | CORE | Dry | 0.575 | |
| 87 | 261690 | Composite-32 | DS151_3.4-4 | 261690 | CORE | Dry | 0.985 | Same Drill-Hole ID |
| 88 | 261600 | Composite-33 | DS151_3.4-4 | 261600 | CORE | Dry | 2.90 | for these composites |
| 89 | 261601 | Composite-34 | DS151_4-19.8 | 261601 | CORE | Dry | 4.10 | |
| 90 | 261602 | | | 261602 | CORE | Dry | 3.70 | |
| 91 | 261603 | | | 261603 | CORE | Dry | 0.795 | |
| 92 | 261604 | Composite-35 | DS151_19.8-26.12 | 261604 | CORE | Dry | 0.625 | |
| 93 | 261605 | | | 261605 | CORE | Dry | 0.870 | |
| 94 | 261606 | | | 261606 | CORE | Dry | 0.840 | |
| 95 | 261607 | | | 261607 | CORE | Dry | 0.790 | |
| 96 | 261608 | | | 261608 | CORE | Dry | 0.505 | |
| 97 | 261609 | | | 261609 | CORE | Dry | 0.870 | |
| 98 | 261610 | | | 261610 | CORE | Dry | 0.570 | |
| 99 | 261611 | | | 261611 | CORE | Dry | 0.360 | |
| 100 | 261612 | | | 261612 | CORE | Dry | 0.380 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| 101 | 261613 | Composite-36 | DS151_26.12-35 | 261613 | CORE | Dry | 0.570 | |
| 102 | 261614 | | | 261614 | CORE | Dry | 0.630 | |
| 103 | 261615 | | | 261615 | CORE | Dry | 0.945 | |
| 104 | 261616 | All for metallurgical testing - sending to SGS | | 261616 | CORE | Dry | 0.980 | |
| 105 | 261617 | | | 261617 | CORE | Dry | 0.710 | |
| 106 | 261618 | | | 261618 | CORE | Dry | 0.700 | |
| 107 | 261619 | Composite-36-DUP | DS151_40-41 | 261619/261620 | CORE | Dry | 2.35 | |
| 108 | 261620 | | | | CORE | Dry | 1.75 | |
| 109 | 261773 | Composite-37 | DS157_6.41-7.0 | 261773 | CORE | Dry | 2.65 | |
| 110 | 261774 | Composite-38 | DS157_7-21 | 261774 | CORE | Dry | 4.45 | |
| 111 | 261775 | | | 261775 | CORE | Dry | 4.55 | |
| 112 | 261776 | | | 261776 | CORE | Dry | 4.10 | |
| 113 | 261777 | Composite-39 | DS157_21-36 | 261777 | CORE | Dry | 4.35 | |
| 114 | 261778 | | | 261778 | CORE | Dry | 1.95 | |
| 115 | 261779 | | | 261779 | CORE | Dry | 1.00 | |
| 116 | 261780 | All for metallurgical testing - sending to SGS | | 261780 | CORE | Dry | 0.445 | |
| 117 | 261781 | | | 261781 | CORE | Dry | 0.430 | |
| 118 | 261782 | | | 261782 | CORE | Dry | 0.651 | |
| 119 | 261783 | Composite-40 | DS157_39-45.0 | 261783 | CORE | Dry | 0.750 | |
| 120 | 261784 | | | 261784 | CORE | Dry | 0.490 | |
| 121 | 261785 | | | 261785 | CORE | Dry | 0.818 | |
| 122 | 261786 | | | 261786 | CORE | Dry | 0.585 | |
| 123 | 261787 | | | 261787 | CORE | Dry | 0.595 | |
| 124 | 261788 | | | 261788 | CORE | Dry | 0.940 | |
| 125 | 261789 | Composite-41 | DS157_50-55 | 261789 | CORE | Dry | 0.660 | |
| 126 | 261790 | | | 261790 | CORE | Dry | 0.345 | |
| 127 | 261791 | | | 261791 | CORE | Dry | 0.696 | |
| 128 | 261792 | | | 261792 | CORE | Dry | 0.800 | |
| 129 | 261793 | All for metallurgical testing - sending to SGS | | 261793 | CORE | Dry | 0.660 | |
| 130 | 261794 | | | 261794 | CORE | Dry | 0.380 | |
| 131 | 261795 | | | 261795 | CORE | Dry | 1.15 | |
| 132 | 261796 | Composite-41-DUP | DS157_60-61 | 261796/261798 | CORE | Dry | 1.80 | 261797 or 261798 sample ID? |
| 133 | 261797 | | | | CORE | Dry | 2.10 | |
| 134 | 261621 | Composite-42 | DS153_3-3.5 | 261621 | CORE | Dry | 2.05 | |
| 135 | 261622 | Composite-43 | DS153_3-20.9 | 261622 | CORE | Dry | 4.25 | |
| 136 | 261623 | | | 261623 | CORE | Dry | 4.70 | |
| 137 | 261624 | | | 261624 | CORE | Dry | 0.805 | |
| 138 | 261625 | Composite-44 | DS153_23-26 | 261625 | CORE | Dry | 0.530 | |
| 139 | 261626 | | | 261626 | CORE | Dry | 0.420 | |
| 140 | 261627 | Composite-45 | DS153_26_34.4 | 261627 | CORE | Dry | 0.525 | |
| 141 | 261628 | | | 261628 | CORE | Dry | 0.405 | |
| 142 | 261629 | | | 261629 | CORE | Dry | 0.600 | |
| 143 | 261630 | | | 261630 | CORE | Dry | 0.740 | |
| 144 | 261631 | | | 261631 | CORE | Dry | 0.580 | |
| 145 | 261632 | | | 261632 | CORE | Dry | 0.300 | |
| 146 | 261633 | | | 261633 | CORE | Dry | 0.440 | |
| 147 | 261634 | | | 261634 | CORE | Dry | 0.705 | |
| 148 | 261635 | | | 261635 | CORE | Dry | 0.380 | |
| 149 | 261636 | Composite-46 | DS153_36_51 | 261636 | CORE | Dry | 0.890 | |
| 150 | 261637 | | | 261637 | CORE | Dry | 1.25 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 151 | 261638 | | | 261638 | CORE | Dry | 1.25 | |
| 152 | 261639 | Composite-47 | DS154_5.4-6 | 261639 | CORE | Dry | 2.65 | |
| 153 | 261640 | Composite-48 | DS154_6-21 | 261640 | CORE | Dry | 4.50 | |
| 154 | 261641 | | | 261641 | CORE | Dry | 4.15 | |
| 155 | 261642 | | | 261642 | CORE | Dry | 4.35 | |
| 156 | 261643 | Composite-49 | DS154_21-41 | 261643 | CORE | Dry | 4.25 | |
| 157 | 261644 | | | 261644 | CORE | Dry | 4.35 | |
| 158 | 261645 | | | 261645 | CORE | Dry | 4.45 | |
| 159 | 261646 | Composite-50 | DS154_41-61 | 261646 | CORE | Dry | 4.55 | |
| 160 | 261647 | | | 261647 | CORE | Dry | 4.55 | |
| 161 | 261648 | | | 261648 | CORE | Dry | 2.80 | |
| 162 | 261649 | Composite-51 | DS154_61.5-67 | 261649 | CORE | Dry | 0.450 | |
| 163 | 261650 | | | 261650 | CORE | Dry | 0.370 | |
| 164 | 261651 | | | 261651 | CORE | Dry | 0.425 | |
| 165 | 261652 | | | 261652 | CORE | Dry | 0.740 | |
| 166 | 261653 | | | 261653 | CORE | Dry | 0.515 | |
| 167 | 261654 | | | 261654 | CORE | Dry | 0.685 | |
| 168 | 261655 | Composite-52 | DS154_67-72.6 | 261655 | CORE | Dry | 0.790 | |
| 169 | 261656 | | | 261656 | CORE | Dry | 1.00 | |
| 170 | 261657 | | | 261657 | CORE | Dry | 1.15 | |
| 171 | 261658 | | | 261658 | CORE | Dry | 0.725 | |
| 172 | 261659 | | | 261659 | CORE | Dry | 0.855 | |
| 173 | 261660 | | | 261660 | CORE | Dry | 0.850 | |
| 174 | 261661 | Composite-53 | DS154_72.6-75.62 | 261661 | CORE | Dry | 0.840 | |
| 175 | 261662 | | | 261662 | CORE | Dry | 0.590 | |
| 176 | 261798 | Composite-54 | DS164_3.86-4.36 | 261798 | CORE | Dry | 2.15 | |
| 177 | 261799 | Composite-55 | DS164_5-21 | 261799 | CORE | Dry | 4.00 | |
| 178 | 261800 | | | 261800 | CORE | Dry | 4.45 | |
| 179 | 261801 | | | 261801 | CORE | Dry | 0.720 | |
| 180 | 261802 | Composite-56 | DS164_31-38 | 261802 | CORE | Dry | 0.616 | |
| 181 | 261803 | | | 261803 | CORE | Dry | 0.480 | |
| 182 | 261804 | | | 261804 | CORE | Dry | 0.680 | |
| 183 | 261805 | | | 261805 | CORE | Dry | 0.670 | |
| 184 | 261806 | | | 261806 | CORE | Dry | 0.940 | |
| 185 | 261807 | | | 261807 | CORE | Dry | 0.61 | |
| 186 | 261808 | | | 261808 | CORE | Dry | 0.88 | |
| 187 | 261809 | Composite-57 | DS164_39.0-41.08 | 261809 | CORE | Dry | 0.75 | |
| 188 | 261810 | | | 261810 | CORE | Dry | 0.73 | |
| 189 | 261811 | | | 261811 | CORE | Dry | 0.48 | |
| 190 | 261812 | Composite-58 | DS164_41.08-43.0 | 261812 | CORE | Dry | 1.85 | |
| 191 | 261813 | | | 261813 | CORE | Dry | 1.60 | |
| 192 | 261814 | Composite-59 | DS165_2.85-3.35 | 261814 | CORE | Dry | 1.80 | |
| 193 | 261815 | Composite-60 | DS165_3.35_17.0 | 261815 | CORE | Dry | 4.45 | |
| 194 | 261816 | | | 261816 | CORE | Dry | 4.65 | |
| 195 | 261817 | | | 261817 | CORE | Dry | 4.40 | |
| 196 | 261818 | Composite-61 | DS165_18_32.0 | 261818 | CORE | Dry | 4.15 | |
| 197 | 261819 | | | 261819 | CORE | Dry | 4.55 | |
| 198 | 261820 | | | 261820 | CORE | Dry | 4.50 | |
| 199 | 261821 | Composite-62 | DS165_32.0-48.0 | 261821 | CORE | Dry | 4.60 | |
| 200 | 261822 | | | 261822 | CORE | Dry | 4.65 | |

Global ARD Testing Services Inc.

# Sample List

**Client:** Canada Fluorspar (NL) Inc.
**Project Name:** South Ridge
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B1)

**Date Rec'd:** 2025-10-27
**No. of Samples:** 246

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| 201 | 261823 | | | 261823 | CORE | Dry | 1.95 | |
| 202 | 261832 | Composite-63 | DS165_61.90-64 | 261832 | CORE | Dry | 1.20 | Send to SGS after compositing |
| 203 | 261833 | | | 261833 | CORE | Dry | 0.900 | |
| 204 | 261834 | | | 261834 | CORE | Dry | 0.500 | |
| 205 | 261835 | Composite-64 | DS165_64.0-67.0 | 261835 | CORE | Dry | 1.15 | Send to SGS after compositing |
| 206 | 261836 | | | 261836 | CORE | Dry | 1.10 | |
| 207 | 261837 | | | 261837 | CORE | Dry | 1.00 | |
| 208 | 261838 | Composite-65 | DS165_76.42-79.0 | 261838 | CORE | Dry | 1.10 | Send to SGS after compositing |
| 209 | 261839 | | | 261839 | CORE | Dry | 0.800 | |
| 210 | 261840 | | | 261840 | CORE | Dry | 1.25 | |
| 211 | 261843 | Composite-66 | DS169_62-65 | 261843 | CORE | Dry | 0.328 | Send to SGS after compositing |
| 212 | 261844 | | | 261844 | CORE | Dry | 0.300 | |
| 213 | 261845 | | | 261845 | CORE | Dry | 0.630 | |
| 214 | 261846 | Composite-67 | DS169_65-75 | 261846 | CORE | Dry | 0.800 | Send to SGS after compositing |
| 215 | 261847 | | | 261847 | CORE | Dry | 1.15 | |
| 216 | 261848 | | | 261848 | CORE | Dry | 1.10 | |
| 217 | 261849 | | | 261849 | CORE | Dry | 1.30 | |
| 218 | 261850 | | | 261850 | CORE | Dry | 1.00 | |
| 219 | 261851 | | | 261851 | CORE | Dry | 1.05 | |
| 220 | 261852 | | | 261852 | CORE | Dry | 1.05 | |
| 221 | 261853 | | | 261853 | CORE | Dry | 1.10 | |
| 222 | 261854 | | | 261854 | CORE | Dry | 1.00 | |
| 223 | 261855 | | | 261855 | CORE | Dry | 1.00 | |
| 224 | 261750 | Composite-68 | DS144_9.65_10.0 | 261750 | CORE | Dry | 1.65 | |
| 225 | 261751 | Composite-69 | DS144_10.0_24.0 | 261751 | CORE | Dry | 4.40 | |
| 226 | 261752 | | | 261752 | CORE | Dry | 3.10 | |
| 227 | 261753 | | | 261753 | CORE | Dry | 3.95 | |
| 228 | 261754 | Composite-70 | DS144_24.0-33.0 | 261754 | CORE | Dry | 3.45 | |
| 229 | 261755 | | | 261755 | CORE | Dry | 4.65 | |
| 230 | 261756 | | | 261756 | CORE | Dry | 1.70 | |
| 231 | 261757 | Composite-71 | DS144_34.44-36.42 | 261757 | CORE | Dry | 0.950 | |
| 232 | 261758 | | | 261758 | CORE | Dry | 0.335 | |
| 233 | 261759 | | | 261759 | CORE | Dry | 0.701 | |
| 234 | 261760 | Composite-72 | DS144_37.0_38.0 | 261760 | CORE | Dry | 1.05 | |
| 235 | 261761 | Composite-73 | DS145_9.33_10.0 | 261761 | CORE | Dry | 3.10 | |
| 236 | 261762 | Composite-74 | DS145_10.0_24 | 261762 | CORE | Dry | 4.65 | |
| 237 | 261763 | | | 261763 | CORE | Dry | 4.15 | |
| 238 | 261764 | | | 261764 | CORE | Dry | 4.45 | |
| 239 | 261765 | Composite-75 | DS145_24.0-38.0 | 261765 | CORE | Dry | 4.65 | |
| 240 | 261766 | | | 261766 | CORE | Dry | 4.30 | |
| 241 | 261767 | | | 261767 | CORE | Dry | 4.50 | |
| 242 | 261768 | Composite-76 | DS145_38.0-52.0 | 261768 | CORE | Dry | 4.35 | |
| 243 | 261769 | | | 261769 | CORE | Dry | 4.65 | |
| 244 | 261770 | | | 261770 | CORE | Dry | 4.55 | |
| 245 | 261771 | Composite-77 | DS145_91.48-93.52 | 261771 | CORE | Dry | 1.00 | Send to SGS after Compositing |
| 246 | 261772 | | | 261772 | CORE | Dry | 0.725 | |

**Total wt of sample rec'd (kg):** **467.27**

## CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| SAMPLE RECEIPT INFO | |
|---|---|
| Date Samples Received: | October 27, 2025 |
| No of Samples Received: | 77 |
| Samples Received By: | Said Zeinab |

| ANALYTICAL INSTRUCTIONS | |
|---|---|
| From: | |
| | as per email Confirmation |
| Date: | October 28, 2025 |

| S. No. | Sample ID | Sample Description | Condition (Wet/Dry) | Wt. of Sample Rec'd (kg) | Global Notes (if any) |
|---|---|---|---|---|---|
| 1 | Composite-1_DS147_7.23-7.5 | | | | |
| 2 | Composite-2_DS147_7.5-18 | | | | |
| 3 | Composite-3_DS147_18-32 | | | | |
| 4 | Composite-4_DS147_31-33.4 | | | | |
| 5 | Composite-5_DS147_33.4-35.4 | | | | |
| 6 | Composite-6_DS147_35.4-38.3 | | | | |
| 7 | Composite-7_DS147_38.3-41.3 | | | | |
| 8 | Composite-8_DS147_42-43 | | | | |
| 8D | Composite-8-DUP_DS147_46-47 | | | | |
| 9 | Composite-9_DS148_7-7.5 | | | | |
| 10 | Composite-10_DS148_7.5-20 | | | | |
| 11 | Composite-11_DS148_21-35 | | | | |
| 12 | Composite-12_DS148_35-64 | | | | |
| 13 | Composite-13_DS148_66.6-67.54 | | | | |
| 14 | Composite-14_DS148_67.54-69.46 | | | | |
| 15 | Composite-15_DS148_67.46-71.31 | | | | |
| 16 | Composite-16_DS148_72.11-73.06 | | | | |
| 16D | Composite-16-DUP_DS148_82-83 | | | | |
| 17 | Composite-17_DS150_4.4-5 | | | | |
| 18 | Composite-18_DS150_5-13 | | | | |
| 19 | Composite-19_DS150_14.25-20 | | | | |
| 20 | Composite-20_DS150_20-23.3 | | | | |
| 21 | Composite-21_DS150_23.3-25.7 | | | | |
| 21D | Composite-21-DUP_DS150_30.5-32 | | | | |
| 22 | Composite-22_DS150_30.07-33.96 | | | | |
| 23 | Composite-23_DS150_35.3-40 | | | | |
| 24 | Composite-24_DS155_4-4.5 | | | | |
| 25 | Composite-25_DS155_5-21 | | | | |
| 26 | Composite-26_DS155_21-25 | | | | |
| 27 | Composite-27_DS155_25-60 | | | | |
| 28 | Composite-28_DS155_62.2-69.2 | | | | |
| 29 | Composite-29_DS155_69.2-72.3 | | | | |
| 30 | Composite-30_DS155_72.3-78 | | | | |
| 31 | Composite-31_DS155_78-79.7 | | | | |
| 32 | Composite-32_DS151_3.4-4 | | | | |
| 33 | Composite-33_DS151_3.4-4 | | | | |
| 34 | Composite-34_DS151_4-19.8 | | | | |
| 35 | Composite-35_DS151_19.8-26.12 | | | | |
| 36 | Composite-36_DS151_26.12-35 | | | | |
| 36D | Composite-36-DUP_DS151_40-41 | | | | |
| 37 | Composite-37_DS157_6.41-7.0 | | | | |
| 38 | Composite-38_DS157_7-21 | | | | |
| 39 | Composite-39_DS157_21-36 | | | | |
| 40 | Composite-40_DS157_39-45.0 | | | | |
| 41 | Composite-41_DS157_50-55 | | | | |
| 41D | Composite-41-DUP_DS157_60-61 | | | | |
| 42 | Composite-42_DS153_3-3.5 | | | | |
| 43 | Composite-43_DS153_3-20.9 | | | | |
| 44 | Composite-44_DS153_23-26 | | | | |
| 45 | Composite-45_DS153_26_34.4 | | | | |
| 46 | Composite-46_DS153_36_51 | | | | |
| 47 | Composite-47_DS154_5.4-6 | | | | |
| 48 | Composite-48_DS154_6-21 | | | | |
| 49 | Composite-49_DS154_21-41 | | | | |
| 50 | Composite-50_DS154_41-61 | | | | |
| 51 | Composite-51_DS154_61.5-67 | | | | |
| 52 | Composite-52_DS154_67-72.6 | | | | |
| 53 | Composite-53_DS154_72.6-75.62 | | | | |
| 54 | Composite-54_DS164_3.86-4.36 | | | | |
| 55 | Composite-55_DS164_5-21 | | | | |
| 56 | Composite-56_DS164_31-38 | | | | |
| 57 | Composite-57_DS164_39.0-41.08 | | | | |
| 58 | Composite-58_DS164_41.08-43.0 | | | | |
| 59 | Composite-59_DS165_2.85-3.35 | | | | |
| 60 | Composite-60_DS165_3.35_17.0 | | | | |
| 61 | Composite-61_DS165_18_32.0 | | | | |
| 62 | Composite-62_DS165_32.0-48.0 | | | | |
| 63 | Composite-63_DS165_61.90-64 | | | | |
| 64 | Composite-64_DS165_64.0-67.0 | | | | |
| 65 | Composite-65_DS165_76.42-79.0 | | | | |
| 66 | Composite-66_DS169_62-65 | | | | |
| 67 | Composite-67_DS169_65-75 | | | | |
| 68 | Composite-68_DS144_9.65_10.0 | | | | |
| 69 | Composite-69_DS144_10.0_24.0 | | | | |
| 70 | Composite-70_DS144_24.0-33.0 | | | | |
| 71 | Composite-71_DS144_34.44-36.42 | | | | |
| 72 | Composite-72_DS144_37.0_38.0 | | | | |
| 73 | Composite-73_DS145_9.33_10.0 | | | | |
| 74 | Composite-74_DS145_10.0_24 | | | | |
| 75 | Composite-75_DS145_24.0-38.0 | | | | |
| 76 | Composite-76_DS145_38.0-52.0 | | | | |
| 77 | Composite-77_DS145_91.48-93.52 | | | | |

**Total wt of sample rec'd (kg):** 0.00

## CERTIFICATE OF ANALYSIS ▪ ABA RESULTS


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No. | Sample ID | Paste pH | Fizz Rating | Total Carbon | Total Inorganic Carbon | $CaCO_3$ (Based on TIC) Equivalents[*1] | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | AP[*3] | Standard Sobek NP | NNP[*4] | NPR[*5] | $CaCO_3$ (Based on TC) Equivalents[*1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***Units:*** | **pH Units** | | **wt %** | **wt %** | **kg $CaCO_3$/tonne** | **wt %** | **wt %** | **wt %** | | **kg $CaCO_3$/tonne** | | | **kg $CaCO_3$/tonne** |
| | ***Reported Detection Limit:*** | ***0.1*** | | ***0.01*** | ***0.02*** | ***1.7*** | ***0.01*** | ***0.01*** | ***0.01*** | **0.3** | | | | ***0.8*** |
| 1 | Composite-1 DS147_7.23-7.5 | 8.11 | None | 0.11 | 0.12 | 10.0 | 0.02 | <0.01 | 0.02 | 0.6 | 10.8 | 10.2 | 17.1 | 9.2 |
| 2 | Composite-2 DS147_7.5-18 | 7.94 | None | 0.07 | 0.13 | 10.8 | 0.02 | <0.01 | 0.02 | 0.6 | 10.3 | 9.7 | 16.4 | 5.8 |
| 3 | Composite-3 DS147_18-32 | 7.93 | None | 0.08 | 0.14 | 11.7 | 0.01 | <0.01 | 0.01 | 0.3 | 9.4 | 9.1 | 30.3 | 6.7 |
| 4 | Composite-4 DS147_31-33.4 | 6.59 | None | 0.03 | 0.06 | 5.0 | 0.12 | 0.03 | 0.09 | 2.8 | 11.9 | 9.1 | 4.2 | 2.5 |
| **4R** | | | | **0.02** | **0.02** | **1.7** | | | | | | | | 1.7 |
| 5 | Composite-5 DS147_33.4-35.4 | 5.62 | None | 0.02 | 0.05 | 4.2 | 0.05 | <0.01 | 0.05 | 1.6 | 5.5 | 3.9 | 3.5 | 1.7 |
| **5R** | | | | **0.01** | **0.02** | **1.7** | | | | | | | | 0.8 |
| 6 | Composite-6 DS147_35.4-38.3 | 7.59 | None | 0.06 | 0.08 | 6.7 | 0.02 | <0.01 | 0.02 | 0.6 | 11.4 | 10.8 | 18.1 | 5.0 |
| 7 | Composite-7 DS147_38.3-41.3 | 7.81 | Slight | 0.37 | 0.39 | 32.5 | 0.02 | <0.01 | 0.02 | 0.6 | 39.1 | 38.5 | 62.1 | 30.8 |
| 8 | Composite-8 DS147_42-43 | 7.79 | Slight | 0.39 | 0.42 | 35.0 | 0.02 | <0.01 | 0.02 | 0.6 | 41.7 | 41.1 | 66.2 | 32.5 |
| 8D | Composite-8-DUP DS147_46-47 | 7.80 | Slight | 0.16 | 0.22 | 18.3 | 0.02 | <0.01 | 0.02 | 0.6 | 23.0 | 22.4 | 36.5 | 13.3 |
| 9 | Composite-9 DS148_7-7.5 | 7.79 | Slight | 0.53 | 0.56 | 46.7 | 0.01 | <0.01 | 0.01 | 0.3 | 51.1 | 50.8 | 164.8 | 44.2 |
| 10 | Composite-10 DS148_7.5-20 | 8.17 | Slight | 0.78 | 0.81 | 67.5 | 0.02 | <0.01 | 0.02 | 0.6 | 69.3 | 68.7 | 110.0 | 65.0 |
| 11 | Composite-11 DS148_21-35 | 8.37 | Slight | 0.18 | 0.19 | 15.8 | 0.01 | <0.01 | 0.01 | 0.3 | 22.2 | 21.9 | 71.6 | 15.0 |
| 12 | Composite-12 DS148_35-64 | 8.12 | None | 0.07 | 0.11 | 9.2 | 0.01 | <0.01 | 0.01 | 0.4 | 6.3 | 5.9 | 15.8 | 6.1 |
| 13 | Composite-13 DS148_66.6-67.54 | 7.63 | None | 0.04 | 0.09 | 7.5 | 0.02 | <0.01 | 0.02 | 0.6 | 3.9 | 3.3 | 6.2 | 3.3 |
| 14 | Composite-14 DS148_67.54-69.46 | 7.78 | Slight | 0.20 | 0.23 | 19.2 | 0.03 | <0.01 | 0.03 | 0.9 | 21.0 | 20.1 | 22.3 | 16.7 |
| 15 | Composite-15 DS148_67.46-71.31 | 6.76 | None | 0.02 | <0.02 | <1.7 | 0.03 | <0.01 | 0.03 | 0.9 | 2.4 | 1.5 | 2.6 | 1.7 |
| 16 | Composite-16 DS148_72.11-73.06 | 6.86 | None | 0.02 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 5.4 | 4.8 | 8.6 | 1.7 |
| 16D | Composite-16-DUP DS148_82-83 | 8.78 | Slight | 0.15 | 0.19 | 15.8 | 0.01 | <0.01 | 0.01 | 0.3 | 16.8 | 16.5 | 54.2 | 12.5 |
| 17 | Composite-17 DS150 4.4-5 | 7.93 | Slight | 0.24 | 0.29 | 24.2 | 0.02 | <0.01 | 0.02 | 0.6 | 23.1 | 22.5 | 36.7 | 20.0 |
| 18 | Composite-18 DS150 5-13 | 7.99 | None | 0.09 | 0.08 | 6.7 | 0.01 | <0.01 | 0.01 | 0.3 | 6.5 | 6.2 | 21.0 | 7.5 |
| 19 | Composite-19 DS150_14.25-20 | 7.38 | Slight | 0.20 | 0.15 | 12.5 | 0.02 | <0.01 | 0.02 | 0.6 | 22.1 | 21.5 | 35.1 | 16.7 |
| 20 | Composite-20 DS150_20-23.3 | 6.63 | None | 0.02 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 4.1 | 3.5 | 6.5 | 1.7 |
| 21 | Composite-21 DS150_23.3-25.7 | 6.08 | None | 0.01 | <0.02 | <1.7 | 0.02 | <0.01 | 0.02 | 0.6 | 1.8 | 1.2 | 2.9 | 0.8 |
| 21D | Composite-21-DUP DS150_30.5-32 | 8.03 | Slight | 0.23 | 0.13 | 10.8 | 0.01 | <0.01 | 0.01 | 0.3 | 22.4 | 22.1 | 72.3 | 19.2 |
| 22 | Composite-22 DS150_30.07-33.96 | 7.49 | None | 0.03 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 5.1 | 4.8 | 16.5 | 2.5 |
| 23 | Composite-23 DS150_35.3-40 | 7.93 | Slight | 0.28 | 0.23 | 19.2 | 0.01 | <0.01 | 0.01 | 0.3 | 22.8 | 22.5 | 73.6 | 23.3 |
| 24 | Composite-24 DS155_4-4.5 | 7.66 | None | 0.02 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 2.5 | 2.2 | 8.1 | 1.7 |
| 25 | Composite-25 DS155 5-21 | 8.08 | None | 0.05 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 2.9 | 2.6 | 9.4 | 4.2 |
| 26 | Composite-26 DS155_21-25 | 7.97 | None | 0.06 | 0.03 | 2.5 | 0.01 | 0.02 | <0.01 | <0.3 | 5.9 | 5.9 | N/A | 5.0 |
| 27 | Composite-27 DS155_25-60 | 8.07 | Slight | 0.12 | 0.06 | 5.0 | 0.01 | <0.01 | 0.01 | 0.3 | 10.8 | 10.5 | 34.8 | 10.0 |
| 28 | Composite-28 DS155_62.2-69.2 | 7.74 | Slight | 0.17 | 0.16 | 13.3 | 0.02 | <0.01 | 0.02 | 0.6 | 21.5 | 20.9 | 34.1 | 14.2 |
| 29 | Composite-29 DS155_69.2-72.3 | 8.20 | Slight | 0.17 | 0.17 | 14.2 | 0.02 | <0.01 | 0.02 | 0.6 | 18.5 | 17.9 | 29.4 | 14.2 |
| 30 | Composite-30 DS155_72.3-78 | 7.80 | Slight | 0.75 | 0.72 | 60.0 | 0.09 | <0.01 | 0.09 | 2.8 | 70.0 | 67.2 | 24.9 | 62.5 |
| 31 | Composite-31 DS155_78-79.7 | 7.96 | Slight | 0.65 | 0.63 | 52.5 | 0.12 | 0.03 | 0.09 | 2.8 | 60.3 | 57.5 | 21.5 | 54.2 |
| 32 | Composite-32 DS151_3.4-4 | 8.15 | Slight | 0.19 | 0.14 | 11.7 | 0.02 | <0.01 | 0.02 | 0.6 | 20.3 | 19.7 | 32.2 | 15.8 |
| 33 | Composite-33 DS151 3.4-4 | 7.88 | None | 0.04 | 0.03 | 2.5 | 0.01 | <0.01 | 0.01 | 0.3 | 3.3 | 3.0 | 10.7 | 3.3 |
| 34 | Composite-34 DS151 4-19.8 | 7.72 | None | 0.03 | 0.04 | 3.3 | 0.01 | <0.01 | 0.01 | 0.3 | 5.9 | 5.6 | 19.0 | 2.5 |
| 35 | Composite-35 DS151_19.8-26.12 | 7.07 | None | 0.03 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 7.3 | 7.0 | 23.6 | 2.5 |
| 36 | Composite-36 DS151_26.12-35 | 7.80 | None | 0.10 | 0.11 | 9.2 | 0.01 | <0.01 | 0.01 | 0.3 | 10.5 | 10.2 | 33.9 | 8.3 |
| 36D | Composite-36-DUP DS151_40-41 | 8.01 | Slight | 0.33 | 0.36 | 30.0 | 0.01 | <0.01 | 0.01 | 0.3 | 32.9 | 32.6 | 106.1 | 27.5 |
| 37 | Composite-37 DS157 6.41-7.0 | 6.89 | None | 0.09 | 0.02 | 1.7 | 0.16 | <0.01 | 0.16 | 5.0 | 6.9 | 1.9 | 1.4 | 7.5 |
| 38 | Composite-38 DS157 7-21 | 7.79 | None | 0.07 | 0.05 | 4.2 | 0.09 | <0.01 | 0.09 | 2.8 | 7.4 | 4.6 | 2.6 | 5.8 |
| 39 | Composite-39 DS157 21-36 | 7.95 | None | 0.07 | 0.07 | 5.8 | 0.01 | <0.01 | 0.01 | 0.3 | 9.6 | 9.3 | 31.0 | 5.8 |
| 40 | Composite-40 DS157_39-45.0 | 7.88 | Slight | 0.37 | 0.45 | 37.5 | 0.02 | <0.01 | 0.02 | 0.6 | 37.8 | 37.2 | 60.0 | 30.8 |
| 41 | Composite-41 DS157 50-55 | 7.74 | None | 0.05 | 0.05 | 4.2 | 0.01 | <0.01 | 0.01 | 0.3 | 8.5 | 8.2 | 27.4 | 4.2 |
| 41D | Composite-41-DUP DS157_60-61 | 7.79 | None | 0.06 | 0.06 | 5.0 | 0.01 | <0.01 | 0.01 | 0.3 | 10.3 | 10.0 | 33.2 | 5.0 |
| 42 | Composite-42 DS153 3-3.5 | 7.15 | None | 0.03 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 6.0 | 5.7 | 19.4 | 2.5 |
| 43 | Composite-43 DS153_3-20.9 | 7.79 | None | 0.07 | 0.06 | 5.0 | 0.02 | <0.01 | 0.02 | 0.6 | 11.2 | 10.6 | 17.8 | 5.8 |
| 44 | Composite-44 DS153_23-26 | 6.90 | None | 0.02 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 9.1 | 8.5 | 14.4 | 1.7 |
| 45 | Composite-45 DS153_26_34.4 | 6.74 | None | 0.03 | <0.02 | <1.7 | 0.02 | <0.01 | 0.02 | 0.6 | 9.5 | 8.9 | 15.1 | 2.5 |
| 46 | Composite-46 DS153_36_51 | 6.94 | None | 0.03 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 6.4 | 6.1 | 20.7 | 2.5 |
| 47 | Composite-47 DS154_5.4-6 | 6.86 | None | 0.03 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 3.6 | 3.0 | 5.7 | 2.5 |
| 48 | Composite-48 DS154 6-21 | 7.69 | None | 0.05 | 0.03 | 2.5 | 0.04 | <0.01 | 0.04 | 1.3 | 5.8 | 4.6 | 4.6 | 4.2 |
| 49 | Composite-49 DS154_21-41 | 7.92 | None | 0.06 | 0.07 | 5.8 | 0.01 | <0.01 | 0.01 | 0.3 | 8.2 | 7.9 | 26.5 | 5.0 |
| 50 | Composite-50 DS154_41-61 | 8.18 | Slight | 0.14 | 0.13 | 10.8 | 0.02 | <0.01 | 0.02 | 0.6 | 16.2 | 15.6 | 25.7 | 11.7 |
| 51 | Composite-51 DS154_61.5-67 | 7.29 | None | 0.06 | 0.06 | 5.0 | 0.03 | <0.01 | 0.03 | 0.9 | 9.9 | 9.0 | 10.5 | 5.0 |
| 52 | Composite-52 DS154_67-72.6 | 7.99 | Slight | 0.43 | 0.46 | 38.3 | 0.01 | <0.01 | 0.01 | 0.3 | 43.5 | 43.2 | 140.3 | 35.8 |
| 53 | Composite-53 DS154_72.6-75.62 | 8.13 | Slight | 0.32 | 0.38 | 31.7 | 0.01 | <0.01 | 0.01 | 0.3 | 32.0 | 31.7 | 103.2 | 26.7 |
| 54 | Composite-54 DS164 3.86-4.36 | 7.27 | None | 0.02 | 0.05 | 4.2 | 0.01 | <0.01 | 0.01 | 0.3 | 5.8 | 5.5 | 18.7 | 1.7 |
| 55 | Composite-55 DS164_5-21 | 6.88 | None | 0.02 | 0.03 | 2.5 | 0.01 | <0.01 | 0.01 | 0.3 | 9.2 | 8.9 | 29.7 | 1.7 |
| 56 | Composite-56 DS164_31-38 | 6.16 | None | 0.03 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 8.8 | 8.2 | 14.0 | 2.5 |
| 57 | Composite-57 DS164_39.0-41.08 | 6.48 | None | 0.03 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 11.7 | 11.1 | 18.6 | 2.5 |
| 58 | Composite-58 DS164_41.08-43.0 | 7.04 | None | 0.02 | 0.02 | 1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 6.8 | 6.5 | 21.9 | 1.7 |
| 59 | Composite-59 DS165_2.85-3.35 | 6.84 | None | 0.02 | 0.02 | 1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 3.9 | 3.6 | 12.6 | 1.7 |
| 60 | Composite-60 DS165_3.35_17.0 | 7.97 | None | 0.03 | 0.05 | 4.2 | 0.02 | <0.01 | 0.02 | 0.6 | 9.4 | 8.8 | 14.9 | 2.5 |
| 61 | Composite-61 DS165_18_32.0 | 7.80 | Slight | 0.12 | 0.11 | 9.2 | 0.01 | <0.01 | 0.01 | 0.3 | 17.7 | 17.4 | 57.1 | 10.0 |
| 62 | Composite-62 DS165_32.0-48.0 | 7.83 | None | 0.06 | 0.08 | 6.7 | 0.01 | <0.01 | 0.01 | 0.3 | 9.2 | 8.9 | 29.7 | 5.0 |
| 63 | Composite-63 DS165_61.90-64 | 6.96 | None | 0.02 | 0.07 | 5.8 | 0.02 | <0.01 | 0.02 | 0.6 | 8.1 | 7.5 | 12.9 | 1.7 |
| 64 | Composite-64 DS165_64.0-67.0 | 6.98 | None | 0.01 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 8.2 | 7.9 | 26.5 | 0.8 |
| 65 | Composite-65 DS165_76.42-79.0 | 7.74 | None | 0.03 | 0.04 | 3.3 | 0.01 | <0.01 | 0.01 | 0.3 | 9.4 | 9.1 | 30.3 | 2.5 |
| 66 | Composite-66 DS169_62-65 | 6.66 | None | 0.03 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 8.1 | 7.5 | 12.9 | 2.5 |
| 67 | Composite-67 DS169_65-75 | 6.64 | None | 0.02 | 0.04 | 3.3 | 0.01 | <0.01 | 0.01 | 0.3 | 5.2 | 4.9 | 16.8 | 1.7 |
| 68 | Composite-68 DS144_9.65_10.0 | 7.83 | None | 0.02 | 0.03 | 2.5 | 0.01 | 0.02 | <0.01 | <0.3 | 3.6 | 3.6 | N/A | 1.7 |
| 69 | Composite-69 DS144_10.0_24.0 | 7.92 | None | 0.02 | 0.04 | 3.3 | 0.02 | 0.02 | <0.01 | <0.3 | 3.5 | 3.5 | N/A | 1.7 |
| 70 | Composite-70 DS144_24.0-33.0 | 7.97 | None | 0.02 | 0.04 | 3.3 | 0.01 | 0.02 | <0.01 | <0.3 | 3.9 | 3.9 | N/A | 1.7 |
| 71 | Composite-71 DS144_34.44-36.42 | 7.29 | None | 0.05 | 0.06 | 5.0 | 0.04 | <0.01 | 0.04 | 1.3 | 9.0 | 7.8 | 7.2 | 4.2 |
| 72 | Composite-72 DS144_37.0_38.0 | 7.93 | None | 0.02 | 0.04 | 3.3 | 0.01 | <0.01 | 0.01 | 0.3 | 6.3 | 6.0 | 20.3 | 1.7 |
| 73 | Composite-73 DS145_9.33_10.0 | 7.83 | Slight | 0.19 | 0.23 | 19.2 | 0.04 | <0.01 | 0.04 | 1.3 | 18.6 | 17.4 | 14.9 | 15.8 |
| 74 | Composite-74 DS145_10.0_24 | 7.86 | None | 0.18 | 0.19 | 15.8 | 0.03 | <0.01 | 0.03 | 0.9 | 14.6 | 13.7 | 15.5 | 15.0 |
| 75 | Composite-75 DS145_24.0-38.0 | 8.01 | None | 0.03 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 3.8 | 3.2 | 6.0 | 2.5 |
| 76 | Composite-76 DS145_38.0-52.0 | 8.52 | None | 0.07 | 0.06 | 5.0 | 0.01 | <0.01 | 0.01 | 0.3 | 9.8 | 9.5 | 31.6 | 5.8 |
| 77 | Composite-77 DS145_91.48-93.52 | 7.56 | None | 0.06 | 0.09 | 7.5 | 0.02 | <0.01 | 0.02 | 0.6 | 11.1 | 10.5 | 17.6 | 5.0 |
| | **QUALITY ASSURANCE / QUALITY CONTROL** | | | | | | | | | | | | | |
| ***Pulp Replicates:*** | | | | | | | | | | | | | | |
| 10 | Composite-10 | 8.17 | Slight | 0.78 | 0.81 | 67.5 | 0.02 | <0.01 | 0.02 | 0.6 | 69.3 | | | |
| 10R | Composite-10 R | 8.14 | Slight | 0.79 | 0.75 | 62.5 | 0.01 | <0.01 | 0.01 | 0.3 | 69 | | | |
| | **%RPD** | 0% | | -1% | 8% | | 67% | | | | 0% | | | |
| 20 | Composite-20 | 6.63 | None | 0.02 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 4.1 | | | |
| 20R | Composite-20 R | 6.64 | None | 0.02 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 4.8 | | | |
| | **%RPD** | 0% | | 0% | 0% | | 0% | | | | -16% | | | |
| 30 | Composite-30 | 7.80 | Slight | 0.75 | 0.72 | 60.0 | 0.09 | <0.01 | 0.09 | 2.8 | 70.0 | | | |
| 30R | Composite-30 R | 7.94 | Slight | 0.76 | 0.76 | 63.3 | 0.09 | 0.02 | 0.07 | 2.2 | 70 | | | |
| | **%RPD** | -2% | | -1% | -5% | | 0% | | | | 0% | | | |
| 40 | Composite-40 | 7.88 | Slight | 0.37 | 0.45 | 37.5 | 0.02 | <0.01 | 0.02 | 0.6 | 37.8 | | | |
| 40R | Composite-40 R | 7.81 | Slight | 0.38 | 0.40 | 33.3 | 0.02 | <0.01 | 0.02 | 0.6 | 41 | | | |
| | **%RPD** | 1% | | -3% | 12% | | 0% | | | | -8% | | | |
| 50 | Composite-50 | 8.18 | Slight | 0.14 | 0.13 | 10.8 | 0.02 | <0.01 | 0.02 | 0.6 | 16.2 | | | |
| 50R | Composite-50 R | 8.24 | Slight | 0.14 | 0.14 | 11.7 | 0.02 | <0.01 | 0.02 | 0.6 | 18.4 | | | |
| | **%RPD** | -1% | | 0% | -7% | | 0% | | | | -13% | | | |
| 60 | Composite-60 | 7.97 | None | 0.03 | 0.05 | 4.2 | 0.02 | <0.01 | 0.02 | 0.6 | 9.4 | | | |
| 60R | Composite-60 R | 7.97 | None | 0.04 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 5.4 | | | |
| | **%RPD** | 0% | | -29% | 50% | | 0% | | | | 54% | | | |
| 70 | Composite-70 | 7.97 | None | 0.02 | 0.04 | 3.3 | 0.01 | 0.02 | <0.01 | <0.3 | 3.9 | | | |
| 70R | Composite-70 R | 7.93 | None | 0.03 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 3.4 | | | |
| | **%RPD** | 1% | | -40% | #VALUE! | | 0% | | | | 14% | | | |
| ***Reference Material Analysis:*** | | | | | | | | | | | | | | |
| Reference Material | | | | 1) OREAS 279<br>2) OREAS 20A | KZK-1 | | OREAS 20a | RTS-3a | | | 1) KZK-1 (Slight)<br>2) KZK-1 (Moderate) | | | |
| **Ref. Material Certified Value** | | | | **1) 1.13 2) 0.054** | **0.92** | | **0.06** | **1.10** | | | **1) 59.0<br>2) 64.8** | | | |
| Reference Material Results | | | | 1) 1.09<br>2) 0.057 / 0.051 | 0.92 / 0.87 / 0.95 | | 0.07 | 1.01 | | | 1) 56.9<br>2) N/A | | | |
| ***Acceptance Range:*** | | | | ***90% - 110%*** | ***80% - 120%*** | | ***90% - 110%*** | ***90% - 110%*** | | | ***90% - 110%*** | | | |
| ***Method Blank Analysis:*** | | | | | | | | | | | | | | |
| Method Blank Results | | | | <0.01 | <0.02 | | <0.01 | <0.01 | | | | | | |
| ***GLOBAL SOP NO./METHOD:*** | | *ARD-005* | *ARD-005* | *LECO* | *$HClO_4$ Leach $CO_2$ Coulometer* | *Calc.* | *LECO* | *ARD-010 (HCl Leach)* | *Calc.* | *Calc.* | *ARD-007* | *Calc.* | *Calc.* | |

***NOTES:***
Job No: 20251110, 20251201(Recheck)

**Date of Analysis (24 h)**: November 10-28, 2025
pH of DI water used (pH units): 5.39, 5.27, 5.28, 5.29
EC of DI water used (µS/cm): 1.69, 1.29, 1.24, 1.21

***METHODS:***
Total Sulphur by LECO.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved $CO_2$ analysed by $CO_2$ Coulometer.

***ABBREVIATIONS:***
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

***CALCULATIONS:***
[*1] $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
[*2] Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
[*3] AP (Acid Potential): Sulphide-sulphur x 31.25
[*4] NNP (Net Neutralization Potential): NP - AP
[*5] NPR (Neutralization Potential Ratio): NP/AP

***REFERENCES:***
**Sample Preparation:** ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
**ABA:** Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
**Surface Rinse-pH**: MEND Report 1.20.1, Version 0 (2009).
**Modified ABA (Sobek) NP:** MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
**STD Sobek NP / Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Sulphate Sulphur:** Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).
**Sulphur Speciation:** Sequential HCl and $HNO_3$ leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Global ARD Testing Services Inc.

**CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS**



**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No. | Sample ID | Method | Silver (Ag) | Aluminum (Al) | Arsenic (As) | Gold (Au) | Boron (B) | Barium (Ba) | Beryllium (Be) | Bismuth (Bi) | Calcium (Ca) | Cadmium (Cd) | Cerium (Ce) | Cobalt (Co) | Chromium (Cr) | Cesium (Cs) | Copper (Cu) | Iron (Fe) | Gallium (Ga) | Germanium (Ge) | Hafnium (Hf) | Mercury (Hg) | Indium (In) | Potassium (K) | Lanthanum (La) | Lithium (Li) | Magnesium (Mg) | Manganese (Mn) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | % | ppm |
| | | MDL | 0.01 | 0.01 | 0.1 | 0.0005 | 10 | 10 | 0.05 | 0.01 | 0.01 | 0.01 | 0.02 | 0.1 | 1 | 0.05 | 0.2 | 0.01 | 0.05 | 0.05 | 0.02 | 0.005 | 0.005 | 0.01 | 0.2 | 0.1 | 0.01 | 5 |
| | | Sample Type | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Composite-1 DS147 7.23-7.5 | Pulp | 0.06 | 1.04 | 3.1 | 0.0072 | <10 | 27 | 2.56 | 0.21 | 1.95 | 0.04 | 133.03 | 0.5 | 97 | 1.35 | 4.2 | 0.92 | 5.28 | 0.14 | 5.15 | <0.005 | 0.106 | 0.88 | 59.0 | 9.3 | <0.01 | 109 |
| 2 | Composite-2 DS147_7.5-18 | Pulp | 0.07 | 0.74 | 2.8 | 0.0066 | <10 | 29 | 2.26 | 0.45 | 1.34 | 0.06 | 128.94 | 0.5 | 85 | 0.93 | 5.7 | 0.94 | 3.91 | 0.14 | 4.37 | 0.01 | 0.089 | 0.62 | 55.3 | 8.1 | <0.01 | 86 |
| 3 | Composite-3 DS147 18-32 | Pulp | 0.16 | 0.33 | 2.1 | 0.0069 | <10 | 127 | 1.88 | 0.62 | 0.51 | 0.31 | 121.24 | 0.4 | 85 | 3.61 | 2.6 | 1.07 | 2.96 | 0.14 | 3.84 | <0.005 | 0.087 | 0.17 | 53.1 | 9.7 | <0.01 | 86 |
| 4 | Composite-4 DS147_31-33.4 | Pulp | 0.09 | 2.41 | 3.0 | 0.0127 | 359 | 2272 | 2.38 | 0.31 | 9.54 | 0.10 | 64.60 | 1.0 | 126 | 14.29 | 21.6 | 1.25 | 13.96 | 0.22 | 4.76 | 0.01 | 0.247 | 2.12 | 28.6 | 99.1 | 0.04 | 233 |
| 5 | Composite-5 DS147_33.4-35.4 | Pulp | 0.18 | 0.47 | 1.5 | 0.0061 | 3683 | 57 | 0.30 | 0.27 | 11.94 | 0.03 | 13.30 | 0.3 | 63 | 1.23 | 7.0 | 0.13 | 1.31 | 0.07 | 1.09 | 0.01 | 0.036 | 0.17 | 6.4 | 24.9 | <0.01 | 13 |
| 6 | Composite-6 DS147_35.4-38.3 | Pulp | 0.09 | 1.90 | 2.6 | 0.0073 | 136 | 63 | 2.24 | 0.18 | 6.42 | 0.20 | 112.35 | 0.5 | 102 | 3.67 | 9.6 | 1.01 | 8.48 | 0.30 | 3.84 | 0.01 | 0.131 | 1.70 | 49.6 | 112.9 | <0.01 | 124 |
| 7 | Composite-7 DS147_38.3-41.3 | Pulp | 0.07 | 1.49 | 2.8 | 0.0066 | 28 | 45 | 2.15 | 0.18 | 4.17 | 0.18 | 150.18 | 0.5 | 102 | 1.96 | 7.0 | 1.19 | 7.40 | 0.19 | 4.38 | <0.005 | 0.213 | 1.20 | 63.5 | 66.8 | <0.01 | 513 |
| 8 | Composite-8 DS147_42-43 | Pulp | 0.13 | 1.67 | 3.4 | 0.0069 | 36 | 43 | 2.39 | 0.18 | 5.09 | 0.12 | 136.03 | 0.4 | 112 | 2.03 | 5.0 | 1.11 | 8.10 | 0.18 | 4.01 | 0.01 | 0.283 | 1.34 | 57.6 | 60.7 | <0.01 | 423 |
| 8D | Composite-8-DUP DS147_46-47 | Pulp | 0.08 | 1.61 | 2.9 | 0.0040 | 35 | 59 | 2.86 | 0.22 | 4.02 | 0.13 | 138.32 | 0.5 | 118 | 2.37 | 16.0 | 0.81 | 7.84 | 0.15 | 2.37 | 0.01 | 0.126 | 1.41 | 59.3 | 90.8 | <0.01 | 194 |
| 9 | Composite-9 DS148_7-7.5 | Pulp | 0.09 | 0.88 | 4.6 | 0.0060 | 11 | 35 | 3.92 | 1.54 | 2.99 | 0.04 | 144.81 | 0.5 | 81 | 1.06 | 5.2 | 0.96 | 4.74 | 0.12 | 3.55 | 0.01 | 0.243 | 0.75 | 61.0 | 2.2 | <0.01 | 1095 |
| 10 | Composite-10 DS148 7.5-20 | Pulp | 0.10 | 0.73 | 4.4 | 0.0064 | 18 | 18 | 2.54 | 0.79 | 3.34 | 0.04 | 161.95 | 0.4 | 85 | 0.93 | 6.8 | 1.08 | 4.52 | 0.13 | 3.53 | <0.005 | 0.348 | 0.62 | 66.0 | 4.6 | <0.01 | 1594 |
| 11 | Composite-11 DS148_21-35 | Pulp | 0.06 | 0.72 | 2.9 | 0.0073 | 20 | 18 | 1.79 | 0.28 | 1.62 | 0.05 | 121.64 | 0.4 | 88 | 0.83 | 3.0 | 0.97 | 3.88 | 0.22 | 4.50 | 0.01 | 0.114 | 0.62 | 50.8 | 4.0 | <0.01 | 228 |
| 12 | Composite-12 DS148_35-64 | Pulp | 0.06 | 0.54 | 3.2 | 0.0078 | 15 | 23 | 2.06 | 0.37 | 0.91 | 0.10 | 129.95 | 0.4 | 101 | 0.80 | 2.7 | 1.07 | 3.27 | 0.19 | 5.24 | <0.005 | 0.077 | 0.44 | 54.9 | 13.3 | <0.01 | 98 |
| 13 | Composite-13 DS148_66.6-67.54 | Pulp | 0.05 | 0.32 | 2.5 | 0.0070 | <10 | 288 | 1.69 | 0.24 | 0.28 | 0.23 | 138.34 | 0.5 | 75 | 6.75 | 3.4 | 0.91 | 4.16 | 0.08 | 4.49 | <0.005 | 0.120 | 0.20 | 59.3 | 4.1 | 0.01 | 89 |
| 14 | Composite-14 DS148_67.54-69.46 | Pulp | 0.17 | 1.84 | 2.3 | 0.0067 | 105 | 574 | 1.91 | 0.71 | 5.43 | 0.19 | 100.32 | 0.5 | 101 | 8.61 | 5.7 | 0.45 | 9.12 | 0.13 | 4.43 | <0.005 | 0.144 | 1.60 | 43.0 | 87.9 | 0.02 | 197 |
| 15 | Composite-15 DS148_67.46-71.31 | Pulp | 0.05 | 1.48 | 1.6 | 0.0125 | 642 | 400 | 1.83 | 0.23 | 8.71 | 0.27 | 58.90 | 0.7 | 102 | 9.39 | 11.6 | 0.32 | 7.89 | 0.07 | 2.96 | <0.005 | 0.129 | 1.37 | 25.2 | 56.6 | 0.03 | 81 |
| 16 | Composite-16 DS148_72.11-73.06 | Pulp | 0.04 | 1.95 | 1.8 | 0.0038 | 118 | 133 | 3.24 | 0.20 | 4.79 | 0.98 | 99.05 | 0.8 | 156 | 2.66 | 38.1 | 0.83 | 9.45 | 0.12 | 1.99 | 0.01 | 0.143 | 1.21 | 43.3 | 374.4 | <0.01 | 142 |
| 16D | Composite-16-DUP DS148_82-83 | Pulp | 0.04 | 0.75 | 2.0 | 0.0029 | 25 | 27 | 1.20 | 0.21 | 1.55 | 0.18 | 122.18 | 0.4 | 126 | 1.27 | 2.4 | 1.07 | 4.05 | 0.08 | 1.95 | <0.005 | 0.117 | 0.64 | 54.9 | 42.1 | <0.01 | 170 |
| 17 | Composite-17 DS150 4.4-5 | Pulp | 0.07 | 0.24 | 2.3 | 0.0067 | <10 | 82 | 1.30 | 0.45 | 1.08 | 0.20 | 133.05 | 0.4 | 100 | 0.74 | 6.9 | 1.02 | 2.14 | 0.09 | 4.31 | <0.005 | 0.139 | 0.16 | 55.9 | 9.5 | <0.01 | 296 |
| 18 | Composite-18 DS150_5-13 | Pulp | 0.05 | 0.14 | 2.3 | 0.0062 | <10 | 87 | 1.21 | 0.47 | 0.37 | 0.13 | 137.86 | 0.4 | 96 | 0.88 | 2.9 | 1.11 | 1.77 | 0.12 | 3.65 | <0.005 | 0.089 | 0.08 | 58.7 | 5.2 | <0.01 | 131 |
| 19 | Composite-19 DS150_14.25-20 | Pulp | 0.05 | 1.53 | 2.2 | 0.0158 | 1808 | 52 | 1.28 | 0.24 | 15.18 | 0.25 | 61.87 | 0.8 | 64 | 1.79 | 41.4 | 0.39 | 5.82 | 0.22 | 1.98 | 0.01 | 0.165 | 1.16 | 30.1 | 151.3 | <0.01 | 406 |
| 20 | Composite-20 DS150_20-23.3 | Pulp | 0.23 | 2.19 | 2.2 | 0.0057 | 171 | 53 | 2.06 | 0.19 | 8.97 | 0.26 | 92.11 | 0.8 | 86 | 4.33 | 21.2 | 0.60 | 9.46 | 0.19 | 3.09 | 0.01 | 0.096 | 1.96 | 44.4 | 194.5 | <0.01 | 255 |
| 21 | Composite-21 DS150_23.3-25.7 | Pulp | 0.05 | 0.52 | 0.8 | 0.0052 | 4324 | 31 | 0.21 | 0.08 | 15.20 | 0.02 | 14.64 | 0.4 | 26 | 0.57 | 4.9 | 0.07 | 1.18 | 0.08 | 0.96 | <0.005 | 0.027 | 0.13 | 6.6 | 31.9 | <0.01 | 29 |
| 21D | Composite-21-DUP DS150_30.5-32 | Pulp | 0.08 | 1.67 | 2.5 | 0.0041 | 32 | 49 | 2.58 | 0.27 | 3.47 | 0.21 | 129.62 | 0.5 | 107 | 8.45 | 16.6 | 1.11 | 9.05 | 0.16 | 3.86 | 0.01 | 0.178 | 1.37 | 58.2 | 138.4 | 0.02 | 346 |
| 22 | Composite-22 DS150_30.07-33.96 | Pulp | 0.27 | 0.57 | 3.4 | 0.0070 | 16 | 50 | 1.48 | 0.18 | 0.71 | 0.24 | 128.89 | 0.5 | 140 | 1.78 | 6.7 | 0.70 | 3.40 | 0.08 | 4.26 | 0.01 | 0.069 | 0.43 | 59.7 | 44.8 | <0.01 | 187 |
| 23 | Composite-23 DS150_35.3-40 | Pulp | 0.05 | 0.16 | 2.5 | 0.0037 | 13 | 56 | 1.60 | 0.21 | 1.13 | 0.09 | 108.06 | 0.3 | 94 | 0.73 | 4.0 | 0.95 | 1.58 | 0.07 | 2.28 | 0.01 | 0.143 | 0.08 | 49.6 | 10.2 | <0.01 | 331 |
| 24 | Composite-24 DS155 4-4.5 | Pulp | 0.06 | 0.22 | 4.0 | 0.0078 | <10 | 13 | 2.46 | 0.42 | 0.32 | 0.15 | 114.72 | 0.4 | 110 | 1.09 | 14.2 | 1.28 | 2.15 | 0.10 | 5.10 | <0.005 | 0.082 | 0.14 | 50.4 | 1.5 | <0.01 | 62 |
| 25 | Composite-25 DS155 5-21 | Pulp | 0.10 | 0.15 | 5.0 | 0.0068 | <10 | 18 | 2.10 | 0.49 | 0.28 | 0.07 | 142.39 | 0.4 | 94 | 0.75 | 5.5 | 1.19 | 2.09 | 0.11 | 4.21 | <0.005 | 0.108 | 0.10 | 62.4 | 3.4 | <0.01 | 118 |
| 26 | Composite-26 DS155_21-25 | Pulp | 0.07 | 0.31 | 4.0 | 0.0048 | 14 | 30 | 2.01 | 0.56 | 0.55 | 0.05 | 134.95 | 0.5 | 101 | 0.71 | 2.9 | 1.19 | 2.77 | 0.17 | 3.65 | <0.005 | 0.121 | 0.21 | 59.8 | 8.0 | <0.01 | 160 |
| 27 | Composite-27 DS155_25-60 | Pulp | 0.05 | 0.29 | 3.4 | 0.0067 | <10 | 36 | 1.58 | 0.30 | 0.74 | 0.05 | 124.93 | 0.4 | 111 | 0.74 | 2.2 | 1.03 | 2.35 | 0.07 | 4.46 | <0.005 | 0.109 | 0.19 | 55.8 | 11.0 | <0.01 | 170 |
| 28 | Composite-28 DS155_62.2-69.2 | Pulp | 0.13 | 2.60 | 7.8 | 0.0058 | 160 | 95 | 3.37 | 0.32 | 12.60 | 0.39 | 140.38 | 0.8 | 99 | 1.91 | 6.1 | 0.34 | 11.52 | 0.18 | 3.31 | 0.01 | 0.288 | 1.96 | 65.1 | 44.1 | <0.01 | 180 |
| 29 | Composite-29 DS155 69.2-72.3 | Pulp | 0.07 | 2.36 | 3.4 | 0.0050 | 44 | 86 | 2.46 | 0.20 | 7.41 | 0.12 | 119.02 | 0.7 | 108 | 1.76 | 4.3 | 0.43 | 9.50 | 0.15 | 2.96 | <0.005 | 0.059 | 1.97 | 54.6 | 14.6 | <0.01 | 145 |
| 30 | Composite-30 DS155_72.3-78 | Pulp | 0.25 | 1.92 | 3.4 | 0.0113 | 527 | 2380 | 2.36 | 2.04 | 15.71 | 0.21 | 96.57 | 0.6 | 78 | 2.07 | 6.7 | 0.29 | 7.94 | 0.14 | 2.62 | 0.01 | 0.309 | 1.58 | 43.2 | 23.6 | <0.01 | 944 |
| 31 | Composite-31 DS155_78-79.7 | Pulp | 0.69 | 1.35 | 6.2 | 0.0036 | <10 | 2770 | 1.79 | 6.31 | 4.61 | 0.14 | 127.89 | 0.6 | 117 | 3.94 | 4.5 | 0.58 | 5.65 | 0.10 | 2.75 | <0.005 | 0.259 | 1.33 | 57.7 | 41.5 | <0.01 | 744 |
| 32 | Composite-32 DS151_3.4-4 | Pulp | 0.27 | 1.16 | 4.8 | 0.0050 | <10 | 92 | 2.38 | 0.44 | 2.33 | 0.09 | 131.12 | 0.6 | 106 | 1.89 | 3.8 | 1.08 | 5.76 | 0.09 | 3.27 | 0.01 | 0.110 | 0.93 | 58.4 | 27.4 | <0.01 | 221 |
| 33 | Composite-33 DS151_3.4-4 | Pulp | 0.05 | 0.20 | 4.1 | 0.0045 | <10 | 28 | 2.16 | 0.31 | 0.30 | 0.27 | 133.65 | 0.6 | 126 | 1.24 | 3.7 | 1.09 | 2.05 | 0.09 | 2.35 | 0.01 | 0.075 | 0.13 | 61.7 | 12.4 | <0.01 | 184 |
| 34 | Composite-34 DS151_4-19.8 | Pulp | 0.08 | 0.94 | 3.2 | 0.0048 | 15 | 55 | 2.15 | 0.44 | 1.36 | 0.50 | 122.43 | 0.5 | 101 | 2.06 | 4.0 | 1.10 | 4.98 | 0.26 | 3.35 | 0.01 | 0.109 | 0.77 | 57.6 | 26.7 | <0.01 | 247 |
| 35 | Composite-35 DS151_19.8-26.12 | Pulp | 0.33 | 2.41 | 4.2 | 0.0079 | 116 | 92 | 2.93 | 0.27 | 9.69 | 0.49 | 95.89 | 0.5 | 99 | 2.73 | 16.9 | 0.64 | 10.37 | 0.14 | 4.47 | 0.01 | 0.167 | 1.94 | 46.5 | 124.3 | <0.01 | 414 |
| 36 | Composite-36 DS151_26.12-35 | Pulp | 0.09 | 2.21 | 3.1 | 0.0045 | 24 | 52 | 2.72 | 0.46 | 5.50 | 0.19 | 106.30 | 0.6 | 109 | 1.90 | 5.7 | 0.94 | 9.78 | 0.12 | 3.30 | <0.005 | 0.091 | 1.78 | 51.6 | 89.2 | <0.01 | 203 |
| 36D | Composite-36-DUP DS151_40-41 | Pulp | 0.07 | 0.79 | 2.0 | 0.0052 | <10 | 30 | 3.15 | 0.21 | 2.18 | 0.07 | 115.34 | 0.6 | 121 | 3.08 | 2.4 | 1.13 | 4.39 | 0.08 | 3.44 | 0.01 | 0.207 | 0.60 | 50.8 | 18.2 | <0.01 | 371 |
| 37 | Composite-37 DS157_6.41-7.0 | Pulp | 0.38 | 0.54 | 30.4 | 0.0063 | <10 | 14 | 1.30 | 1.56 | 0.64 | 0.22 | 118.33 | 1.2 | 117 | 5.34 | 3.3 | 1.01 | 5.21 | 0.08 | 4.65 | 0.01 | 0.128 | 0.34 | 52.4 | 8.4 | 0.02 | 312 |
| 38 | Composite-38 DS157_7-21 | Pulp | 0.22 | 0.42 | 16.6 | 0.0053 | <10 | 209 | 1.27 | 0.86 | 0.46 | 0.13 | 124.45 | 0.8 | 117 | 2.87 | 3.1 | 1.02 | 3.50 | 0.06 | 3.38 | 0.01 | 0.109 | 0.19 | 55.7 | 23.8 | 0.01 | 346 |
| 39 | Composite-39 DS157_21-36 | Pulp | 0.05 | 0.41 | 4.0 | 0.0041 | <10 | 35 | 1.80 | 0.40 | 0.65 | 0.29 | 134.14 | 0.5 | 143 | 0.92 | 4.0 | 0.89 | 2.87 | 0.07 | 2.91 | 0.01 | 0.086 | 0.26 | 60.3 | 18.9 | <0.01 | 152 |
| 40 | Composite-40 DS157_39-45.0 | Pulp | 0.54 | 2.34 | 5.3 | 0.0068 | 50 | 61 | 3.36 | 0.28 | 8.02 | 0.38 | 108.82 | 0.5 | 89 | 3.54 | 9.0 | 0.62 | 10.70 | 0.12 | 5.02 | 0.01 | 0.198 | 1.85 | 48.4 | 97.8 | <0.01 | 553 |
| 41 | Composite-41 DS157_50-55 | Pulp | 0.27 | 1.62 | 5.0 | 0.0065 | 11 | 42 | 2.76 | 1.04 | 3.17 | 0.37 | 129.04 | 0.5 | 108 | 1.68 | 7.1 | 0.74 | 7.72 | 0.13 | 4.25 | <0.005 | 0.064 | 1.25 | 58.8 | 99.5 | <0.01 | 253 |
| 41D | Composite-41-DUP DS157_60-61 | Pulp | 0.19 | 1.60 | 4.4 | 0.0048 | <10 | 92 | 3.17 | 0.31 | 3.47 | 0.14 | 122.95 | 0.5 | 106 | 2.29 | 8.7 | 0.72 | 7.32 | 0.18 | 3.16 | 0.01 | 0.080 | 1.21 | 56.1 | 68.2 | <0.01 | 192 |
| 42 | Composite-42 DS153_3-3.5 | Pulp | 0.07 | 1.07 | 2.4 | 0.0034 | <10 | 13 | 1.77 | 0.24 | 1.86 | 0.05 | 120.31 | 0.5 | 103 | 1.33 | 3.3 | 0.70 | 5.00 | 0.20 | 2.11 | <0.005 | 0.050 | 0.86 | 58.9 | 15.1 | <0.01 | 60 |
| 43 | Composite-43 DS153 3-20.9 | Pulp | 0.12 | 1.70 | 3.0 | 0.0040 | <10 | 27 | 2.83 | 0.42 | 3.17 | 0.10 | 130.42 | 0.7 | 107 | 8.25 | 4.8 | 0.86 | 10.73 | 0.11 | 3.28 | 0.01 | 0.116 | 1.19 | 65.2 | 19.9 | 0.03 | 148 |
| 44 | Composite-44 DS153_23-26 | Pulp | 0.15 | 2.31 | 2.9 | 0.0053 | 47 | 65 | 2.13 | 0.85 | 6.72 | 0.44 | 99.84 | 0.6 | 142 | 4.21 | 29.1 | 0.83 | 10.31 | 0.12 | 4.21 | 0.03 | 0.295 | 1.90 | 50.8 | 125.5 | <0.01 | 323 |
| 45 | Composite-45 DS153_26_34.4 | Pulp | 0.13 | 1.97 | 3.5 | 0.0146 | 940 | 159 | 1.35 | 0.61 | 14.15 | 0.41 | 68.57 | 0.7 | 77 | 2.06 | 23.2 | 0.57 | 7.81 | 0.07 | 2.23 | 0.01 | 0.218 | 1.63 | 33.4 | 171.9 | <0.01 | 988 |
| 46 | Composite-46 DS153_36_51 | Pulp | 0.04 | 0.88 | 3.9 | 0.0026 | 12 | 32 | 1.41 | 0.22 | 0.90 | 0.16 | 110.06 | 0.6 | 138 | 1.03 | 7.1 | 1.28 | 5.07 | 0.10 | 2.18 | 0.01 | 0.088 | 0.40 | 65.6 | 17.5 | <0.01 | 156 |
| 47 | Composite-47 DS154 5.4-6 | Pulp | 0.59 | 0.18 | 7.3 | 0.0159 | <10 | 28 | 5.50 | 1.59 | 0.24 | 0.10 | 268.77 | 0.8 | 97 | 1.70 | 6.5 | 2.33 | 3.70 | 0.14 | 4.93 | 0.01 | 0.165 | 0.09 | 115.3 | 8.2 | <0.01 | 119 |
| 48 | Composite-48 DS154_6-21 | Pulp | 0.12 | 0.30 | 5.2 | 0.0033 | <10 | 46 | 0.91 | 0.33 | 0.33 | 0.05 | 95.05 | 0.7 | 100 | 7.52 | 3.3 | 1.08 | 4.33 | 0.06 | 2.60 | <0.005 | 0.106 | 0.20 | 41.9 | 4.4 | 0.01 | 242 |
| 49 | Composite-49 DS154_21-41 | Pulp | 0.10 | 0.61 | 4.1 | 0.0062 | 14 | 61 | 1.58 | 0.64 | 0.91 | 0.07 | 129.06 | 1.0 | 81 | 5.10 | 3.4 | 0.94 | 5.70 | 0.11 | 4.76 | 0.01 | 0.136 | 0.44 | 57.3 | 12.2 | 0.01 | 297 |
| 50 | Composite-50 DS154 41-61 | Pulp | 0.08 | 0.62 | 3.3 | 0.0072 | 12 | 201 | 1.70 | 0.47 | 1.23 | 0.06 | 148.74 | 0.6 | 99 | 1.11 | 2.7 | 0.74 | 3.48 | 0.17 | 5.39 | <0.005 | 0.117 | 0.50 | 66.6 | 13.1 | <0.01 | 179 |
| 51 | Composite-51 DS154_61.5-67 | Pulp | 0.32 | 1.65 | 3.6 | 0.0082 | 718 | 568 | 3.68 | 0.74 | 12.17 | 0.23 | 103.62 | 0.5 | 58 | 1.98 | 15.2 | 0.46 | 7.31 | 0.27 | 1.60 | 0.01 | 0.125 | 1.27 | 52.6 | 32.9 | <0.01 | 230 |
| 52 | Composite-52 DS154 67-72.6 | Pulp | 0.06 | 1.62 | 3.0 | 0.0044 | 37 | 61 | 2.76 | 0.57 | 6.44 | 0.21 | 129.19 | 0.5 | 96 | 2.00 | 5.0 | 1.02 | 7.76 | 0.30 | 3.98 | <0.005 | 0.206 | 1.30 | 57.0 | 24.6 | <0.01 | 524 |

| S. No. | Sample ID | Method | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | Silver (Ag) | Aluminum (Al) | Arsenic (As) | Gold (Au) | Boron (B) | Barium (Ba) | Beryllium (Be) | Bismuth (Bi) | Calcium (Ca) | Cadmium (Cd) | Cerium (Ce) | Cobalt (Co) | Chromium (Cr) | Cesium (Cs) | Copper (Cu) | Iron (Fe) | Gallium (Ga) | Germanium (Ge) | Hafnium (Hf) | Mercury (Hg) | Indium (In) | Potassium (K) | Lanthanum (La) | Lithium (Li) | Magnesium (Mg) | Manganese (Mn) |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | % | ppm |
| | | MDL | 0.01 | 0.01 | 0.1 | 0.0005 | 10 | 10 | 0.05 | 0.01 | 0.01 | 0.01 | 0.02 | 0.1 | 1 | 0.05 | 0.2 | 0.01 | 0.05 | 0.05 | 0.02 | 0.005 | 0.005 | 0.01 | 0.2 | 0.1 | 0.01 | 5 |
| | | Sample Type | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 53 | Composite-53_DS154_72.6-75.62 | Pulp | 0.03 | 1.02 | 2.6 | 0.0029 | 13 | 42 | 1.88 | 0.31 | 3.42 | 0.12 | 126.39 | 0.5 | 112 | 1.89 | 4.4 | 0.86 | 4.89 | 0.17 | 2.26 | <0.005 | 0.139 | 0.91 | 56.5 | 24.0 | <0.01 | 280 |
| 54 | Composite-54_DS164_3.86-4.36 | Pulp | 0.29 | 0.67 | 3.4 | 0.0041 | 12 | 47 | 1.38 | 0.39 | 0.85 | 0.12 | 104.26 | 0.4 | 88 | 0.87 | 13.0 | 0.93 | 4.59 | 0.13 | 3.29 | 0.01 | 0.081 | 0.36 | 52.9 | 9.6 | <0.01 | 288 |
| 55 | Composite-55_DS164_5-21 | Pulp | 0.22 | 0.65 | 3.5 | 0.0047 | <10 | 40 | 1.14 | 0.40 | 0.68 | 0.14 | 114.55 | 0.4 | 92 | 0.80 | 16.7 | 1.02 | 4.50 | 0.13 | 2.90 | 0.01 | 0.093 | 0.22 | 57.5 | 14.6 | <0.01 | 215 |
| 56 | Composite-56_DS164_31-38 | Pulp | 0.21 | 1.67 | 6.9 | 0.0025 | <10 | 50 | 0.65 | 0.72 | 0.67 | 0.07 | 153.20 | 0.8 | 82 | 0.93 | 13.5 | 0.98 | 11.70 | 0.17 | 1.21 | 0.01 | 0.159 | 0.05 | 96.6 | 16.2 | <0.01 | 327 |
| 57 | Composite-57_DS164_39.0-41.08 | Pulp | 0.19 | 2.14 | 5.6 | 0.0032 | 19 | 57 | 1.26 | 2.12 | 2.73 | 0.09 | 151.41 | 0.9 | 120 | 1.80 | 15.8 | 1.07 | 10.69 | 0.25 | 2.41 | 0.01 | 0.348 | 1.04 | 92.8 | 61.7 | <0.01 | 275 |
| 58 | Composite-58_DS164_41.08-43.0 | Pulp | 0.16 | 0.46 | 4.0 | 0.0041 | 17 | 65 | 1.63 | 1.49 | 0.54 | 0.26 | 130.89 | 0.7 | 110 | 1.11 | 15.2 | 1.31 | 3.23 | 0.19 | 3.01 | <0.005 | 0.134 | 0.23 | 61.4 | 16.4 | <0.01 | 453 |
| 59 | Composite-59_DS165_2.85-3.35 | Pulp | 0.14 | 0.18 | 4.4 | 0.0044 | <10 | 10 | 1.13 | 0.87 | 0.18 | 0.07 | 109.88 | 0.8 | 136 | 1.48 | 6.2 | 1.13 | 2.36 | 0.08 | 3.18 | 0.01 | 0.097 | 0.12 | 51.3 | 5.9 | <0.01 | 113 |
| 60 | Composite-60_DS165_3.35_17.0 | Pulp | 0.17 | 0.19 | 5.4 | 0.0046 | <10 | <10 | 1.27 | 0.79 | 0.25 | 0.08 | 134.85 | 0.6 | 121 | 1.40 | 3.9 | 1.23 | 2.34 | 0.11 | 3.50 | <0.005 | 0.107 | 0.13 | 60.5 | 5.5 | <0.01 | 120 |
| 61 | Composite-61_DS165_18_32.0 | Pulp | 0.05 | 0.36 | 3.4 | 0.0052 | 10 | 18 | 1.91 | 0.32 | 0.86 | 0.39 | 133.43 | 0.5 | 110 | 1.10 | 5.8 | 1.08 | 3.02 | 0.12 | 3.30 | 0.01 | 0.123 | 0.26 | 59.6 | 10.2 | <0.01 | 188 |
| 62 | Composite-62_DS165_32.0-48.0 | Pulp | 0.08 | 0.43 | 4.1 | 0.0050 | 10 | 28 | 1.86 | 0.59 | 0.60 | 0.58 | 133.52 | 0.8 | 114 | 4.53 | 10.2 | 0.98 | 5.33 | 0.10 | 3.62 | <0.005 | 0.109 | 0.23 | 57.1 | 14.2 | 0.02 | 126 |
| 63 | Composite-63_DS165_61.90-64 | Pulp | 0.06 | 2.07 | 2.5 | 0.0068 | 355 | 57 | 2.04 | 0.27 | 11.75 | 0.15 | 112.86 | 0.7 | 124 | 2.00 | 9.9 | 0.85 | 9.02 | 0.26 | 3.18 | 0.01 | 0.082 | 1.90 | 53.2 | 157.2 | <0.01 | 195 |
| 64 | Composite-64_DS165_64.0-67.0 | Pulp | 0.05 | 1.85 | 2.7 | 0.0035 | 26 | 38 | 1.77 | 0.28 | 4.13 | 0.14 | 136.12 | 0.4 | 94 | 1.98 | 3.6 | 0.98 | 8.71 | 0.22 | 3.26 | <0.005 | 0.069 | 1.53 | 68.9 | 42.7 | <0.01 | 93 |
| 65 | Composite-65_DS165_76.42-79.0 | Pulp | 0.38 | 0.94 | 4.7 | 0.0027 | <10 | 32 | 1.81 | 0.34 | 1.57 | 0.16 | 131.38 | 0.9 | 128 | 2.12 | 12.1 | 1.01 | 5.09 | 0.15 | 2.61 | 0.01 | 0.071 | 0.71 | 59.2 | 32.7 | <0.01 | 160 |
| 66 | Composite-66_DS169_62-65 | Pulp | 0.17 | 1.69 | 2.6 | 0.0091 | 929 | 101 | 1.09 | 0.43 | 11.85 | 0.32 | 69.42 | 0.6 | 73 | 2.13 | 7.8 | 0.47 | 7.21 | 0.16 | 2.51 | 0.01 | 0.184 | 1.44 | 32.5 | 142.7 | <0.01 | 545 |
| 67 | Composite-67_DS169_65-75 | Pulp | 0.19 | 1.67 | 3.4 | 0.0040 | 17 | 64 | 1.13 | 0.39 | 2.58 | 0.28 | 121.23 | 0.5 | 97 | 8.22 | 7.1 | 1.04 | 9.84 | 0.18 | 3.92 | 0.01 | 0.190 | 1.05 | 63.5 | 44.6 | 0.02 | 332 |
| 68 | Composite-68_DS144_9.65_10.0 | Pulp | 0.03 | 0.18 | 3.2 | 0.0044 | <10 | 13 | 1.30 | 0.21 | 0.26 | 0.07 | 162.31 | 0.4 | 98 | 0.75 | 2.7 | 1.07 | 2.19 | 0.14 | 2.83 | <0.005 | 0.059 | 0.12 | 71.4 | 3.1 | <0.01 | 37 |
| 69 | Composite-69_DS144_10.0_24.0 | Pulp | 0.06 | 0.18 | 4.2 | 0.0065 | <10 | 19 | 1.67 | 0.29 | 0.23 | 0.10 | 120.40 | 0.5 | 117 | 0.93 | 4.0 | 1.11 | 1.86 | 0.11 | 4.29 | 0.01 | 0.098 | 0.11 | 53.9 | 0.8 | <0.01 | 42 |
| 70 | Composite-70_DS144_24.0-33.0 | Pulp | 0.03 | 0.64 | 3.1 | 0.0055 | <10 | 31 | 1.92 | 0.14 | 0.98 | 0.09 | 139.90 | 0.4 | 108 | 2.22 | 3.1 | 1.12 | 3.89 | 0.15 | 4.14 | <0.005 | 0.079 | 0.51 | 62.1 | 1.5 | <0.01 | 49 |
| 71 | Composite-71_DS144_34.44-36.42 | Pulp | 0.07 | 1.30 | 3.5 | 0.0088 | 698 | 1069 | 1.81 | 0.17 | 9.98 | 1.95 | 57.20 | 0.5 | 98 | 7.73 | 5.9 | 0.47 | 6.32 | 0.15 | 2.75 | 0.03 | 0.128 | 1.21 | 26.0 | 47.1 | 0.02 | 91 |
| 72 | Composite-72_DS144_37.0_38.0 | Pulp | 0.06 | 0.64 | 4.2 | 0.0096 | 11 | 84 | 2.01 | 0.38 | 1.07 | 0.30 | 130.51 | 0.5 | 137 | 1.28 | 3.7 | 0.94 | 3.57 | 0.12 | 4.05 | 0.01 | 0.062 | 0.50 | 58.4 | 7.3 | <0.01 | 41 |
| 73 | Composite-73_DS145_9.33_10.0 | Pulp | 0.07 | 0.38 | 4.2 | 0.0054 | <10 | 20 | 2.30 | 0.33 | 0.77 | 0.04 | 161.98 | 0.5 | 85 | 5.92 | 3.3 | 0.89 | 3.86 | 0.07 | 3.77 | 0.01 | 0.153 | 0.12 | 71.1 | 47.0 | <0.01 | 277 |
| 74 | Composite-74_DS145_10.0_24 | Pulp | 0.06 | 0.36 | 4.3 | 0.0056 | <10 | 20 | 2.32 | 0.29 | 0.73 | 0.04 | 156.17 | 0.5 | 73 | 6.24 | 3.1 | 0.96 | 3.66 | 0.07 | 3.64 | <0.005 | 0.150 | 0.12 | 68.4 | 41.9 | <0.01 | 282 |
| 75 | Composite-75_DS145_24.0-38.0 | Pulp | 0.07 | 0.30 | 4.4 | 0.0065 | <10 | 13 | 2.13 | 0.14 | 0.20 | 0.03 | 120.46 | 0.4 | 94 | 1.53 | 3.5 | 1.32 | 3.70 | 0.09 | 4.03 | <0.005 | 0.091 | 0.06 | 52.2 | 12.4 | 0.01 | 123 |
| 76 | Composite-76_DS145_38.0-52.0 | Pulp | 0.25 | 0.30 | 12.7 | 0.0117 | <10 | 19 | 3.68 | 0.92 | 0.67 | 0.02 | 157.82 | 0.5 | 79 | 2.28 | 1.8 | 1.23 | 4.00 | 0.16 | 8.04 | 0.01 | 0.145 | 0.20 | 66.8 | 2.2 | 0.01 | 116 |
| 77 | Composite-77_DS145_91.48-93.52 | Pulp | 0.40 | 1.02 | 2.0 | 0.0160 | 1436 | 141 | 1.23 | 1.36 | 10.44 | 0.09 | 58.28 | 0.4 | 72 | 13.42 | 3.9 | 0.41 | 8.51 | 0.14 | 2.53 | <0.005 | 0.209 | 0.77 | 25.9 | 2.8 | 0.03 | 66 |
| ***QUALITY ASSURANCE / QUALITY CONTROL*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Composite-8_DS147_42-43 | Pulp | 0.13 | 1.67 | 3.4 | 0.0069 | 36 | 43 | 2.39 | 0.18 | 5.09 | 0.12 | 136.03 | 0.4 | 112 | 2.03 | 5.0 | 1.11 | 8.1 | 0.18 | 4.01 | 0.005 | 0.283 | 1.34 | 57.6 | 60.7 | <0.01 | 423 |
| 8R | Composite-8_DS147_42-43 (Rep) | Pulp | 0.2 | 1.70 | 3.6 | 0.0061 | 28 | 45 | 2.45 | 0.19 | 5.37 | 0.12 | 138.81 | 0.4 | 111 | 2.04 | 5.0 | 1.16 | 8 | 0.16 | 4.10 | 0.006 | 0.285 | 1.37 | 58.5 | 59.3 | <0.01 | 432 |
| | **%RPD** | | -42% | -2% | -6% | 12% | 25% | -5% | -2% | -5% | -5% | 0% | -2% | 0% | 1% | 0% | 0% | -4% | 1% | 12% | -2% | -18% | -1% | -2% | -2% | 2% | #VALUE! | -2% |
| 44 | Composite-44_DS153_23-26 | Pulp | 0.15 | 2.31 | 2.9 | 0.0053 | 47 | 65 | 2.13 | 0.85 | 6.72 | 0.44 | 99.84 | 0.6 | 142 | 4.21 | 29.1 | 0.83 | 10.31 | 0.12 | 4.21 | 0.026 | 0.295 | 1.90 | 50.8 | 125.5 | <0.01 | 323 |
| 44R | Composite-44_DS153_23-26 (Rep) | Pulp | 0.14 | 2.14 | 2.7 | 0.0054 | 50 | 61 | 1.98 | 0.79 | 6.35 | 0.46 | 95.52 | 0.6 | 134 | 3.99 | 27.4 | 0.78 | 9.6 | 0.16 | 3.99 | 0.029 | 0.273 | 1.76 | 48.9 | 114.3 | <0.01 | 304 |
| | **%RPD** | | 7% | 8% | 7% | -2% | -6% | 6% | 7% | 7% | 6% | -4% | 4% | 0% | 6% | 5% | 6% | 6% | 7% | -29% | 5% | -11% | 8% | 8% | 4% | 9% | #VALUE! | 6% |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 20a | | | 0.06 | 2.380 | 17.1 | 0.002 | <10 | 489 | 0.65 | 0.16 | 0.83 | 0.04 | 72.1 | 12.10 | 67.0 | 13.41 | 46.1 | 3.29 | 8.76 | 0.13 | 0.46 | <0.005 | 0.031 | 1.350 | 34.7 | 38.00 | 1.180 | 357 |
| **True Value STD OREAS 20a** | | | **0.06** | **2.367** | **17.2** | | | **487.193** | **0.65** | **0.14** | **0.83** | **0.04** | **71.7** | **12.46** | **66.6** | **13.46** | **45.9** | **3.27** | **8.77** | **0.18** | **0.46** | | **0.030** | **1.347** | **34.8** | **37.74** | **1.173** | **358** |
| % Difference | | | -1% | 1% | 0% | | | 0% | 1% | 12% | 0% | 11% | 1% | -3% | 1% | 0% | 1% | 1% | 0% | -28% | 0% | | 4% | 0% | 0% | 1% | 1% | 0% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.01 | <0.01 | <0.1 | <0.0005 | <10 | <10 | <0.05 | <0.01 | <0.01 | <0.01 | <0.02 | <0.1 | <1 | <0.05 | <0.2 | <0.01 | <0.05 | <0.05 | <0.02 | <0.005 | <0.005 | <0.01 | <0.2 | <0.1 | <0.01 | <5 |

***Notes:***
Job No: YVR2511292

***Analytical Methods (IMS-130):***
A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

***Abbreviations:***
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

***On Cerfified Reference Material and Tolerance:***
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

**CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS**

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No. | Sample ID | Method | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | Molybdenum (Mo) | Sodium (Na) | Niobium (Nb) | Nickel (Ni) | Phosphorous (P) | Lead (Pb) | Rubidium (Rb) | Rhenium (Re) | Sulphur (S) | Antimony (Sb) | Scandium (Sc) | Selenium (Se) | Tin (Sn) | Stronium (Sr) | Tantalum (Ta) | Tellurium (Te) | Thorium (Th) | Titanium (Ti) | Thallium (Tl) | Uranium (U) | Vanadium (V) | Tungsten (W) | Yttrium (Y) | Zinc (Zn) | Zirconium (Zr) |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| | | MDL | 0.05 | 0.01 | 0.05 | 0.2 | 10 | 0.2 | 0.1 | 0.001 | 0.01 | 0.05 | 0.1 | 0.2 | 0.2 | 0.2 | 0.01 | 0.01 | 0.2 | 0.005 | 0.02 | 0.05 | 1 | 0.05 | 0.05 | 1 | 0.5 |
| | | Sample Typ | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Composite-1 DS147 7.23-7.5 | Pulp | 2.45 | 0.38 | 45.04 | 1.6 | <10 | 8.9 | 59.5 | 0.002 | <0.01 | 1.11 | 0.8 | <0.2 | 8.2 | 3.8 | 0.02 | 0.04 | 20.9 | 0.025 | 0.35 | 5.18 | 1 | 2.86 | 110.70 | 9 | 146.7 |
| 2 | Composite-2 DS147_7.5-18 | Pulp | 2.32 | 0.27 | 43.25 | 1.5 | <10 | 10.9 | 42.2 | 0.002 | <0.01 | 1.03 | 0.7 | <0.2 | 7.3 | 3.4 | 0.02 | 0.03 | 18.5 | 0.025 | 0.27 | 4.30 | 2 | 2.32 | 93.75 | 11 | 119.9 |
| 3 | Composite-3 DS147 18-32 | Pulp | 2.03 | 0.07 | 36.26 | 1.4 | <10 | 39.9 | 17.8 | 0.002 | <0.01 | 0.84 | 0.5 | <0.2 | 8.4 | 3.3 | 0.02 | 0.07 | 17.4 | 0.027 | 0.11 | 4.12 | <1 | 2.61 | 69.50 | 112 | 104.6 |
| 4 | Composite-4 DS147_31-33.4 | Pulp | 2.39 | 0.31 | 34.18 | 2.2 | <10 | 399.5 | 189.0 | 0.002 | 0.07 | 1.1 | 3.3 | <0.2 | 6.3 | 32.4 | 0.22 | 0.04 | 13.0 | 0.021 | 0.91 | 7.44 | 1 | 4.02 | 121.35 | 120 | 136 |
| 5 | Composite-5 DS147_33.4-35.4 | Pulp | 1.59 | 0.55 | 2.91 | 1.1 | 12 | 161.1 | 11.6 | 0.002 | <0.01 | 0.31 | 5.5 | <0.2 | 0.9 | 33 | 0.2 | 0.01 | 0.9 | <0.005 | 0.05 | 14.85 | <1 | 1.75 | 154.59 | 23 | 39.7 |
| 6 | Composite-6 DS147_35.4-38.3 | Pulp | 2.65 | 0.47 | 35.98 | 1.7 | <10 | 246.1 | 121.5 | 0.002 | <0.01 | 0.83 | 2.4 | <0.2 | 6.4 | 9 | 0.04 | 0.03 | 14.8 | 0.023 | 0.77 | 3.30 | 1 | 3.36 | 179.94 | 88 | 108.8 |
| 7 | Composite-7 DS147 38.3-41.3 | Pulp | 2.98 | 0.48 | 48.42 | 1.6 | <10 | 31.0 | 89.3 | 0.003 | <0.01 | 1.02 | 1.2 | <0.2 | 8.5 | 8.9 | 0.02 | 0.03 | 19.2 | 0.03 | 0.62 | 4.24 | <1 | 3.33 | 161.42 | 29 | 122.3 |
| 8 | Composite-8 DS147_42-43 | Pulp | 2.91 | 0.61 | 49.76 | 1.7 | <10 | 9.0 | 97.2 | 0.003 | <0.01 | 1.26 | 1.4 | <0.2 | 8.2 | 11.3 | 0.03 | 0.03 | 19.2 | 0.027 | 0.7 | 4.10 | 2 | 3.3 | 209.67 | 11 | 115.2 |
| 8D | Composite-8-DUP DS147_46-47 | Pulp | 4.54 | 0.45 | 40.84 | 1.8 | <10 | 10.9 | 109.5 | 0.002 | <0.01 | 0.84 | 1.0 | <0.2 | 7.8 | 8.8 | 0.02 | 0.03 | 24.3 | 0.022 | 0.62 | 4.71 | 1 | 3.37 | 167.53 | 23 | 64.5 |
| 9 | Composite-9 DS148_7-7.5 | Pulp | 2.10 | 0.33 | 44.25 | 1.3 | 15 | 12.9 | 53.0 | 0.003 | <0.01 | 1.05 | 0.9 | <0.2 | 7.5 | 8.1 | 0.03 | 0.02 | 24.8 | 0.017 | 0.26 | 6.04 | <1 | 1.98 | 176.62 | 25 | 91 |
| 10 | Composite-10 DS148 7.5-20 | Pulp | 2.37 | 0.28 | 57.49 | 1.5 | 10 | 14.9 | 45.9 | 0.004 | <0.01 | 1.79 | 0.9 | <0.2 | 10.4 | 8.5 | 0.03 | 0.03 | 22.8 | 0.021 | 0.23 | 4.87 | <1 | 3.31 | 182.21 | 12 | 98.3 |
| 11 | Composite-11 DS148_21-35 | Pulp | 2.37 | 0.27 | 37.91 | 1.5 | <10 | 13.0 | 41.4 | 0.001 | <0.01 | 1.17 | 0.8 | <0.2 | 6.6 | 4.1 | 0.02 | 0.03 | 16.4 | 0.021 | 0.24 | 4.33 | <1 | 3.03 | 99.08 | 11 | 123.1 |
| 12 | Composite-12 DS148_35-64 | Pulp | 2.49 | 0.20 | 47.07 | 1.7 | <10 | 17.6 | 30.5 | 0.002 | <0.01 | 1.23 | 0.6 | <0.2 | 9.2 | 3.5 | 0.02 | 0.03 | 19.9 | 0.025 | 0.21 | 4.83 | <1 | 2.44 | 86.44 | 14 | 145.5 |
| 13 | Composite-13 DS148_66.6-67.54 | Pulp | 2.17 | 0.03 | 24.90 | 1.4 | <10 | 20.8 | 32.2 | 0.002 | <0.01 | 0.61 | 0.5 | <0.2 | 8.2 | 4.7 | 0.04 | 0.03 | 21.0 | 0.022 | 0.11 | 5.05 | <1 | 3.12 | 72.93 | 42 | 120.7 |
| 14 | Composite-14 DS148 67.54-69.46 | Pulp | 2.43 | 0.26 | 22.58 | 1.7 | <10 | 57.8 | 142.8 | 0.002 | 0.02 | 0.47 | 1.4 | <0.2 | 4.2 | 17.1 | 0.02 | 0.03 | 12.3 | 0.01 | 0.73 | 3.53 | <1 | 1.66 | 166.45 | 43 | 122.5 |
| 15 | Composite-15 DS148_67.46-71.31 | Pulp | 2.14 | 0.13 | 14.01 | 1.8 | <10 | 29.6 | 135.9 | 0.002 | 0.01 | 0.34 | 2.6 | <0.2 | 2.7 | 16.9 | 0.33 | 0.02 | 7.8 | 0.006 | 0.61 | 3.08 | 1 | 0.97 | 138.06 | 121 | 84.5 |
| 16 | Composite-16 DS148 72.11-73.06 | Pulp | 2.72 | 0.30 | 31.90 | 2.5 | <10 | 34.3 | 92.1 | 0.002 | <0.01 | 0.67 | 1.1 | <0.2 | 7.4 | 6 | 0.02 | 0.02 | 18.1 | 0.018 | 0.51 | 2.44 | <1 | 2.77 | 137.16 | 247 | 50.5 |
| 16D | Composite-16-DUP DS148_82-83 | Pulp | 3.08 | 0.20 | 21.03 | 1.8 | <10 | 9.5 | 46.5 | 0.001 | <0.01 | 1.1 | 0.7 | <0.2 | 4.8 | 5.1 | 0.01 | 0.02 | 10.2 | 0.02 | 0.21 | 2.09 | 2 | 2.73 | 67.99 | 12 | 62.8 |
| 17 | Composite-17 DS150 4.4-5 | Pulp | 2.78 | 0.10 | 35.59 | 1.6 | <10 | 15.6 | 11.0 | 0.002 | <0.01 | 0.8 | 0.6 | <0.2 | 9.2 | 4.8 | 0.02 | 0.03 | 20.0 | 0.029 | 0.09 | 5.43 | <1 | 1.88 | 67.07 | 16 | 114.4 |
| 18 | Composite-18 DS150_5-13 | Pulp | 2.42 | 0.06 | 39.57 | 1.5 | <10 | 22.7 | 6.8 | 0.002 | <0.01 | 1.05 | 0.5 | <0.2 | 9.1 | 3.1 | 0.04 | 0.03 | 22.1 | 0.029 | 0.06 | 4.34 | <1 | 2.31 | 54.63 | 19 | 96.6 |
| 19 | Composite-19 DS150 14.25-20 | Pulp | 1.80 | 0.46 | 16.78 | 1.4 | 41 | 210.5 | 73.3 | 0.002 | <0.01 | 0.47 | 5.5 | <0.2 | 2.7 | 26.8 | 0.58 | 0.01 | 5.2 | 0.009 | 0.42 | 2.15 | 1 | 1.42 | 215.88 | 77 | 59.5 |
| 20 | Composite-20 DS150_20-23.3 | Pulp | 2.57 | 0.25 | 37.23 | 1.6 | 21 | 72.2 | 138.9 | 0.002 | <0.01 | 0.72 | 2.4 | <0.2 | 7.1 | 11.4 | 0.09 | 0.02 | 13.5 | 0.016 | 0.64 | 3.38 | 2 | 5.08 | 128.92 | 56 | 81.1 |
| 21 | Composite-21 DS150_23.3-25.7 | Pulp | 0.73 | 0.71 | 2.53 | 0.7 | 36 | 23.7 | 5.6 | <0.001 | <0.01 | 0.19 | 5.3 | <0.2 | 0.6 | 47.2 | 0.18 | <0.01 | 0.5 | <0.005 | <0.02 | 0.40 | 1 | 0.54 | 186.02 | 8 | 35.4 |
| 21D | Composite-21-DUP DS150_30.5-32 | Pulp | 2.89 | 0.14 | 63.31 | 1.8 | 14 | 33.8 | 110.2 | 0.002 | <0.01 | 1.44 | 0.9 | <0.2 | 9.7 | 6.9 | 0.03 | 0.04 | 22.5 | 0.027 | 0.46 | 3.23 | 1 | 3.53 | 103.63 | 46 | 90.8 |
| 22 | Composite-22 DS150_30.07-33.96 | Pulp | 3.11 | 0.08 | 33.64 | 2.2 | <10 | 35.8 | 30.6 | 0.002 | <0.01 | 1.02 | 0.5 | <0.2 | 6.2 | 2.3 | 0.02 | 0.03 | 16.9 | 0.016 | 0.16 | 3.33 | <1 | 3.02 | 68.51 | 48 | 143.2 |
| 23 | Composite-23 DS150_35.3-40 | Pulp | 2.75 | 0.05 | 40.67 | 1.5 | <10 | 9.0 | 5.6 | 0.002 | <0.01 | 1.27 | 0.5 | <0.2 | 8.5 | 5.4 | 0.04 | 0.03 | 17.4 | 0.024 | 0.05 | 3.87 | 1 | 3.01 | 57.21 | 14 | 57.8 |
| 24 | Composite-24 DS155_4-4.5 | Pulp | 2.99 | 0.10 | 48.20 | 1.6 | <10 | 11.3 | 10.8 | 0.002 | <0.01 | 1.85 | 0.4 | <0.2 | 10.2 | 3.6 | 0.03 | 0.02 | 21.6 | 0.025 | 0.07 | 4.68 | <1 | 2.65 | 69.30 | 13 | 159.7 |
| 25 | Composite-25 DS155 5-21 | Pulp | 2.56 | 0.07 | 57.89 | 1.5 | <10 | 12.3 | 7.2 | 0.002 | <0.01 | 1.9 | 0.4 | <0.2 | 10.1 | 3.6 | 0.06 | 0.02 | 23.1 | 0.028 | 0.06 | 6.78 | <1 | 2.44 | 92.50 | 14 | 140.3 |
| 26 | Composite-26 DS155_21-25 | Pulp | 2.90 | 0.13 | 59.56 | 1.6 | <10 | 10.3 | 14.3 | 0.001 | <0.01 | 1.68 | 0.5 | <0.2 | 10.5 | 4.2 | 0.03 | 0.03 | 20.5 | 0.026 | 0.1 | 6.43 | <1 | 2.35 | 91.76 | 14 | 101.3 |
| 27 | Composite-27 DS155_25-60 | Pulp | 2.80 | 0.12 | 43.92 | 1.5 | 12 | 19.6 | 12.1 | 0.002 | <0.01 | 1.27 | 0.5 | <0.2 | 8.3 | 4.2 | 0.02 | 0.02 | 19.0 | 0.024 | 0.13 | 4.71 | <1 | 1.96 | 74.09 | 8 | 137 |
| 28 | Composite-28 DS155_62.2-69.2 | Pulp | 2.50 | 1.00 | 43.62 | 1.7 | 24 | 38.9 | 143.1 | 0.003 | <0.01 | 0.84 | 2.3 | <0.2 | 4.2 | 20.1 | 0.07 | 0.03 | 15.6 | 0.01 | 0.67 | 4.43 | 1 | 1.86 | 265.84 | 156 | 95.1 |
| 29 | Composite-29 DS155 69.2-72.3 | Pulp | 2.44 | 0.82 | 36.43 | 1.7 | 21 | 16.5 | 132.7 | 0.002 | <0.01 | 0.56 | 1.1 | <0.2 | 4.5 | 12.2 | 0.02 | 0.03 | 16.0 | 0.012 | 0.73 | 3.54 | <1 | 1.76 | 172.98 | 26 | 81.9 |
| 30 | Composite-30 DS155_72.3-78 | Pulp | 1.82 | 0.84 | 27.63 | 1.3 | 42 | 33.6 | 107.1 | 0.003 | 0.06 | 0.45 | 3.0 | <0.2 | 2.7 | 37.8 | 0.38 | 0.02 | 9.0 | 0.008 | 0.58 | 3.78 | <1 | 1.3 | 327.40 | 56 | 76.1 |
| 31 | Composite-31 DS155 78-79.7 | Pulp | 2.71 | 0.36 | 35.94 | 1.8 | 14 | 53.7 | 88.1 | 0.002 | 0.07 | 0.83 | 0.6 | <0.2 | 4.6 | 22.2 | 0.02 | 0.02 | 16.2 | 0.012 | 0.51 | 4.43 | <1 | 2.27 | 127.41 | 22 | 75.4 |
| 32 | Composite-32 DS151_3.4-4 | Pulp | 2.52 | 0.36 | 63.48 | 1.7 | <10 | 13.1 | 62.6 | 0.002 | <0.01 | 1.63 | 0.6 | <0.2 | 10.6 | 7 | 0.02 | 0.05 | 22.9 | 0.024 | 0.43 | 4.37 | <1 | 3.17 | 105.05 | 17 | 83.5 |
| 33 | Composite-33 DS151_3.4-4 | Pulp | 2.79 | 0.05 | 39.14 | 1.9 | <10 | 33.8 | 9.5 | 0.002 | <0.01 | 1.42 | 0.4 | <0.2 | 10.1 | 3 | 0.04 | 0.03 | 20.4 | 0.023 | 0.08 | 2.51 | <1 | 4.82 | 64.91 | 42 | 57.8 |
| 34 | Composite-34 DS151_4-19.8 | Pulp | 2.62 | 0.25 | 63.46 | 1.6 | 11 | 35.0 | 51.4 | 0.002 | <0.01 | 1.68 | 0.6 | <0.2 | 11.2 | 4 | 0.02 | 0.05 | 24.9 | 0.027 | 0.3 | 3.70 | <1 | 3.73 | 82.79 | 117 | 82.8 |
| 35 | Composite-35 DS151 19.8-26.12 | Pulp | 2.67 | 0.62 | 40.22 | 1.6 | 24 | 130.2 | 141.1 | 0.002 | <0.01 | 1.01 | 1.7 | <0.2 | 6.1 | 11.6 | 0.05 | 0.03 | 13.9 | 0.016 | 0.79 | 4.11 | 1 | 2.98 | 169.78 | 86 | 134.6 |
| 36 | Composite-36 DS151_26.12-35 | Pulp | 2.66 | 0.59 | 42.99 | 1.7 | 19 | 41.1 | 117.5 | 0.001 | <0.01 | 1.07 | 0.8 | <0.2 | 6.5 | 8.2 | 0.02 | 0.03 | 14.0 | 0.023 | 0.58 | 2.78 | <1 | 2.45 | 137.70 | 34 | 100.6 |
| 36D | Composite-36-DUP DS151_40-41 | Pulp | 2.57 | 0.24 | 50.30 | 1.8 | 11 | 5.0 | 41.7 | 0.002 | <0.01 | 0.71 | 0.6 | <0.2 | 10.5 | 6.9 | 0.02 | 0.02 | 20.3 | 0.032 | 0.3 | 6.74 | <1 | 4.78 | 100.81 | 11 | 82.3 |
| 37 | Composite-37 DS157_6.41-7.0 | Pulp | 2.94 | 0.11 | 38.72 | 2.0 | 12 | 19.6 | 32.4 | 0.002 | 0.16 | 1.36 | 0.4 | <0.2 | 7.8 | 4.3 | 0.02 | 0.02 | 20.7 | 0.018 | 0.21 | 5.38 | <1 | 2.07 | 79.42 | 30 | 163 |
| 38 | Composite-38 DS157_7-21 | Pulp | 2.76 | 0.06 | 31.75 | 1.9 | <10 | 15.7 | 19.9 | 0.002 | 0.09 | 1.15 | 0.4 | <0.2 | 8.4 | 4.7 | 0.03 | 0.02 | 20.6 | 0.023 | 0.17 | 5.83 | <1 | 2.55 | 71.02 | 26 | 96.3 |
| 39 | Composite-39 DS157_21-36 | Pulp | 3.12 | 0.14 | 38.86 | 2.0 | <10 | 20.5 | 17.7 | 0.002 | <0.01 | 1.29 | 0.4 | <0.2 | 10 | 3.5 | 0.03 | 0.03 | 23.2 | 0.022 | 0.23 | 4.66 | <1 | 3.36 | 86.27 | 50 | 73.1 |
| 40 | Composite-40 DS157_39-45.0 | Pulp | 2.36 | 0.66 | 52.65 | 1.4 | 21 | 32.1 | 140.3 | 0.003 | <0.01 | 1.01 | 1.1 | <0.2 | 7.7 | 12.6 | 0.03 | 0.03 | 20.2 | 0.016 | 0.69 | 3.73 | <1 | 2.47 | 171.47 | 53 | 166.3 |
| 41 | Composite-41 DS157_50-55 | Pulp | 2.77 | 0.42 | 53.61 | 1.7 | 14 | 99.0 | 83.7 | 0.002 | <0.01 | 1.15 | 0.7 | <0.2 | 7.3 | 5.2 | 0.02 | 0.04 | 22.0 | 0.018 | 0.54 | 3.92 | <1 | 3.11 | 108.84 | 45 | 130 |
| 41D | Composite-41-DUP DS157_60-61 | Pulp | 3.04 | 0.49 | 42.14 | 1.6 | 14 | 58.6 | 88.1 | 0.002 | <0.01 | 0.97 | 0.9 | <0.2 | 8.9 | 6.7 | 0.02 | 0.04 | 17.5 | 0.021 | 0.61 | 2.94 | 1 | 3.73 | 123.97 | 34 | 85.3 |
| 42 | Composite-42 DS153_3-3.5 | Pulp | 2.88 | 0.37 | 45.96 | 1.6 | 13 | 33.6 | 58.1 | 0.002 | <0.01 | 1.09 | 0.7 | <0.2 | 9.3 | 4.5 | 0.01 | 0.05 | 19.1 | 0.021 | 0.43 | 3.45 | <1 | 2.82 | 92.20 | 9 | 50.7 |
| 43 | Composite-43 DS153 3-20.9 | Pulp | 2.81 | 0.42 | 60.47 | 1.8 | 18 | 37.2 | 121.3 | 0.003 | <0.01 | 1.2 | 0.6 | <0.2 | 10.9 | 6.6 | 0.02 | 0.06 | 24.0 | 0.024 | 0.54 | 4.69 | <1 | 3 | 149.70 | 29 | 84.4 |
| 44 | Composite-44 DS153_23-26 | Pulp | 3.21 | 0.45 | 40.91 | 2.3 | 28 | 198.0 | 131.5 | 0.002 | <0.01 | 1 | 1.2 | <0.2 | 6.1 | 9.9 | 0.02 | 0.03 | 15.3 | 0.019 | 0.73 | 3.77 | <1 | 2.33 | 166.45 | 126 | 131 |
| 45 | Composite-45 DS153_26_34.4 | Pulp | 1.76 | 0.33 | 25.05 | 1.7 | 41 | 52.7 | 104.3 | 0.003 | <0.01 | 0.55 | 2.6 | <0.2 | 4.2 | 21.3 | 0.66 | 0.02 | 7.6 | 0.013 | 0.6 | 3.11 | 1 | 2.47 | 279.75 | 48 | 62.3 |
| 46 | Composite-46 DS153_36_51 | Pulp | 2.88 | 0.14 | 42.36 | 1.9 | <10 | 35.9 | 25.2 | 0.002 | <0.01 | 1.18 | 0.5 | <0.2 | 9.9 | 4.4 | 0.02 | 0.02 | 19.4 | 0.02 | 0.23 | 4.13 | <1 | 2.93 | 93.92 | 20 | 51.1 |
| 47 | Composite-47 DS154_5.4-6 | Pulp | 3.05 | 0.07 | 186.28 | 1.7 | <10 | 38.7 | 9.9 | 0.004 | <0.01 | 2.07 | 0.6 | 0.2 | 40.5 | 4 | 0.41 | 0.08 | 83.3 | 0.058 | 0.09 | 19.75 | <1 | 5.96 | 172.91 | 43 | 134.7 |
| 48 | Composite-48 DS154_6-21 | Pulp | 2.52 | 0.04 | 26.78 | 1.7 | <10 | 11.7 | 26.3 | 0.002 | 0.02 | 0.66 | 0.3 | <0.2 | 7.7 | 2.8 | 0.02 | 0.03 | 16.3 | 0.022 | 0.1 | 4.11 | <1 | 2.73 | 49.68 | 16 | 71.7 |
| 49 | Composite-49 DS154_21-41 | Pulp | 2.24 | 0.12 | 56.63 | 1.6 | <10 | 9.7 | 41.8 | 0.003 | <0.01 | 1.02 | 0.5 | <0.2 | 11.3 | 5.4 | 0.03 | 0.03 | 27.3 | 0.03 | 0.24 | 8.38 | <1 | 4.09 | 97.63 | 13 | 138.8 |
| 50 | Composite-50 DS154 41-61 | Pulp | 2.56 | 0.21 | 63.70 | 1.5 | <10 | 12.7 | 33.3 | 0.002 | <0.01 | 1.38 | 0.6 | <0.2 | 9.1 | 5.3 | 0.03 | 0.06 | 24.6 | 0.024 | 0.25 | 7.66 | <1 | 2.51 | 97.54 | 6 | 165.6 |
| 51 | Composite-51 DS154 61.5-67 | Pulp | 2.04 | 0.56 | 26.49 | 1.1 | 29 | 99.1 | 107.4 | 0.002 | 0.01 | 1.04 | 8.7 | <0.2 | 5 | 21.8 | 0.34 | 0.02 | 18.2 | 0.011 | 0.58 | 3.49 | 1 | 3.61 | 282.99 | 68 | 52.5 |
| 52 | Composite-52 DS154 67-72.6 | Pulp | 2.50 | 0.54 | 42.03 | 1.6 | 23 | 34.2 | 95.5 | 0.003 | <0.01 | 0.85 | 2.7 | <0.2 | 8.4 | 16.9 | 0.04 | 0.04 | 21.3 | 0.024 | 0.56 | 3.56 | <1 | 3.63 | 177.11 | 18 | 127.4 |

| S. No. | Sample ID | Method | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | Molybdenum (Mo) | Sodium (Na) | Niobium (Nb) | Nickel (Ni) | Phosphorous (P) | Lead (Pb) | Rubidium (Rb) | Rhenium (Re) | Sulphur (S) | Antimony (Sb) | Scandium (Sc) | Selenium (Se) | Tin (Sn) | Stronium (Sr) | Tantalum (Ta) | Tellurium (Te) | Thorium (Th) | Titanium (Ti) | Thallium (Tl) | Uranium (U) | Vanadium (V) | Tungsten (W) | Yttrium (Y) | Zinc (Zn) | Zirconium (Zr) |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| | | MDL | 0.05 | 0.01 | 0.05 | 0.2 | 10 | 0.2 | 0.1 | 0.001 | 0.01 | 0.05 | 0.1 | 0.2 | 0.2 | 0.2 | 0.01 | 0.01 | 0.2 | 0.005 | 0.02 | 0.05 | 1 | 0.05 | 0.05 | 1 | 0.5 |
| | | Sample Typ | | | | | | | | | | | | | | | | | | | | | | | | | |
| ~~53~~ | ~~Composite-53_DS154_72.6-75.62~~ | ~~Pulp~~ | 3.29 | 0.27 | 33.01 | 1.9 | 17 | 17.7 | 66.4 | 0.002 | <0.01 | 0.68 | 1.3 | <0.2 | 7.3 | 10.1 | 0.02 | 0.03 | 17.5 | 0.02 | 0.38 | 2.55 | <1 | 3.13 | 97.64 | 11 | 65.1 |
| 54 | Composite-54_DS164_3.86-4.36 | Pulp | 2.00 | 0.12 | 36.41 | 1.5 | <10 | 68.9 | 25.3 | 0.001 | <0.01 | 1.16 | 0.6 | <0.2 | 7.8 | 3.2 | 0.02 | 0.03 | 21.4 | 0.019 | 0.22 | 5.05 | <1 | 3.01 | 85.33 | 25 | 141.7 |
| 55 | Composite-55_DS164_5-21 | Pulp | 2.37 | 0.06 | 36.81 | 1.6 | <10 | 59.7 | 14.9 | 0.002 | <0.01 | 1.39 | 0.6 | <0.2 | 8.6 | 3 | 0.02 | 0.03 | 19.7 | 0.02 | 0.17 | 6.23 | 1 | 2.79 | 79.77 | 21 | 124 |
| 56 | Composite-56_DS164_31-38 | Pulp | 2.60 | 0.02 | 22.79 | 1.5 | <10 | 165.0 | 5.2 | 0.002 | <0.01 | 0.85 | 0.6 | <0.2 | 8.3 | 2.6 | 0.08 | 0.06 | 25.5 | 0.013 | 0.14 | 6.16 | <1 | 3.92 | 120.36 | 16 | 37.4 |
| 57 | Composite-57_DS164_39.0-41.08 | Pulp | 2.37 | 0.08 | 42.72 | 2.1 | 16 | 134.6 | 74.7 | 0.002 | <0.01 | 1.04 | 1.1 | <0.2 | 9.2 | 5.4 | 0.02 | 0.05 | 23.0 | 0.021 | 0.55 | 5.96 | 2 | 3.7 | 182.91 | 22 | 70.7 |
| 58 | Composite-58_DS164_41.08-43.0 | Pulp | 2.79 | 0.11 | 38.77 | 2.0 | <10 | 44.2 | 16.1 | 0.002 | <0.01 | 1.54 | 0.6 | <0.2 | 11.1 | 4.2 | 0.02 | 0.04 | 24.1 | 0.027 | 0.21 | 4.08 | 2 | 3.17 | 89.22 | 24 | 88.2 |
| 59 | Composite-59_DS165_2.85-3.35 | Pulp | 2.86 | 0.06 | 15.46 | 2.2 | <10 | 14.6 | 9.9 | 0.001 | <0.01 | 0.59 | 0.5 | <0.2 | 4.2 | 3.1 | 0.02 | 0.04 | 14.5 | 0.02 | 0.06 | 4.24 | <1 | 2.52 | 59.91 | 21 | 116.5 |
| 60 | Composite-60_DS165_3.35_17.0 | Pulp | 3.23 | 0.07 | 30.64 | 2.0 | <10 | 14.2 | 11.2 | 0.002 | 0.01 | 1.15 | 0.5 | <0.2 | 8.8 | 4 | 0.04 | 0.04 | 20.7 | 0.021 | 0.07 | 6.66 | <1 | 3.09 | 66.12 | 19 | 143.4 |
| 61 | Composite-61_DS165_18_32.0 | Pulp | 2.63 | 0.11 | 35.67 | 1.9 | 10 | 93.5 | 19.7 | 0.002 | <0.01 | 1.09 | 0.6 | <0.2 | 9.3 | 4.9 | 0.03 | 0.03 | 22.4 | 0.021 | 0.11 | 5.03 | <1 | 2.6 | 82.67 | 651 | 127.9 |
| 62 | Composite-62_DS165_32.0-48.0 | Pulp | 2.31 | 0.05 | 36.26 | 2.0 | <10 | 36.4 | 32.6 | 0.001 | <0.01 | 1.06 | 0.5 | <0.2 | 8.8 | 4.6 | 0.03 | 0.04 | 25.0 | 0.017 | 0.13 | 5.49 | <1 | 2.64 | 72.43 | 49 | 133.3 |
| 63 | Composite-63_DS165_61.90-64 | Pulp | 2.38 | 0.31 | 31.67 | 2.2 | 35 | 21.3 | 153.2 | 0.002 | <0.01 | 0.72 | 6.3 | <0.2 | 6.8 | 17.7 | 0.24 | 0.03 | 13.2 | 0.016 | 0.66 | 2.84 | 1 | 2.72 | 275.97 | 21 | 100.7 |
| 64 | Composite-64_DS165_64.0-67.0 | Pulp | 2.34 | 0.33 | 42.06 | 1.6 | 16 | 33.8 | 116.4 | 0.002 | <0.01 | 0.99 | 1.6 | <0.2 | 8.6 | 6.8 | 0.02 | 0.04 | 19.1 | 0.023 | 0.51 | 4.10 | <1 | 3.31 | 130.63 | 20 | 97.8 |
| 65 | Composite-65_DS165_76.42-79.0 | Pulp | 2.78 | 0.25 | 31.35 | 2.1 | <10 | 53.9 | 51.7 | 0.002 | <0.01 | 0.78 | 0.8 | <0.2 | 11.8 | 13.3 | 0.02 | 0.02 | 20.9 | 0.019 | 0.27 | 3.81 | <1 | 2.69 | 91.08 | 40 | 73.8 |
| 66 | Composite-66_DS169_62-65 | Pulp | 1.85 | 0.22 | 16.00 | 1.6 | 38 | 25.6 | 108.9 | 0.002 | <0.01 | 0.51 | 6.6 | <0.2 | 3.5 | 18.2 | 0.33 | 0.03 | 7.6 | 0.01 | 0.51 | 3.68 | 1 | 3.67 | 232.82 | 25 | 85.2 |
| 67 | Composite-67_DS169_65-75 | Pulp | 2.60 | 0.08 | 31.58 | 1.9 | 15 | 51.7 | 94.7 | 0.002 | <0.01 | 0.86 | 1.3 | <0.2 | 7.8 | 5 | 0.03 | 0.03 | 17.8 | 0.021 | 0.45 | 5.93 | 1 | 3.31 | 107.75 | 35 | 132.6 |
| 68 | Composite-68_DS144_9.65_10.0 | Pulp | 2.09 | 0.08 | 35.23 | 1.7 | <10 | 29.5 | 9.4 | 0.001 | <0.01 | 0.93 | 0.4 | <0.2 | 11.1 | 2.8 | 0.04 | 0.02 | 20.3 | 0.021 | 0.07 | 4.78 | <1 | 1.6 | 57.16 | 12 | 85.2 |
| 69 | Composite-69_DS144_10.0_24.0 | Pulp | 2.13 | 0.09 | 35.49 | 1.8 | <10 | 16.4 | 9.5 | 0.001 | <0.01 | 1.15 | 0.3 | <0.2 | 11.5 | 3.1 | 0.05 | 0.02 | 24.6 | 0.02 | 0.07 | 5.62 | <1 | 1.66 | 58.08 | 15 | 158 |
| 70 | Composite-70_DS144_24.0-33.0 | Pulp | 2.07 | 0.21 | 40.47 | 1.8 | <10 | 18.8 | 38.4 | 0.001 | <0.01 | 1.05 | 0.6 | <0.2 | 9.7 | 4.2 | 0.02 | 0.02 | 25.9 | 0.022 | 0.23 | 4.26 | <1 | 1.61 | 74.62 | 15 | 136.3 |
| 71 | Composite-71_DS144_34.44-36.42 | Pulp | 2.01 | 0.19 | 16.54 | 1.7 | 29 | 111.1 | 108.0 | 0.001 | 0.03 | 0.56 | 5.7 | <0.2 | 3.7 | 25.3 | 0.27 | 0.02 | 8.6 | 0.009 | 0.48 | 2.16 | 1 | 2.16 | 140.46 | 624 | 80.5 |
| 72 | Composite-72_DS144_37.0_38.0 | Pulp | 3.23 | 0.22 | 37.91 | 2.2 | <10 | 22.1 | 36.8 | 0.002 | <0.01 | 1.67 | 0.6 | <0.2 | 8.6 | 3.9 | 0.02 | 0.03 | 21.0 | 0.021 | 0.28 | 4.05 | 1 | 3.23 | 75.87 | 29 | 147.5 |
| 73 | Composite-73_DS145_9.33_10.0 | Pulp | 2.07 | 0.02 | 24.10 | 1.6 | <10 | 7.1 | 16.7 | 0.002 | 0.03 | 0.97 | 0.5 | <0.2 | 8 | 4.6 | 0.07 | 0.02 | 23.1 | 0.014 | 0.05 | 6.08 | <1 | 1.89 | 92.60 | 16 | 134.3 |
| 74 | Composite-74_DS145_10.0_24 | Pulp | 1.94 | 0.02 | 25.94 | 1.4 | <10 | 7.1 | 16.5 | 0.002 | 0.03 | 1.03 | 0.5 | <0.2 | 8.8 | 4.4 | 0.07 | 0.03 | 23.1 | 0.016 | 0.04 | 5.66 | <1 | 1.99 | 89.34 | 16 | 130 |
| 75 | Composite-75_DS145_24.0-38.0 | Pulp | 2.28 | 0.03 | 31.88 | 1.6 | <10 | 8.3 | 6.8 | 0.002 | <0.01 | 0.91 | 0.4 | <0.2 | 9.2 | 3.3 | 0.05 | 0.03 | 27.1 | 0.021 | 0.03 | 6.48 | <1 | 1.94 | 83.05 | 32 | 146.8 |
| 76 | Composite-76_DS145_38.0-52.0 | Pulp | 2.18 | 0.10 | 76.33 | 1.7 | <10 | 9.4 | 19.1 | 0.002 | <0.01 | 2.05 | 0.6 | <0.2 | 16.9 | 5.3 | 0.09 | 0.05 | 40.8 | 0.021 | 0.07 | 10.92 | <1 | 2.65 | 121.89 | 38 | 253.4 |
| 77 | Composite-77_DS145_91.48-93.52 | Pulp | 1.47 | 0.23 | 16.01 | 1.5 | 26 | 125.0 | 111.1 | 0.002 | <0.01 | 0.42 | 6.2 | <0.2 | 3.6 | 24.3 | 0.59 | 0.2 | 7.7 | 0.007 | 0.33 | 2.82 | 2 | 1.58 | 309.13 | 33 | 79.5 |
| ***QUALITY ASSURANCE / QUALITY CONTROL*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Composite-8_DS147_42-43 | Pulp | 2.91 | 0.61 | 49.76 | 1.7 | <10 | 9.0 | 97.2 | 0.003 | <0.01 | 1.26 | 1.4 | <0.2 | 8.2 | 11.3 | 0.03 | 0.03 | 19.2 | 0.027 | 0.7 | 4.1 | 2 | 3.3 | 209.67 | 11 | 115.2 |
| 8R | Composite-8_DS147_42-43 (Rep) | Pulp | 3.02 | 0.62 | 49.99 | 1.6 | <10 | 9.0 | 96.6 | 0.003 | <0.01 | 1.3 | 1.3 | <0.2 | 8.4 | 11.4 | 0.03 | 0.03 | 19.7 | 0.028 | 0.69 | 4.16 | 2 | 3.38 | 213.16 | 12 | 112.5 |
| | | **%RPD** | -4% | -2% | 0% | 6% | #VALUE! | 0% | 1% | 0% | | -3% | 7% | #VALUE! | -2% | -1% | 0% | 0% | -3% | -4% | 1% | -1% | 0% | -2% | -2% | -9% | 2% |
| 44 | Composite-44_DS153_23-26 | Pulp | 3.21 | 0.45 | 40.91 | 2.3 | 28 | 198.0 | 131.5 | 0.002 | <0.01 | 1 | 1.2 | <0.2 | 6.1 | 9.9 | 0.02 | 0.03 | 15.3 | 0.019 | 0.73 | 3.77 | <1 | 2.33 | 166.45 | 126 | 131 |
| 44R | Composite-44_DS153_23-26 (Rep) | Pulp | 2.97 | 0.41 | 43.63 | 2.2 | 20 | 186.9 | 121.4 | 0.002 | <0.01 | 0.98 | 1.4 | <0.2 | 5.8 | 9.2 | 0.04 | 0.04 | 15 | 0.017 | 0.7 | 3.55 | <1 | 2.22 | 158.38 | 118 | 125.5 |
| | | **%RPD** | 8% | 9% | -6% | 4% | 33% | 6% | 8% | 0% | | 2% | -15% | #VALUE! | 5% | 7% | -67% | -29% | 2% | 11% | 4% | 6% | | 5% | 5% | 7% | 4% |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 20a | | | 3.02 | 0.26 | 1.14 | 36.0 | 957 | 5.8 | 164.5 | 0.001 | 0.07 | 0.28 | 7.60 | <0.2 | 3.40 | 59.6 | <0.01 | 0.03 | 21.2 | 0.368 | 0.86 | 5.93 | 105.00 | 2.27 | 19.37 | 63 | 10.5 |
| **True Value STD OREAS 20a** | | | **3.01** | **0.26** | **1.15** | **36.3** | **965** | **5.8** | **164.3** | | **0.07** | **0.28** | **7.65** | | **3.367** | **59.6** | **0.0088571** | | **21.1** | **0.366** | **0.86** | **5.91** | **105.20** | **2.27** | **19.29** | **62.77** | **10.6** |
| % Difference | | | 0% | 1% | -1% | -1% | -1% | 0% | 0% | | 0% | 2% | -1% | | 1% | 0% | | | 1% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | -1% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.05 | <0.01 | <0.05 | <0.2 | <10 | <0.2 | <0.1 | <0.001 | <0.01 | <0.05 | <0.1 | <0.2 | <0.2 | <0.2 | <0.01 | <0.01 | <0.2 | <0.005 | <0.02 | <0.05 | <1 | <0.05 | <0.05 | <1 | <0.5 |

## CERTIFICATE OF ANALYSIS ▪ SINGLE ADDITION NAG RESULTS (EGi Method)

Global ARD Testing Services Inc.



**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No: | Sample ID | Pulp Sample Weight (g) | Vol. of 15% $H_2O_2$ (mL) | NAG pH (pH Units) | NaOH to pH 4.5 (mL) | NaOH to pH 7.0 (mL) | NaOH Conc. (N) | NAG Acidity pH 4.5 (kg $H_2SO_4$/tonne) | NAG Acidity pH 7.0 (kg $H_2SO_4$/tonne) | % RPD to pH 4.5 | % RPD to pH 7.0 | % RPD Acceptance Criteria |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| 4 | Composite-4 DS147 31-33.4 | 2.5 | 250 | 6.52 | 0.00 | 0.08 | 0.1 | 0.0 | 0.2 | | | |
| 5 | Composite-5 DS147 33.4-35.4 | 2.5 | 250 | 7.23 | 0.00 | 0.00 | 0.1 | 0.0 | 0.0 | | | |
| 15 | Composite-15 DS148 67.46-71.31 | 2.5 | 250 | 7.26 | 0.00 | 0.00 | 0.1 | 0.0 | 0.0 | | | |
| 21 | Composite-21 DS150_23.3-25.7 | 2.5 | 250 | 7.61 | 0.00 | 0.00 | 0.1 | 0.0 | 0.0 | | | |
| 21D | Composite-21-DUP DS150 30.5-32 | 2.5 | 250 | 10.25 | 0.00 | 0.00 | 0.1 | 0.0 | 0.0 | | | |
| 37 | Composite-37 DS157 6.41-7.0 | 2.5 | 250 | 5.73 | 0.00 | 1.10 | 0.1 | 0.0 | 2.2 | | | |
| 38 | Composite-38 DS157 7-21 | 2.5 | 250 | 7.42 | 0.00 | 0.00 | 0.1 | 0.0 | 0.0 | | | |
| **QUALITY ASSURANCE / QUALITY CONTROL** | | | | | | | | | | | | |
| ***Replicates:*** | | | | | | | | | | | | |
| | | | | | | | | | | | | 10% |
| | | | | | | | | | | | | |
| ***Method Blank Analysis:*** | | | | | | | | | | | | |
| Method Blank (15% $H_2O_2$ Solution) | | N/A | 250 | 5.37 | 0.00 | 8.43 | 0.1 | | | | | |
| ***GLOBAL SOP NO:*** | | ***ARD-017*** | | | | | | | | | | |

***NOTES:***
**Date of Analysis:** November 6-13,2025

pH (pH Units) of 15% $H_2O_2$ (buffered with 0.5 N NaOH): 5.00
EC (µS/cm) of 15% $H_2O_2$ (buffered with 0.5 N NaOH): 21.63
pH (pH Units) of DI water used: 5.24
EC (µS/cm) of DI water used: 1.24

Solid:Liquid ratio used: 1:100; 2.5 g Pulp Sample: 250 mL 15% $H_2O_2$.
pH measurement of 15% $H_2O_2$ solution was conducted at room temperature & buffered with 0.5N NaOH solution to ensure a pH between 4 and 7.
NAG pH & method blank pH measurements were taken after digesting with peroxide solution and making up the solution to its original volume of 250 mL with DI water.
On client's request the NAG procedure is repeated using 1 g of pulp sample when the NAG value for pH 4.5 exceeds 25 kg $H_2SO_4$ per tonne.

***ABBREVIATIONS:***
R = Replicate (i.e. using a pulp sample from the same bag).
D = Duplicate (i.e. client sample is processed to produced a 2nd pulp bag & analyzed as a duplicate).
RPD = Relative Percent Difference.
EC = Electrical Conductivity
ORP = Oxidation Reduction Potential
RDL = Reportable Detection Limit.
EDL = Estimated Detection Limit
SIE = Selective Ion Electrode
IC = Ion Chromatography
Calc. = Calculation

***REFERENCE:***
Egi - Environmental Geochemistry International; Single Addition Net Acid Generation (NAG) Test Procedure; Miller et al; Revised Dec. 2006; Page 2 to 4.

## CERTIFICATE OF ANALYSIS • MEND SHAKE FLASK EXTRACTION RESULTS




EXTRACTION RESULTS

**PAGE:** 8 of 9
**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

EXTRACTION RESULTS

**PAGE:** 8 of 9
**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3


| Parameter | Method | Unit | RDL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8D | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 16D | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Composite-1 DS147_7.23-7.5 | Composite-2 DS147_7.5-18 | Composite-3 DS147_18-32 | Composite-4 DS147_31-33.4 | Composite-5 DS147_33.4-35.4 | Composite-6 DS147_35.4-38.3 | Composite-7 DS147_38.3-41.3 | Composite-8 DS147_42-43 | Composite-8-DUP DS147_46-47 | Composite-9 DS148_7-7.5 | Composite-10 DS148_7.5-20 | Composite-11 DS148_21-35 | Composite-12 DS148_35-64 | Composite-13 DS148_66.6-67.54 | Composite-14 DS148_67.54-69.46 | Composite-15 DS148_67.46-71.31 | Composite-16 DS148_72.11-73.06 | Composite-16-DUP DS148_82-83 | Composite-17 DS150_4.4-5 | Composite-18 DS150_5-13 | Composite-19 DS150_14.25-20 |
| Weight of dry sample used | Weighing Scale | g | 0.01 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | Meter | pH units | 0.01 | 6.1 | 6.2 | 6.2 | 6.1 | 5.9 | 6.2 | 6.2 | 6.2 | 6.2 | 6.3 | 6.3 | 6.3 | 6.2 | 6.2 | 6.3 | 6.1 | 6.0 | 6.3 | 6.3 | 6.2 | 6.2 |
| EC | Meter | µS/cm | 1 | 78 | 80 | 79 | 68 | 103 | 105 | 116 | 117 | 109 | 114 | 109 | 80 | 99 | 111 | 98 | 118 | 97 | 105 | 102 | 102 | 109 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 20.0 | 19.5 | 19.4 | 13.1 | 17.8 | 22.2 | 24.6 | 25.7 | 23.0 | 23.9 | 27.4 | 22.3 | 20.9 | 21.7 | 23.2 | 17.2 | 14.6 | 24.2 | 24.1 | 21.5 | 21.6 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 22.3 | 20.8 | 22.2 | 8.8 | 6.0 | 23.5 | 30.0 | 30.4 | 26.4 | 35.8 | 38.1 | 29.4 | 26.7 | 22.0 | 31.2 | 11.0 | 6.9 | 27.7 | 32.0 | 27.2 | 25.8 |
| Sulphate | Turbidimetric | mg/L | 0.5 | 1.05 | 0.73 | 1.09 | 1.56 | 0.46 | 0.72 | 0.31 | <0.5 | 0.45 | <0.5 | 0.66 | 0.27 | <0.5 | 0.92 | 0.72 | 0.87 | <0.5 | 0.38 | 0.35 | 1.22 | <0.5 |
| Chloride | IC | mg/L | 0.1 | 5.30 | 8.93 | 7.74 | 6.94 | 16.10 | 11.90 | 12.30 | 11.80 | 10.60 | 8.30 | 8.09 | 4.66 | 10.80 | 17.00 | 5.65 | 17.80 | 17.40 | 14.90 | 10.40 | 10.40 | 8.99 |
| Fluoride | IC | mg/L | 0.1 | 2.85 | 2.62 | 1.79 | 4.69 | 5.14 | 4.58 | 3.04 | 2.77 | 2.91 | 2.05 | 1.84 | 2.21 | 2.07 | 1.03 | 3.31 | 3.54 | 2.53 | 2.17 | 1.11 | 1.07 | 3.90 |
| Nitrate + Nitrite as N | Calc. | mg/L | 0.01 | 0.018 | 0.050 | 0.064 | 0.051 | 0.028 | 0.030 | 0.022 | 0.015 | 0.014 | 0.012 | 0.011 | 0.011 | 0.018 | 0.033 | 0.026 | 0.035 | 0.032 | 0.023 | 0.013 | 0.011 | 0.030 |
| Phosphorus, Total Dissolved | | mg/L | 0.005 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Hardness (CaCO3) | ICP-MS | mg/L | 0.125 | 23.0 | 24.8 | 23.9 | 13.9 | 28.4 | 32.8 | 38.7 | 40.0 | 34.5 | 36.7 | 39.4 | 30.3 | 29.9 | 31.5 | 36.7 | 29.2 | 19.0 | 31.0 | 33.5 | 25.0 | 36.4 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | 0.0851 | 0.0859 | 0.0741 | 0.0397 | 0.0081 | 0.0711 | 0.0942 | 0.0838 | 0.0857 | 0.108 | 0.129 | 0.0834 | 0.077 | 0.0957 | 0.0884 | 0.0509 | 0.0736 | 0.104 | 0.109 | 0.098 | 0.0479 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | 0.000191 | 0.000155 | 0.000142 | 0.000118 | 0.000194 | 0.000136 | 0.000162 | 0.000159 | 0.000205 | 0.000234 | 0.000262 | 0.000156 | 0.000217 | 0.000165 | 0.000168 | 0.000203 | 0.000142 | 0.000227 | 0.000211 | 0.000245 | 0.000091 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | 0.000823 | 0.000463 | 0.000644 | 0.000293 | 0.000138 | 0.000235 | 0.000483 | 0.000479 | 0.000627 | 0.00121 | 0.00103 | 0.00066 | 0.000931 | 0.000809 | 0.000389 | 0.000369 | <0.000400 | 0.00117 | 0.000839 | <0.000900 | 0.000101 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0284 | 0.0336 | 0.184 | 0.279 | 0.195 | 0.127 | 0.0975 | 0.0834 | 0.273 | 0.0478 | 0.0206 | 0.0243 | 0.0525 | 0.274 | 0.513 | 0.353 | 0.102 | 0.0833 | 0.148 | 0.232 | 0.074 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000061 | 0.000071 | 0.000057 | 0.000371 | 0.00102 | 0.000072 | 0.000044 | 0.000018 | 0.000052 | 0.000109 | 0.00003 | 0.00003 | 0.000055 | 0.000116 | 0.000032 | 0.000885 | 0.00165 | 0.000025 | 0.000032 | 0.000046 | 0.000037 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000031 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000028 | 0.000012 | <0.000010 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | 0.0112 | 0.0096 | 0.0097 | 0.012 | 0.0036 | 0.0075 | 0.0089 | 0.0075 | 0.0107 | 0.0121 | 0.01 | 0.0054 | 0.0069 | 0.0107 | 0.008 | 0.0095 | 0.0068 | 0.0064 | 0.0101 | 0.0106 | 0.0058 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | 0.0000309 | 0.0000615 | 0.000284 | 0.000185 | 0.000447 | 0.000122 | 0.0000951 | 0.0000451 | 0.0000569 | 0.0000248 | 0.000016 | 0.0000397 | 0.0000737 | 0.000422 | 0.000101 | 0.00119 | 0.00164 | 0.0000659 | 0.0000736 | 0.000129 | 0.000278 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | 8.6 | 9.3 | 8.9 | 4.9 | 10.4 | 12.4 | 14.7 | 15.5 | 13.4 | 13.9 | 15.3 | 11.8 | 11.3 | 11.5 | 13.9 | 10.5 | 6.8 | 11.8 | 12.8 | 9.2 | 13.5 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | 0.0000622 | 0.0000855 | 0.0000449 | 0.000264 | 0.00124 | 0.000015 | 0.0000105 | <0.0000050 | 0.000011 | 0.0000523 | <0.0000050 | 0.000011 | 0.000014 | 0.000197 | 0.0000115 | 0.000248 | 0.000471 | <0.0000050 | 0.0000766 | 0.000124 | 0.000164 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | 0.00268 | 0.00355 | 0.00175 | 0.00482 | 0.00971 | 0.00218 | 0.00262 | 0.00108 | 0.00274 | 0.00659 | 0.00173 | 0.00135 | 0.00186 | 0.00376 | 0.0015 | 0.0124 | 0.0525 | 0.00114 | 0.0163 | 0.00713 | 0.014 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | 0.0326 | 0.0236 | 0.0147 | 0.0102 | <0.0020 | 0.0023 | 0.0037 | 0.022 | 0.0026 | 0.0503 | 0.0102 | 0.0174 | 0.0168 | 0.0206 | 0.0033 | 0.0071 | 0.0108 | 0.012 | 0.0356 | 0.0427 | 0.002 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | 0.000222 | 0.000212 | 0.00109 | 0.0104 | 0.0558 | 0.00115 | 0.000218 | 0.000285 | 0.000095 | 0.00104 | 0.000142 | 0.00022 | 0.000854 | 0.000782 | 0.000611 | 0.002 | 0.00354 | 0.000109 | 0.00176 | 0.00759 | 0.00309 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | 0.0044 | 0.0043 | 0.0098 | 0.0081 | 0.0122 | 0.0282 | 0.0226 | 0.0204 | 0.0354 | 0.0038 | 0.0056 | 0.0031 | 0.0141 | 0.0104 | 0.0250 | 0.0201 | 0.0305 | 0.0259 | 0.0137 | 0.0121 | 0.0202 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | 0.338 | 0.367 | 0.401 | 0.393 | 0.576 | 0.445 | 0.466 | 0.280 | 0.277 | 0.489 | 0.286 | 0.221 | 0.412 | 0.643 | 0.498 | 0.703 | 0.517 | 0.347 | 0.393 | 0.470 | 0.651 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | 0.1 | 0.116 | 0.0566 | 0.0822 | 0.156 | 0.0487 | 0.124 | 0.104 | 0.0669 | 0.354 | 0.254 | 0.128 | 0.0943 | 0.178 | 0.0484 | 0.2 | 0.248 | 0.0441 | 0.168 | 0.236 | 0.168 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | <0.000020 | 0.000021 | <0.000020 | 0.000024 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | 0.000525 | 0.000537 | 0.000907 | 0.000271 | 0.000159 | 0.00125 | 0.000944 | 0.00077 | 0.00275 | 0.000682 | 0.000938 | 0.000474 | 0.00112 | 0.00217 | 0.00116 | 0.000698 | 0.000313 | 0.0012 | 0.000588 | 0.000696 | 0.000552 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | 0.000234 | 0.000215 | 0.000202 | 0.000339 | 0.00049 | <0.000040 | <0.000040 | <0.000040 | <0.000040 | 0.000216 | 0.000051 | 0.000096 | 0.00007 | 0.000468 | 0.000067 | 0.000673 | 0.000433 | <0.000040 | 0.00015 | 0.000224 | 0.000282 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | 4.09 | 3.52 | 3.29 | 3.66 | 2.56 | 2.8 | 2.4 | 2.27 | 3.92 | 5.7 | 3.41 | 3.27 | 3.91 | 3.54 | 2.98 | 3.01 | 1.62 | 4.91 | 4.18 | 5.39 | 2.69 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | 1.46 | 1.38 | 1.79 | 0.84 | 0.38 | 1.52 | 1.65 | 1.69 | 2.01 | 1.76 | 2.11 | 1.75 | 2.28 | 1.9 | 2.23 | 1.25 | 0.55 | 2.12 | 1.97 | 1.98 | 0.6 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | 0.000024 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000031 | <0.000010 | <0.000010 | 0.00002 | 0.000019 | <0.000010 | <0.000010 | 0.000011 | <0.000010 | 0.000016 | 0.000041 | 0.000058 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | 3.95 | 4.54 | 5.24 | 5.96 | 7.13 | 6.12 | 6.18 | 6.49 | 6.14 | 5.46 | 5.47 | 3.65 | 6.36 | 8.1 | 4.21 | 9.37 | 9.89 | 7.1 | 5.8 | 6.3 | 4.98 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0168 | 0.0195 | 0.0203 | 0.0136 | 0.046 | 0.0275 | 0.0379 | 0.0415 | 0.0439 | 0.0196 | 0.0253 | 0.016 | 0.0289 | 0.0468 | 0.0512 | 0.0397 | 0.0177 | 0.0328 | 0.034 | 0.0301 | 0.016 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | <1.00 | <1.00 | <1.00 | 1.1 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | 0.0000638 | 0.0000894 | 0.0000683 | 0.0000251 | 0.0000482 | 0.0000826 | 0.0000812 | 0.0000762 | 0.00015 | 0.0000419 | 0.000028 | 0.0000151 | 0.0000904 | 0.0000462 | 0.0000297 | 0.0000268 | 0.0000242 | 0.0000311 | 0.0000083 | 0.0000947 | 0.0000551 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000301 | 0.000467 | 0.000304 | 0.000057 | 0.000013 | 0.000049 | 0.000034 | <0.000010 | 0.000053 | 0.000799 | 0.000088 | 0.00007 | 0.000246 | 0.000663 | 0.000016 | 0.000227 | 0.000975 | 0.000022 | 0.000701 | 0.00154 | 0.00003 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | <0.000100 | <0.000100 | 0.0001 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | 0.00113 | 0.00069 | 0.00051 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | 0.00097 | 0.00053 | 0.00054 | 0.00055 | 0.00096 | <0.00020 | 0.00034 | 0.00034 | 0.00032 | 0.00073 | 0.00081 | <0.00020 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | 0.00173 | 0.00123 | 0.00088 | 0.00031 | 0.00203 | 0.00074 | 0.00087 | 0.00086 | 0.0031 | 0.00655 | 0.0105 | 0.00482 | 0.00203 | 0.00172 | 0.00178 | 0.00215 | 0.00075 | 0.00244 | 0.00595 | 0.00313 | 0.0042 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | 0.000781 | 0.000658 | 0.000916 | 0.000767 | 0.00191 | 0.00128 | 0.00152 | 0.000725 | 0.00373 | 0.00494 | 0.00351 | 0.00295 | 0.00194 | 0.00174 | 0.00184 | 0.000965 | 0.000849 | 0.00147 | 0.00135 | 0.0028 | 0.00125 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | 0.0019 | 0.0028 | 0.0059 | 0.0234 | 0.0709 | 0.0039 | 0.0020 | 0.0013 | 0.0025 | 0.0023 | 0.0015 | 0.0029 | 0.0026 | 0.0117 | 0.0030 | 0.0555 | 0.1240 | <0.0010 | 0.0023 | 0.0046 | 0.0072 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | 0.00181 | 0.00153 | 0.00109 | 0.00088 | 0.00006 | 0.00015 | 0.00021 | 0.00007 | 0.00022 | 0.00149 | 0.00048 | 0.00064 | 0.00091 | 0.00762 | 0.00019 | 0.00256 | 0.00273 | 0.00028 | 0.00448 | 0.00445 | 0.00009 |
| ***Ion Balance:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Major Anions | Calc. | meq/L | | 0.77 | 0.82 | 0.78 | 0.65 | 0.85 | 1.06 | 1.11 | 1.09 | 0.99 | 1.06 | 1.10 | 0.84 | 0.95 | 0.99 | 0.97 | 0.93 | 0.76 | 1.10 | 1.00 | 0.92 | 0.98 |
| Major Cations | Calc. | meq/L | | 0.75 | 0.80 | 0.81 | 0.65 | 0.96 | 1.01 | 1.12 | 1.16 | 1.08 | 1.15 | 1.14 | 0.87 | 0.99 | 1.10 | 1.02 | 1.09 | 0.88 | 1.07 | 1.06 | 0.94 | 1.03 |
| Difference | Calc. | meq/L | | -0.01 | -0.02 | 0.03 | 0.00 | 0.10 | -0.05 | 0.01 | 0.07 | 0.09 | 0.09 | 0.04 | 0.03 | 0.04 | 0.10 | 0.04 | 0.17 | 0.12 | -0.03 | 0.06 | 0.02 | 0.05 |
| Balance (%) | Calc. | % | | -0.9% | -1.2% | 1.7% | -0.3% | 5.7% | -2.6% | 0.5% | 3.1% | 4.4% | 4.1% | 1.8% | 1.5% | 2.3% | 5.0% | 2.3% | 8.2% | 7.1% | -1.2% | 2.8% | 1.1% | 2.7% |
| | | *Shake Flask Extract ID:* | | *25K1047-01* | *25K1047-02* | *25K1047-03* | *25K1047-04* | *25K1047-05* | *25K1047-06* | *25K1047-07* | *25K1047-08* | *25K1047-09* | *25K1047-10* | *25K1047-11* | *25K1047-12* | *25K1047-13* | *25K1047-14* | *25K1047-15* | *25K1047-16* | *25K1047-17* | *25K1047-18* | *25K1047-19* | *25K1047-20* | *25K1047-21* |

***NOTES:***
Job No: 25K1047, 25K1217, 25K1740, 25K1746
**Date of Analysis (24 h):** November 6-13, 2025
pH of DI water used (pH Units): 5.24, 5.34, 5.39, 5.54
EC of DI water used (µS/cm): 1.24, 1.19, 1.29, 1.14

***ABBREVIATIONS:***
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S; 750 mL DI $H_2O$: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

## CERTIFICATE OF ANALYSIS • MEND SHAKE FLASK EXTRACTION RESULTS




EXTRACTION RESULTS

PAGE: 8 of 9
GLOBAL PROJECT NO: 2577 (B1)
CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
PROJECT NO: 2025 Geochemical Sampling
REPORT VERSION: 3

EXTRACTION RESULTS

PAGE: 8 of 9
GLOBAL PROJECT NO: 2577 (B1)
CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
PROJECT NO: 2025 Geochemical Sampling
REPORT VERSION: 3


| Parameter | Method | Unit | RDL | Method Blank | 20 | 21 | 21D | 22 | 23 | 24 | 25 | 26 | 27 | 27R | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 36D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Composite-20 DS150_20-23.3 | Composite-21 DS150_23.3-25.7 | Composite-21-DUP DS150_30.5-32 | Composite-22 DS150_30.07-33.96 | Composite-23 DS150_35.3-40 | Composite-24 DS155_4-4.5 | Composite-25 DS155_5-21 | Composite-26 DS155_21-25 | Composite-27 DS155_25-60 | Composite-27 DS155_25-60 (Rep) | Composite-28 DS155_62.2-69.2 | Composite-29 DS155_69.2-72.3 | Composite-30 DS155_72.3-78 | Composite-31 DS155_78-79.7 | Composite-32 DS151_3.4-4 | Composite-33 DS151_3.4-4 | Composite-34 DS151_4-19.8 | Composite-35 DS151_19.8-26.12 | Composite-36 DS151_26.12-35 | Composite-36-DUP DS151_40-41 |
| Weight of dry sample used | Weighing Scale | g | 0.01 | N/A | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | Meter | pH units | 0.01 | 6.0 | 5.9 | 5.9 | 6.3 | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 | 6.3 | | 6.2 | 6.3 | 6.2 | 6.4 | 6.2 | 6.2 | 6.2 | 6.1 | 6.3 | 6.3 |
| EC | Meter | µS/cm | 1 | 1.31 | 73 | 70 | 78 | 56 | 95 | 68 | 81 | 73 | 77 | | 87 | 109 | 111 | 163 | 87 | 83 | 82 | 99 | 81 | 131 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 4.6 | 12.0 | 13.9 | 19.4 | 11.5 | 18.9 | 9.6 | 14.2 | 15.6 | 15.7 | | 19.9 | 19.9 | 20.8 | 25.3 | 17.8 | 14.5 | 14.9 | 17.5 | 19.4 | 21.6 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 3.4 | 6.5 | 6.0 | 24.8 | 7.1 | 23.6 | 6.7 | 13.6 | 15.6 | 17.6 | | 17.3 | 22.1 | 22.6 | 32.2 | 19.6 | 15.0 | 14.5 | 11.3 | 20.3 | 27.7 |
| Sulphate | Turbidimetric | mg/L | 0.5 | | <0.5 | 0.51 | 0.82 | 1.01 | 0.50 | 0.64 | 0.62 | 0.73 | 0.83 | | 0.57 | 0.84 | 0.76 | 2.15 | 0.55 | 0.35 | 0.27 | 0.33 | <0.5 | 0.54 |
| Chloride | IC | mg/L | 0.1 | | 7.81 | 5.94 | 2.86 | 4.53 | 9.26 | 11.40 | 10.40 | 7.70 | 8.21 | | 7.10 | 7.07 | 7.42 | 13.80 | 6.79 | 8.36 | 7.93 | 9.89 | 3.82 | 12.50 |
| Fluoride | IC | mg/L | 0.1 | | 3.27 | 5.09 | 2.61 | 2.77 | 0.92 | 1.66 | 1.00 | 1.29 | 1.06 | | 3.04 | 3.13 | 3.19 | 2.50 | 1.30 | 1.41 | 2.89 | 4.22 | 3.25 | 1.95 |
| Nitrate + Nitrite as N | Calc. | mg/L | 0.01 | | 0.021 | 0.011 | <0.01 | 0.011 | <0.01 | 0.011 | <0.01 | <0.01 | <0.01 | | 0.024 | 0.021 | 0.018 | 0.037 | <0.01 | 0.015 | 0.011 | 0.027 | 0.013 | 0.016 |
| Phosphorus, Total Dissolved | | mg/L | 0.005 | | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Hardness (CaCO3) | ICP-MS | mg/L | 0.125 | <0.125 | 12.3 | 20.9 | 23.0 | 9.0 | 23.7 | 10.0 | 15.2 | 17.7 | 17.8 | | 26.2 | 27.7 | 31.0 | 40.9 | 19.7 | 17.0 | 17.7 | 24.1 | 25.1 | 30.9 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | <0.0010 | 0.0627 | 0.0074 | 0.0861 | 0.0953 | 0.0564 | 0.0402 | 0.0389 | 0.049 | 0.0447 | 0.0461 | 0.0394 | 0.0493 | 0.0243 | 0.0549 | 0.0484 | 0.0336 | 0.0377 | 0.0285 | 0.0555 | 0.0642 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | 0.000067 | <0.000050 | 0.000091 | 0.000137 | 0.000173 | 0.000134 | 0.000181 | 0.000151 | 0.000155 | 0.00014 | 0.000076 | 0.000068 | 0.000085 | 0.000158 | 0.000141 | 0.000166 | 0.000121 | 0.000059 | 0.000098 | 0.000121 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | 0.000113 | 0.000065 | 0.000319 | 0.000368 | 0.000747 | 0.000205 | 0.000631 | 0.000605 | 0.000786 | 0.000796 | 0.00025 | 0.000224 | 0.000137 | 0.000757 | 0.000688 | 0.000339 | 0.000174 | 0.000084 | 0.000128 | 0.000634 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | 0.0342 | 0.0237 | 0.0329 | 0.0306 | 0.0469 | 0.0133 | 0.0115 | 0.0138 | 0.0324 | 0.0323 | 0.157 | 0.163 | 0.557 | 0.648 | 0.102 | 0.0229 | 0.024 | 0.044 | 0.0303 | 0.031 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | 0.000294 | 0.000264 | 0.000054 | 0.000415 | 0.000069 | 0.000078 | 0.00003 | 0.000038 | 0.000029 | 0.00003 | 0.000038 | 0.000059 | 0.000037 | 0.000049 | 0.000017 | 0.000053 | 0.000063 | 0.00009 | 0.000069 | 0.000048 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000028 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | <0.0020 | 0.005 | 0.0021 | 0.0053 | 0.0054 | 0.0073 | 0.0049 | 0.0139 | 0.0074 | 0.0072 | 0.0071 | 0.0044 | 0.0057 | 0.0096 | 0.0091 | 0.0112 | 0.0063 | 0.0064 | 0.006 | 0.005 | 0.0098 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | <0.0000020 | 0.00112 | 0.000196 | 0.0000389 | 0.00083 | 0.0000192 | 0.000279 | 0.0000206 | 0.0000094 | 0.0000234 | 0.0000249 | 0.000177 | 0.0000811 | 0.0000862 | 0.000109 | 0.0000151 | 0.000144 | 0.000316 | 0.000458 | 0.0000468 | 0.0000159 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | <0.050 | 4.4 | 8.0 | 8.8 | 3.3 | 9.1 | 3.5 | 5.7 | 6.7 | 6.8 | 6.9 | 10.1 | 10.6 | 12.0 | 15.6 | 7.5 | 6.1 | 6.5 | 8.9 | 9.5 | 11.8 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | <0.0000050 | 0.000409 | 0.0015 | <0.0000050 | 0.000012 | 0.0000059 | 0.0000802 | 0.0000094 | 0.0000059 | 0.0000148 | 0.0000144 | 0.000239 | 0.000442 | 0.0000891 | 0.00044 | 0.0000759 | 0.0000074 | 0.0000175 | 0.000153 | 0.000138 | 0.0000157 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | 0.0392 | 0.0162 | 0.00125 | 0.00525 | 0.00253 | 0.00678 | 0.00198 | 0.00128 | 0.00197 | 0.00202 | 0.0109 | 0.0183 | 0.0111 | 0.0188 | 0.00526 | 0.0006 | 0.00112 | 0.0204 | 0.00434 | 0.00196 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | <0.0020 | 0.0069 | <0.0020 | 0.0105 | 0.0354 | 0.0329 | 0.0117 | 0.0186 | 0.0153 | 0.0213 | 0.0227 | 0.0052 | 0.0126 | <0.0020 | 0.013 | 0.0187 | 0.0058 | 0.011 | 0.0029 | 0.004 | 0.0093 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | 0.000783 | 0.00745 | 0.000145 | 0.000566 | 0.000111 | 0.000346 | 0.000302 | 0.000066 | 0.000169 | 0.000167 | 0.000428 | 0.000266 | 0.000087 | 0.00053 | 0.000062 | 0.000061 | 0.000182 | 0.00032 | 0.000125 | 0.000079 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | <0.000050 | 0.0365 | 0.0059 | 0.0300 | 0.0253 | 0.0150 | 0.0041 | 0.0096 | 0.0050 | 0.0071 | 0.0072 | 0.0090 | 0.0062 | 0.0076 | 0.0220 | 0.0084 | 0.0195 | 0.0141 | 0.0155 | 0.0097 | 0.0114 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | <0.0050 | 0.299 | 0.225 | 0.270 | 0.218 | 0.233 | 0.311 | 0.212 | 0.245 | 0.233 | 0.230 | 0.242 | 0.322 | 0.256 | 0.485 | 0.236 | 0.418 | 0.337 | 0.481 | 0.345 | 0.346 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | 0.804 | 0.155 | 0.0404 | 0.121 | 0.0668 | 0.311 | 0.0302 | 0.0486 | 0.0471 | 0.0469 | 0.0539 | 0.0648 | 0.0774 | 0.108 | 0.0685 | 0.0318 | 0.108 | 0.121 | 0.0323 | 0.109 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | 0.000159 | 0.000038 | 0.000387 | 0.000431 | 0.000805 | 0.000752 | 0.00225 | 0.00238 | 0.00114 | 0.00116 | 0.000653 | 0.000443 | 0.000756 | 0.00162 | 0.000492 | 0.00117 | 0.000792 | 0.00042 | 0.000477 | 0.000747 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | <0.000040 | 0.00213 | 0.00097 | <0.000040 | 0.000259 | 0.000053 | 0.000317 | 0.000052 | <0.000040 | 0.000048 | 0.00006 | 0.000404 | 0.000682 | 0.000289 | 0.000974 | 0.000263 | 0.00005 | 0.000092 | 0.000378 | 0.000115 | 0.000071 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | <0.020 | 3.62 | 1.22 | 5.3 | 4.04 | 3.66 | 3.19 | 3.53 | 2.33 | 2.81 | 2.79 | 1.46 | 2.98 | 1.95 | 4.31 | 2.19 | 2.75 | 2.58 | 2.28 | 1.56 | 3.05 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00011 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | <0.10 | 0.54 | 0.1 | 1.27 | 0.78 | 1.75 | 0.71 | 1.3 | 1.11 | 1.49 | 1.47 | 0.84 | 1.32 | 0.91 | 1.69 | 1.1 | 1.7 | 1.19 | 0.63 | 1.16 | 1.53 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | 0.000208 | 0.000038 | 0.000014 | 0.000063 | 0.000025 | <0.000010 | 0.000016 | 0.000012 | <0.000010 | 0.00001 | <0.000010 | 0.000013 | <0.000010 | 0.000015 | 0.000025 | <0.000010 | 0.000014 | 0.000013 | <0.000010 | <0.000010 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | <0.020 | 4.76 | 2.98 | 2.55 | 4.12 | 5.47 | 5.46 | 5.69 | 4.45 | 4.83 | 4.8 | 4.44 | 4.79 | 4.31 | 7.32 | 4.38 | 4.53 | 4.39 | 5.04 | 2.59 | 7.46 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | 0.00671 | 0.0198 | 0.00854 | 0.00486 | 0.0226 | 0.0211 | 0.0195 | 0.0174 | 0.0208 | 0.0206 | 0.016 | 0.018 | 0.0255 | 0.0391 | 0.019 | 0.0165 | 0.011 | 0.00911 | 0.0113 | 0.0277 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.1 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | <0.0000040 | 0.0000372 | 0.0000129 | 0.0000221 | 0.0000392 | 0.0000507 | 0.0000205 | 0.0000324 | 0.0000203 | 0.0000084 | 0.0000784 | 0.0000912 | 0.0000797 | 0.0000754 | 0.000089 | 0.0000921 | 0.0000494 | 0.0000564 | 0.0000563 | 0.0000681 | 0.0000864 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | 0.000042 | <0.000010 | 0.000033 | 0.000217 | 0.000376 | 0.000116 | 0.000187 | 0.000122 | 0.000129 | 0.000112 | 0.00004 | 0.000218 | <0.000010 | 0.000113 | 0.000155 | 0.000018 | 0.000045 | 0.000018 | 0.000017 | 0.000225 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | 0.000115 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | <0.00020 | <0.00020 | <0.00020 | 0.00024 | 0.00076 | 0.00082 | 0.00027 | 0.00051 | 0.00058 | 0.0005 | 0.00054 | 0.00025 | 0.00061 | <0.00020 | 0.00052 | 0.00039 | <0.00020 | 0.00042 | <0.00020 | <0.00020 | 0.00053 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | <0.00020 | 0.00229 | 0.0018 | 0.00108 | 0.00228 | 0.00247 | 0.00032 | 0.00086 | 0.00071 | 0.00059 | 0.00059 | 0.00107 | 0.0025 | 0.00081 | 0.00183 | 0.00165 | 0.0062 | 0.00254 | 0.00054 | 0.00085 | 0.0008 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | <0.0000010 | 0.000683 | 0.00031 | 0.000848 | 0.000776 | 0.00161 | 0.000441 | 0.00157 | 0.00137 | 0.000707 | 0.000694 | 0.000535 | 0.000706 | 0.000776 | 0.00172 | 0.000746 | 0.000134 | 0.00046 | 0.000657 | 0.00108 | 0.00126 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | <0.0010 | 0.0950 | 0.0333 | 0.0015 | 0.0240 | 0.0014 | 0.0073 | 0.0023 | 0.0014 | 0.0011 | 0.0013 | 0.0041 | 0.0033 | 0.0033 | 0.0048 | 0.0020 | 0.0056 | 0.0144 | 0.0164 | 0.0013 | 0.0013 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | <0.000020 | 0.00040 | <0.000020 | 0.00073 | 0.00161 | 0.00139 | 0.00085 | 0.00086 | 0.00056 | 0.00084 | 0.00091 | 0.00028 | 0.00114 | 0.00009 | 0.00099 | 0.00072 | 0.00012 | 0.00024 | 0.00011 | 0.00012 | 0.00178 |
| ***Ion Balance:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Major Anions | Calc. | meq/L | | | 0.52 | 0.57 | 0.73 | 0.44 | 0.79 | 0.56 | 0.63 | 0.61 | 0.66 | 0.66 | 0.72 | 0.82 | 0.84 | 1.21 | 0.66 | 0.62 | 0.67 | 0.73 | 0.68 | 1.02 |
| Major Cations | Calc. | meq/L | | | 0.59 | 0.59 | 0.72 | 0.48 | 0.82 | 0.54 | 0.65 | 0.62 | 0.65 | 0.66 | 0.77 | 0.85 | 0.88 | 1.27 | 0.66 | 0.61 | 0.62 | 0.77 | 0.66 | 1.04 |
| Difference | Calc. | meq/L | | | 0.07 | 0.02 | -0.01 | 0.05 | 0.03 | -0.02 | 0.02 | 0.01 | -0.01 | 0.00 | 0.05 | 0.03 | 0.03 | 0.06 | -0.01 | 0.00 | -0.05 | 0.04 | -0.02 | 0.02 |
| Balance (%) | Calc. | % | | | 5.9% | 2.0% | -0.7% | 5.0% | 1.7% | -1.5% | 1.7% | 0.5% | -0.6% | -0.1% | 3.2% | 1.8% | 1.8% | 2.5% | -0.6% | -0.2% | -3.8% | 2.5% | -1.5% | 0.8% |
| | | *Shake Flask Extract ID:* | | *25K1047-22* | *25K1217-01* | *25K1217-02* | *25K1217-03* | *25K1217-04* | *25K1217-05* | *25K1217-06* | *25K1217-07* | *25K1217-08* | *25K1217-09* | *25K1217-09* | *25K1217-10* | *25K1217-11* | *25K1217-12* | *25K1217-13* | *25K1217-14* | *25K1217-15* | *25K1217-16* | *25K1217-17* | *25K1217-18* | *25K1217-19* |

***NOTES:***

Job No: 25K1047, 25K1217, 25K1740, 25K1746
**Date of Analysis (24 h):** November 6-13, 2025
pH of DI water used (pH Units): 5.24, 5.34, 5.39, 5.54
EC of DI water used (µS/cm): 1.24, 1.19, 1.29, 1.14

***ABBREVIATIONS:***

R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliqu
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***

Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Re
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S, 750 mL DI $H_2O$: 250 g of crushed sample (85% p

EXTRACTION RESULTS

PAGE: 8 of 9
GLOBAL PROJECT NO: 2577 (B1)
CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
PROJECT NO: 2025 Geochemical Sampling
REPORT VERSION: 3

EXTRACTION RESULTS

PAGE: 8 of 9
GLOBAL PROJECT NO: 2577 (B1)
CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
PROJECT NO: 2025 Geochemical Sampling
REPORT VERSION: 3

| Parameter | Method | Unit | RDL | 37 | 38 | 39 | 40 | Method Blank | 41 | 41D | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Composite-37 DS157_6.41-7.0 | Composite-38 DS157_7-21 | Composite-39 DS157_21-36 | Composite-40 DS157_39-45.0 | | Composite-41 DS157_50-55 | Composite-41-DUP DS157_60-61 | Composite-42 DS153_3-3.5 | Composite-43 DS153_3-20.9 | Composite-44 DS153_23-26 | Composite-45 DS153_26_34.4 | Composite-46 DS153_36_51 | Composite-47 DS154_5.4-6 | Composite-48 DS154_6-21 | Composite-49 DS154_21-41 | Composite-50 DS154_41-61 | Composite-51 DS154_61.5-67 | Composite-52 DS154_67-72.6 | Composite-53 DS154_72.6-75.62 | Composite-54 DS164_3.86-4.36 | Composite-55 DS164_5-21 |
| Weight of dry sample used | Weighing Scale | g | 0.01 | 250 | 250 | 250 | 250 | N/A | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | Meter | pH units | 0.01 | 5.9 | 6.2 | 6.3 | 6.2 | 6.1 | 6.0 | 6.1 | 6.1 | 6.2 | 5.8 | 6.0 | 6.1 | 6.0 | 6.1 | 6.2 | 6.3 | 6.2 | 6.3 | 6.2 | 6.0 | 5.8 |
| EC | Meter | µS/cm | 1 | 150 | 132 | 110 | 129 | 1.65 | 106 | 91 | 64 | 96 | 92 | 118 | 99 | 71 | 71 | 86 | 83 | 158 | 116 | 103 | 61 | 81 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 17.3 | 20.0 | 17.8 | 21.5 | 4.2 | 23.0 | 21.6 | 14.3 | 21.3 | 17.8 | 20.4 | 14.4 | 12.0 | 16.4 | 22.4 | 20.5 | 22.6 | 26.5 | 26.6 | 12.1 | 13.2 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 6.7 | 17.9 | 20.0 | 24.6 | 3.4 | 21.9 | 21.4 | 7.1 | 21.8 | 8.1 | 11.1 | 8.4 | 6.1 | 12.9 | 26.5 | 27.0 | 21.9 | 32.5 | 31.9 | 8.4 | 6.3 |
| Sulphate | Turbidimetric | mg/L | 0.5 | 15.41 | 9.49 | 0.75 | 0.44 | | <0.5 | <0.5 | 0.51 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.76 | 0.64 | 1.07 | 1.39 | <0.5 | <0.5 | 0.7 | <0.5 |
| Chloride | IC | mg/L | 0.1 | 12.20 | 9.33 | 13.50 | 13.60 | | 14.90 | 11.40 | 12.30 | 15.00 | 17.10 | 23.60 | 18.10 | 14.50 | 9.88 | 9.33 | 7.87 | 23.90 | 12.10 | 9.56 | 9.22 | 17.10 |
| Fluoride | IC | mg/L | 0.1 | 1.70 | 1.27 | 1.50 | 3.58 | | 4.24 | 4.08 | 3.86 | 3.59 | 3.99 | 4.78 | 3.42 | 1.67 | 1.48 | 1.61 | 1.35 | 4.10 | 3.31 | 2.48 | 2.65 | 3.22 |
| Nitrate + Nitrite as N | Calc. | mg/L | 0.01 | 0.013 | 0.012 | 0.018 | 0.026 | | 0.042 | 0.025 | 0.019 | 0.028 | 0.035 | 0.033 | 0.028 | 0.015 | <0.010 | <0.010 | <0.010 | 0.035 | 0.023 | 0.017 | 0.015 | 0.034 |
| Phosphorus, Total Dissolved | | mg/L | 0.005 | 0.005 | <0.0050 | <0.0050 | <0.0050 | | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Hardness (CaCO3) | ICP-MS | mg/L | 0.125 | 29.6 | 31.6 | 22.9 | 33.3 | <0.125 | 33.0 | 30.3 | 14.1 | 30.1 | 21.6 | 27.4 | 16.2 | 8.5 | 17.4 | 26.5 | 24.2 | 39.8 | 39.2 | 36.5 | 10.4 | 13.9 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | 0.138 | 0.0766 | 0.0506 | 0.0625 | <0.0010 | 0.039 | 0.0674 | 0.0984 | 0.0574 | 0.0993 | 0.0558 | 0.0794 | 0.0684 | 0.0453 | 0.116 | 0.0595 | 0.108 | 0.0696 | 0.0526 | 0.258 | 0.17 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | 0.00028 | 0.000426 | 0.000198 | 0.000173 | <0.000050 | 0.000157 | 0.000105 | 0.000172 | 0.00025 | 0.000083 | 0.000078 | 0.000192 | 0.000202 | 0.000177 | 0.000126 | 0.000228 | 0.000377 | 0.000124 | 0.000108 | 0.000154 | 0.000173 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | 0.000766 | 0.000666 | 0.000485 | 0.000312 | <0.000050 | 0.000281 | 0.000219 | <0.00110 | 0.000287 | <0.000250 | <0.000250 | 0.000288 | <0.000550 | 0.000544 | 0.000278 | 0.000752 | <0.000300 | 0.000237 | 0.000373 | <0.000500 | 0.000307 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0355 | 0.116 | 0.0479 | 0.0463 | <0.00010 | 0.0331 | 0.212 | 0.0155 | 0.0497 | 0.111 | 0.0796 | 0.0334 | 0.0632 | 0.0144 | 0.0218 | 0.227 | 0.268 | 0.0585 | 0.0612 | 0.0135 | 0.0371 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000561 | 0.000167 | 0.00007 | 0.000061 | <0.000010 | 0.000162 | 0.000094 | 0.000217 | 0.00004 | 0.00032 | 0.000124 | 0.000182 | 0.000499 | 0.000025 | 0.000023 | 0.000048 | 0.00025 | 0.000131 | 0.000091 | 0.000122 | 0.000235 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000018 | <0.000010 | <0.000010 | 0.000029 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | 0.0109 | 0.0072 | 0.0061 | 0.0062 | <0.0020 | 0.0094 | 0.0068 | 0.0081 | 0.01 | 0.0099 | 0.0108 | 0.0128 | 0.0219 | 0.0081 | 0.0087 | 0.0091 | 0.0114 | 0.0075 | 0.0096 | 0.0118 | 0.0118 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | 0.00345 | 0.000149 | 0.000245 | 0.000211 | <0.0000020 | 0.000256 | 0.0000502 | 0.000226 | 0.0000541 | 0.00134 | 0.000893 | 0.000535 | 0.000213 | 0.0000206 | 0.0000105 | 0.0000239 | 0.00048 | 0.0000756 | 0.0000567 | 0.000153 | 0.000351 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | 10.3 | 11.6 | 8.6 | 12.7 | <0.050 | 12.5 | 11.7 | 4.5 | 10.8 | 7.1 | 8.6 | 5.2 | 2.6 | 6.4 | 10.0 | 9.2 | 14.2 | 15.0 | 14.0 | 3.2 | 4.2 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | 0.0005 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | 0.00291 | 0.000597 | 0.0000165 | 0.0000806 | <0.0000050 | 0.000146 | 0.0000381 | 0.000172 | 0.000032 | 0.00024 | 0.00051 | 0.0000765 | 0.000746 | 0.0000557 | 0.0000229 | 0.0000279 | 0.00172 | 0.0000787 | 0.0000486 | 0.000122 | 0.000132 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | 0.00098 | 0.00118 | 0.00324 | 0.0116 | <0.00010 | 0.0176 | 0.0145 | 0.00613 | 0.00284 | 0.0689 | 0.0444 | 0.00804 | 0.00354 | 0.00124 | 0.00064 | 0.00298 | 0.0585 | 0.00656 | 0.00518 | 0.0104 | 0.00946 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | 0.0102 | 0.0182 | 0.024 | 0.0103 | <0.0020 | 0.0068 | 0.0074 | 0.0266 | 0.0188 | 0.0181 | 0.0051 | 0.0096 | 0.0417 | 0.0196 | 0.0551 | 0.0355 | 0.0271 | 0.0056 | 0.0086 | 0.0536 | 0.0173 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | 0.00059 | 0.000199 | 0.000183 | 0.000195 | <0.000050 | 0.000553 | 0.000431 | 0.00134 | 0.00035 | 0.0085 | 0.000301 | 0.000318 | 0.000483 | 0.000412 | 0.000158 | 0.000237 | 0.0164 | 0.000198 | 0.000209 | 0.00137 | 0.000435 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | 0.0110 | 0.0214 | 0.0161 | 0.0189 | <0.000050 | 0.0338 | 0.0233 | 0.0121 | 0.0081 | 0.0179 | 0.0174 | 0.0113 | 0.0083 | 0.0086 | 0.0108 | 0.0105 | 0.0082 | 0.0100 | 0.0143 | 0.0064 | 0.0111 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | 0.917 | 0.610 | 0.375 | 0.380 | <0.0050 | 0.430 | 0.279 | 0.659 | 0.728 | 0.913 | 1.410 | 0.807 | 0.512 | 0.359 | 0.356 | 0.305 | 1.060 | 0.417 | 0.361 | 0.613 | 0.852 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | 1.73 | 0.198 | 0.094 | 0.0829 | <0.000050 | 0.0464 | 0.0329 | 0.409 | 0.125 | 0.367 | 0.863 | 0.416 | 0.566 | 0.127 | 0.0446 | 0.0883 | 0.607 | 0.0779 | 0.0985 | 0.487 | 0.425 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | 0.000022 | <0.000020 | 0.000025 | <0.000020 | 0.000023 | <0.000020 | <0.000020 | <0.000020 | 0.000025 | <0.000020 | <0.000020 | 0.000022 | <0.000020 | <0.000020 | <0.000020 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | 0.00019 | 0.00131 | 0.00113 | 0.00144 | <0.000010 | 0.000932 | 0.00159 | 0.00081 | 0.00198 | 0.000342 | 0.00119 | 0.000865 | 0.000774 | 0.00167 | 0.003 | 0.000736 | 0.000924 | 0.00167 | 0.00168 | 0.000638 | 0.000481 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | 0.00259 | 0.000349 | 0.00013 | 0.000245 | <0.000040 | 0.000392 | 0.000134 | 0.000746 | 0.00013 | 0.000861 | 0.00121 | 0.000317 | 0.000591 | 0.000102 | <0.000040 | 0.000051 | 0.000601 | 0.000163 | 0.000161 | 0.000701 | 0.000583 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | 6.12 | 4.67 | 3.53 | 3.9 | <0.020 | 3.47 | 2.6 | 3.06 | 3.49 | 4.21 | 5.35 | 4.26 | 4.04 | 3.58 | 4.12 | 3.9 | 9.3 | 3.14 | 2.77 | 4.75 | 4.14 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0004 | 0.00017 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00022 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | 0.77 | 1.17 | 1.4 | 1.03 | <0.10 | 1.38 | 1.6 | 0.76 | 1.38 | 0.75 | 0.51 | 1.05 | 0.84 | 1.47 | 2.09 | 1.83 | 0.85 | 1.43 | 1.78 | 1.04 | 1.03 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | 0.000012 | <0.000010 | 0.00001 | <0.000010 | 0.000013 | 0.00002 | <0.000010 | <0.000010 | <0.000010 | 0.000035 | 0.000024 | 0.000026 | 0.000036 | 0.000024 | <0.000010 | 0.000012 | 0.000057 | <0.000010 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | 6.35 | 5.52 | 6.63 | 6.09 | <0.020 | 7.36 | 6.06 | 5.71 | 7.24 | 8.71 | 10.6 | 9.15 | 6.78 | 5.33 | 5.22 | 5.22 | 10.7 | 6.87 | 5.37 | 5.32 | 8.33 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0278 | 0.0288 | 0.0172 | 0.0312 | <0.00010 | 0.0168 | 0.0254 | 0.0197 | 0.0213 | 0.0152 | 0.0172 | 0.0179 | 0.0164 | 0.0131 | 0.0146 | 0.0232 | 0.0234 | 0.0295 | 0.0273 | 0.00874 | 0.0152 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | 8.1 | 5.5 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | 0.000131 | 0.00012 | 0.00018 | 0.0000949 | <0.0000040 | 0.000118 | 0.000114 | 0.000234 | 0.0000839 | 0.000132 | 0.0000744 | 0.00018 | 0.0001 | 0.0000267 | 0.0000662 | 0.000153 | 0.000233 | 0.0000961 | 0.0000683 | 0.000176 | 0.000157 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | 0.00014 | 0.0001 | 0.000238 | 0.000087 | <0.000010 | 0.000048 | 0.000051 | 0.00128 | 0.000286 | 0.000069 | 0.000034 | 0.000079 | 0.00283 | 0.000623 | 0.000311 | 0.000259 | 0.000477 | 0.000109 | 0.000131 | 0.00147 | 0.000098 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | 0.00035 | 0.00086 | 0.00097 | 0.00039 | <0.00020 | 0.00027 | 0.00037 | 0.00104 | 0.00042 | 0.00045 | <0.00020 | <0.00020 | 0.00092 | 0.00033 | 0.0012 | 0.00125 | 0.00072 | <0.00020 | 0.00028 | 0.00123 | 0.00058 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | <0.00020 | 0.00048 | 0.00071 | 0.00055 | <0.00020 | 0.0006 | 0.00087 | 0.00095 | 0.00091 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | 0.00055 | 0.00081 | 0.00632 | 0.00176 | 0.00087 | 0.00077 | 0.00052 | <0.00020 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | 0.00231 | 0.00677 | 0.000846 | 0.0023 | <0.0000010 | 0.000445 | 0.000732 | 0.000694 | 0.000694 | 0.00202 | 0.00264 | 0.0029 | 0.0027 | 0.00118 | 0.00287 | 0.00139 | 0.0142 | 0.00181 | 0.0009916 | 0.00267 | 0.00306 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | 0.0912 | 0.0047 | 0.0094 | 0.0083 | <0.0010 | 0.0098 | 0.0017 | 0.0074 | 0.0023 | 0.0758 | 0.0421 | 0.0154 | 0.0197 | 0.0017 | <0.0010 | 0.0013 | 0.0232 | 0.0025 | 0.0016 | 0.0144 | 0.0132 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | 0.00100 | 0.00123 | 0.00090 | 0.00104 | <0.000020 | 0.00024 | 0.00029 | 0.00135 | 0.00084 | 0.00065 | 0.00027 | 0.00036 | 0.00289 | 0.00108 | <0.00180 | 0.00170 | 0.00176 | 0.00043 | 0.00048 | 0.00383 | 0.00050 |
| ***Ion Balance:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Major Anions | Calc. | meq/L | | 0.89 | 0.89 | 0.88 | 1.07 | | 1.08 | 0.96 | 0.70 | 1.05 | 0.85 | 1.14 | 0.86 | 0.62 | 0.63 | 0.89 | 0.85 | 1.36 | 1.16 | 1.04 | 0.58 | 0.78 |
| Major Cations | Calc. | meq/L | | 1.11 | 1.01 | 0.85 | 1.04 | | 1.08 | 0.95 | 0.64 | 1.02 | 0.95 | 1.19 | 0.86 | 0.61 | 0.68 | 0.88 | 0.83 | 1.54 | 1.18 | 1.05 | 0.61 | 0.79 |
| Difference | Calc. | meq/L | | 0.22 | 0.12 | -0.03 | -0.03 | | 0.00 | -0.01 | -0.06 | -0.03 | 0.10 | 0.05 | 0.00 | -0.01 | 0.06 | -0.01 | -0.03 | 0.19 | 0.01 | 0.01 | 0.03 | 0.01 |
| Balance (%) | Calc. | % | | 11.1% | 6.6% | -1.5% | -1.4% | | 0.0% | -0.6% | -4.7% | -1.4% | 5.6% | 2.2% | 0.2% | -0.9% | 4.2% | -0.5% | -1.5% | 6.5% | 0.5% | 0.4% | 2.8% | 0.6% |
| | *Shake Flask Extract ID:* | | | *25K1217-20* | *25K1217-21* | *25K1217-22* | *25K1217-23* | *25K1217-24* | *25K1740-01* | *25K1740-02* | *25K1740-03* | *25K1740-04* | *25K1740-05* | *25K1740-06* | *25K1740-07* | *25K1740-08* | *25K1740-09* | *25K1740-10* | *25K1740-11* | *25K1740-12* | *25K1740-13* | *25K1740-14* | *25K1740-15* | *25K1740-16* |

***NOTES:***
Job No: 25K1047, 25K1217, 25K1740, 25K1746
**Date of Analysis (24 h):** November 6-13, 2025
pH of DI water used (pH Units): 5.24, 5.34, 5.39, 5.54
EC of DI water used (µS/cm): 1.24, 1.19, 1.29, 1.14

***ABBREVIATIONS:***
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliqu
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Re
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S, 750 mL DI $H_2O$: 250 g of crushed sample (85% p

## CERTIFICATE OF ANALYSIS • MEND SHAKE FLASK EXTRACTION RESULTS




EXTRACTION RESULTS

**PAGE:** 8 of 9
**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

EXTRACTION RESULTS

**PAGE:** 8 of 9
**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3


| Parameter | Method | Unit | RDL | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | Method Blank | 64 | 65 | 66 | 66R | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Composite-56 DS164_31-38 | Composite-57 DS164_39.0-41.08 | Composite-58 DS164_41.08-43.0 | Composite-59 DS165_2.85-3.35 | Composite-60 DS165_3.35_17.0 | Composite-61 DS165_18_3 2.0 | Composite-62 DS165_32.0-48.0 | Composite-63 DS165_61.90-64 | | Composite-64 DS165_64.0-67.0 | Composite-65 DS165_76.42-79.0 | Composite-66 DS169_62-65 | Composite-66 DS169_62-65 (Rep) | Composite-67 DS169_65-75 | Composite-68 DS144_9.65_10.0 | Composite-69 DS144_10.0_24.0 | Composite-70 DS144_24.0-33.0 | Composite-71 DS144_34.44-36.42 | Composite-72 DS144_37.0_38.0 | Composite-73 DS145_9.33_10.0 | Composite-74 DS145_10.0_24 |
| Weight of dry sample used | Weighing Scale | g | 0.01 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | N/A | 250 | 250 | 250 | | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | Meter | pH units | 0.01 | 5.9 | 5.9 | 6.0 | 5.9 | 6.1 | 6.2 | 6.3 | 5.9 | 5.9 | 5.8 | 6.1 | 6.1 | | 6.1 | 6.1 | 6.0 | 6.0 | 6.3 | 6.2 | 6.4 | 6.1 |
| EC | Meter | µS/cm | 1 | 81 | 134 | 84 | 83 | 65 | 92 | 89 | 77 | 1.31 | 91 | 75 | 126 | | 115 | 47 | 46 | 62 | 95 | 67 | 94 | 88 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 12.4 | 17.0 | 13.0 | 14.5 | 15.2 | 23.2 | 21.4 | 14.5 | 4.5 | 14.3 | 16.8 | 16.0 | | 14.6 | 9.7 | 10.4 | 16.4 | 24.9 | 18.5 | 25.4 | 21.2 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 5.9 | 6.4 | 7.0 | 5.1 | 15.9 | 28.8 | 25.7 | 8.1 | 1.6 | 6.5 | 15.3 | 12.0 | | 7.7 | 7.5 | 5.8 | 9.8 | 24.5 | 12.1 | 31.7 | 27.8 |
| Sulphate | Turbidimetric | mg/L | 0.5 | <0.5 | 0.7 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | | <0.5 | <0.5 | 1.1 | | 0.82 | <0.5 | <0.5 | 0.83 | 1.1 | 1.3 | 1.9 | 3.86 |
| Chloride | IC | mg/L | 0.1 | 18.40 | 26.90 | 15.10 | 18.10 | 7.93 | 8.55 | 9.60 | 9.67 | | 13.30 | 8.70 | 20.70 | | 22.80 | 6.75 | 7.17 | 6.98 | 9.84 | 9.11 | 9.46 | 7.72 |
| Fluoride | IC | mg/L | 0.1 | 2.23 | 2.75 | 2.32 | 1.46 | 1.24 | 1.70 | 1.41 | 4.07 | | 3.80 | 2.83 | 3.28 | | 3.36 | 1.91 | 2.02 | 2.28 | 3.62 | 1.94 | 0.71 | 0.72 |
| Nitrate + Nitrite as N | Calc. | mg/L | 0.01 | 0.083 | 0.079 | 0.029 | 0.475 | <0.010 | <0.010 | 0.020 | 0.032 | | 0.032 | 0.012 | 0.038 | | 0.069 | 0.013 | 0.010 | 0.011 | 0.029 | 0.015 | <0.010 | <0.010 |
| Phosphorus, Total Dissolved | | mg/L | 0.005 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | 0.012 | <0.0100 | | <0.0050 | <0.0050 | <0.0050 | | <0.0050 | 0.008 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.020 | 0.007 |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Hardness (CaCO3) | ICP-MS | mg/L | 0.125 | 9.8 | 18.3 | 12.8 | 7.9 | 16.0 | 30.1 | 25.4 | 18.7 | <0.125 | 16.0 | 19.5 | 21.7 | | 18.2 | 6.7 | 6.5 | 14.6 | 33.6 | 17.0 | 28.5 | 27.6 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | 0.137 | 0.219 | 0.0709 | 0.115 | 0.0427 | 0.0761 | 0.0724 | 0.0415 | <0.0010 | 0.0982 | 0.0395 | 0.111 | 0.113 | 0.106 | 0.0859 | 0.0713 | 0.0568 | 0.0346 | 0.0581 | 0.0916 | 0.103 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | 0.000069 | 0.000111 | 0.000172 | 0.000097 | 0.000206 | 0.000119 | 0.000155 | 0.000063 | <0.000050 | 0.000118 | 0.000099 | 0.000144 | 0.000116 | 0.000109 | 0.00014 | 0.000149 | 0.000145 | 0.000118 | 0.000329 | 0.000177 | 0.000538 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | 0.000128 | <0.000350 | 0.000256 | <0.000250 | 0.000472 | 0.000546 | 0.00093 | 0.000104 | <0.000050 | 0.000232 | 0.000302 | 0.000392 | 0.00041 | 0.000203 | <0.000650 | <0.000500 | <0.000500 | 0.000225 | <0.00125 | 0.00139 | 0.00162 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | 0.027 | 0.0609 | 0.0441 | 0.02 | 0.00523 | 0.0168 | 0.0545 | 0.0412 | <0.00010 | 0.0333 | 0.0206 | 0.0817 | 0.0827 | 0.0497 | 0.0146 | 0.0115 | 0.0667 | 0.578 | 0.205 | 0.0156 | 0.0538 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000192 | 0.000618 | 0.000391 | 0.000325 | 0.00002 | 0.000017 | 0.000018 | 0.000202 | <0.000010 | 0.000187 | 0.000099 | 0.000292 | 0.000296 | 0.000159 | 0.00012 | 0.000143 | 0.00011 | 0.000119 | 0.000804 | 0.000419 | 0.000112 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000023 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | 0.0093 | 0.0115 | 0.0067 | 0.0085 | 0.0072 | 0.0087 | 0.0096 | 0.0073 | <0.0020 | 0.0086 | 0.0063 | 0.0074 | 0.0075 | 0.0103 | 0.0075 | 0.0069 | 0.0073 | 0.0077 | 0.0092 | 0.0114 | 0.0124 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | 0.0000801 | 0.000231 | 0.000358 | 0.000312 | 0.0000177 | 0.000193 | 0.000242 | 0.000342 | <0.0000020 | 0.000438 | 0.0000818 | 0.000933 | 0.000935 | 0.000607 | 0.000131 | 0.000117 | 0.000193 | 0.00309 | 0.00207 | 0.0000891 | 0.0000288 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | 3.0 | 5.6 | 4.2 | 2.3 | 5.9 | 11.4 | 9.4 | 6.7 | <0.050 | 5.4 | 7.1 | 7.3 | 7.2 | 5.7 | 2.3 | 2.3 | 5.2 | 12.6 | 6.2 | 10.5 | 9.9 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | 0.0006 | <0.00050 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | 0.00336 | 0.00498 | 0.000803 | 0.000389 | 0.0000227 | <0.0000050 | 0.0000599 | 0.000254 | <0.0000050 | 0.000466 | 0.0000823 | 0.0012 | 0.0012 | 0.000354 | 0.000153 | 0.000132 | 0.000155 | 0.000183 | 0.000322 | 0.000164 | 0.0000546 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | 0.0186 | 0.042 | 0.0282 | 0.00136 | 0.00077 | 0.00057 | 0.00504 | 0.0204 | <0.00010 | 0.0158 | 0.00522 | 0.033 | 0.0329 | 0.0245 | 0.00448 | 0.00442 | 0.00536 | 0.0129 | 0.0175 | 0.0134 | 0.00496 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | <0.0020 | 0.0041 | 0.0057 | 0.0131 | 0.0176 | 0.0055 | 0.0068 | <0.0020 | <0.0020 | 0.0111 | 0.0085 | 0.0067 | 0.0067 | 0.004 | 0.0363 | 0.0296 | 0.0299 | 0.0056 | 0.0666 | 0.0945 | 0.0706 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | 0.00664 | 0.00447 | 0.000166 | 0.000406 | 0.000135 | 0.000567 | 0.000341 | 0.000098 | <0.000050 | 0.000512 | 0.000462 | 0.000345 | 0.000359 | 0.000501 | 0.00202 | 0.000383 | 0.000745 | 0.0038 | 0.00274 | 0.00148 | 0.000769 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | 0.0152 | 0.0177 | 0.0122 | 0.0134 | 0.0064 | 0.0110 | 0.0115 | 0.0303 | <0.000050 | 0.0164 | 0.0153 | 0.0155 | 0.0154 | 0.0145 | 0.0023 | 0.0025 | 0.0026 | 0.0187 | 0.0090 | 0.0038 | 0.0241 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | 0.565 | 1.060 | 0.569 | 0.558 | 0.340 | 0.409 | 0.488 | 0.508 | <0.0050 | 0.615 | 0.434 | 0.857 | 0.863 | 0.952 | 0.258 | 0.200 | 0.370 | 0.532 | 0.400 | 0.537 | 0.668 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | 0.0789 | 0.284 | 0.358 | 0.631 | 0.0808 | 0.0737 | 0.0363 | 0.213 | <0.000050 | 0.248 | 0.0475 | 0.948 | 0.941 | 0.216 | 0.0998 | 0.0881 | 0.191 | 0.0649 | 0.276 | 0.173 | 0.144 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | 0.000024 | <0.000020 | 0.000021 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | 0.000032 | 0.000032 | 0.000034 | 0.000037 | 0.000039 | 0.00003 | 0.000023 | 0.000024 | 0.000035 | 0.00002 | 0.000024 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | 0.000098 | 0.000154 | 0.000674 | 0.000502 | 0.0032 | 0.00108 | 0.000809 | 0.000598 | <0.000010 | 0.000778 | 0.00119 | 0.00181 | 0.00183 | 0.000943 | 0.000401 | 0.000391 | 0.000438 | 0.000634 | 0.00169 | 0.000444 | 0.00987 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | 0.000435 | 0.00103 | 0.00106 | 0.000529 | <0.000040 | <0.000040 | 0.000052 | 0.000764 | <0.000040 | 0.00088 | 0.000091 | 0.0029 | 0.00276 | 0.000923 | 0.000297 | 0.00024 | 0.000412 | 0.000353 | 0.000586 | 0.000591 | 0.000143 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.02 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | 4.89 | 7.83 | 3.83 | 4.54 | 2.85 | 2.15 | 3.12 | 3.13 | <0.020 | 4.95 | 2.5 | 10.2 | 10.3 | 5.26 | 3.25 | 3.01 | 3.88 | 2.86 | 2.97 | 10.6 | 7.49 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00031 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | 0.96 | 1.22 | 0.92 | 0.83 | 1.38 | 1.65 | 1.77 | 0.65 | <0.10 | 0.85 | 1.3 | 0.48 | 0.45 | 0.96 | 0.7 | 0.75 | 1.02 | 1.33 | 0.91 | 1.23 | 1.11 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000011 | <0.000010 | 0.00001 | <0.000010 | <0.000010 | <0.000010 | 0.000224 | 0.000848 | 0.000823 | 0.000026 | 0.000034 | 0.000013 | 0.000025 | 0.000021 | 0.000026 | 0.000031 | 0.000018 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | 8.82 | 12.4 | 7.84 | 8.34 | 4.43 | 4.78 | 5.34 | 5.34 | <0.020 | 7.57 | 4.99 | 9.28 | 9.39 | 11.5 | 4.26 | 4.59 | 4.29 | 5.1 | 5.51 | 4.24 | 5.21 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | 0.00768 | 0.0139 | 0.0172 | 0.0153 | 0.0166 | 0.0255 | 0.0225 | 0.0125 | <0.00010 | 0.0124 | 0.0167 | 0.0186 | 0.0187 | 0.0147 | 0.00979 | 0.0126 | 0.0158 | 0.0403 | 0.0214 | 0.0148 | 0.0219 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.1 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | 0.000297 | 0.000376 | 0.000187 | 0.0000353 | 0.0000259 | 0.0000264 | 0.000031 | 0.0000623 | <0.0000040 | 0.000105 | 0.0000633 | 0.000115 | 0.00012 | 0.0000965 | 0.0000521 | 0.0000541 | 0.0000746 | 0.0000215 | 0.000132 | 0.0000337 | 0.0000215 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000011 | 0.000027 | 0.000066 | 0.000096 | 0.000085 | 0.000045 | 0.000083 | <0.000010 | <0.000010 | 0.000075 | 0.000051 | 0.00005 | 0.000043 | 0.000051 | 0.000762 | 0.000465 | 0.002 | 0.000113 | 0.00442 | 0.0019 | 0.00132 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | 0.00046 | <0.00020 | 0.00034 | <0.00020 | <0.00020 | 0.00039 | 0.00025 | <0.00020 | <0.00020 | 0.00032 | 0.00103 | 0.00081 | 0.00088 | <0.00020 | 0.00167 | 0.00444 | 0.00157 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | 0.0004 | 0.00047 | 0.00065 | <0.00020 | <0.00020 | <0.00020 | 0.00044 | 0.00361 | 0.00357 | 0.00024 | 0.00041 | 0.00035 | 0.00086 | 0.00119 | 0.00177 | 0.00185 | 0.00148 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | 0.0031 | 0.00837 | 0.00253 | 0.000985 | 0.00308 | 0.00103 | 0.00156 | 0.00154 | <0.0000010 | 0.00295 | 0.00116 | 0.0103 | 0.0104 | 0.00701 | 0.00208 | 0.00132 | 0.00152 | 0.00194 | 0.00195 | 0.00207 | 0.00226 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | 0.0096 | 0.0217 | 0.0270 | 0.0215 | 0.0014 | 0.0030 | 0.0015 | 0.0246 | <0.0010 | 0.0234 | 0.0036 | 0.0818 | 0.0825 | 0.0331 | 0.0104 | 0.0082 | 0.0147 | 0.0311 | 0.0706 | 0.0081 | 0.0018 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | 0.00003 | 0.00018 | 0.00036 | 0.00065 | 0.00057 | 0.00030 | 0.00070 | 0.00006 | <0.000020 | 0.00057 | 0.00022 | 0.00063 | 0.00074 | 0.00017 | 0.00189 | 0.00181 | 0.00231 | 0.00072 | 0.00452 | 0.00595 | 0.00543 |
| ***Ion Balance:*** | | | | | | | | | | | | | | | | | | | | | | | | |
| Major Anions | Calc. | meq/L | | 0.75 | 1.05 | 0.69 | 0.69 | 0.61 | 0.91 | 0.86 | 0.65 | | 0.70 | 0.70 | 1.02 | 1.02 | 0.99 | 0.44 | 0.42 | 0.53 | 0.98 | 0.63 | 0.98 | 0.89 |
| Major Cations | Calc. | meq/L | | 0.73 | 1.15 | 0.72 | 0.68 | 0.60 | 0.88 | 0.83 | 0.70 | | 0.80 | 0.68 | 1.15 | 1.16 | 1.03 | 0.42 | 0.42 | 0.60 | 0.99 | 0.68 | 1.05 | 0.99 |
| Difference | Calc. | meq/L | | -0.03 | 0.10 | 0.03 | -0.01 | -0.01 | -0.03 | -0.02 | 0.06 | | 0.10 | -0.02 | 0.13 | 0.14 | 0.04 | -0.02 | 0.00 | 0.07 | 0.01 | 0.06 | 0.07 | 0.10 |
| Balance (%) | Calc. | % | | -1.8% | 4.6% | 2.3% | -0.8% | -0.7% | -1.4% | -1.5% | 4.1% | | 6.5% | -1.4% | 6.2% | 6.3% | 1.8% | -2.4% | -0.3% | 5.9% | 0.4% | 4.3% | 3.5% | 5.4% |
| | | *Shake Flask Extract ID:* | | *25K1740-17* | *25K1740-18* | *25K1740-19* | *25K1740-20* | *25K1740-21* | *25K1740-22* | *25K1740-23* | *25K1740-24* | *25K1740-25* | *25K1746-01* | *25K1746-02* | *25K1746-03* | *25K1746-03* | *25K1746-04* | *25K1746-05* | *25K1746-06* | *25K1746-07* | *25K1746-08* | *25K1746-09* | *25K1746-10* | *25K1746-11* |

***NOTES:***

Job No: 25K1047, 25K1217, 25K1740, 25K1746
**Date of Analysis (24 h):** November 6-13, 2025
pH of DI water used (pH Units): 5.24, 5.34, 5.39, 5.54
EC of DI water used (µS/cm): 1.24, 1.19, 1.29, 1.14

***ABBREVIATIONS:***

R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliqu
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***

Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Re
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S; 750 mL DI $H_2O$: 250 g of crushed sample (85% p

## CERTIFICATE OF ANALYSIS • MEND SHAKE FLASK EXTRACTION RESULTS



**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| Parameter | Method | Unit | RDL | 75<br>Composite-75 DS145_24.0-38.0 | 76<br>Composite-76 DS145_38.0-52.0 | 77<br>Composite-77 DS145_91.48-93.52 | Method Blank |
|---|---|---|---|---|---|---|---|
| Weight of dry sample used | Weighing Scale | g | 0.01 | 250 | 250 | 250 | N/A |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | | | |
| pH | Meter | pH units | 0.01 | 6.1 | 6.1 | 6.2 | 6.0 |
| EC | Meter | µS/cm | 1 | 36 | 64 | 106 | 1.14 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 8.4 | 18.1 | 22.5 | 4.1 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 8.9 | 23.5 | 26.7 | 1.5 |
| Sulphate | Turbidimetric | mg/L | 0.5 | 1.03 | 1.58 | 0.66 | |
| Chloride | IC | mg/L | 0.1 | 4.05 | 5.21 | 11.40 | |
| Fluoride | IC | mg/L | 0.1 | 1.19 | 0.94 | 4.21 | |
| Nitrate + Nitrite as N | Calc. | mg/L | 0.01 | <0.010 | <0.010 | 0.038 | |
| Phosphorus, Total Dissolved | | mg/L | 0.005 | <0.0050 | 0.009 | <0.0050 | |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | | | |
| Dissolved Hardness (CaCO3) | ICP-MS | mg/L | 0.125 | 6.7 | 21.2 | 39.0 | <0.125 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | 0.0514 | 0.0826 | 0.0774 | <0.0010 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | 0.000404 | 0.00131 | 0.0002 | <0.000050 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | 0.00187 | 0.238 | 0.000284 | <0.000050 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0146 | 0.02 | 0.243 | <0.00010 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000095 | 0.000077 | 0.000028 | <0.000010 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | 0.000028 | 0.000018 | <0.000010 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | 0.009 | 0.0085 | 0.0092 | <0.0020 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | 0.0000206 | 0.0000093 | 0.000124 | <0.0000020 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | 2.3 | 8.0 | 14.7 | <0.050 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | 0.0000186 | 0.000111 | 0.000274 | <0.0000050 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | 0.00139 | 0.0017 | 0.00825 | <0.00010 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | 0.0665 | 0.103 | 0.016 | <0.0020 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | 0.000574 | 0.000364 | 0.00306 | <0.000050 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | 0.0083 | 0.0052 | 0.0086 | <0.000050 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | 0.221 | 0.319 | 0.547 | <0.0050 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | 0.051 | 0.0905 | 0.0755 | <0.000050 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | 0.000026 | 0.000031 | 0.00003 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | 0.00171 | 0.00738 | 0.000598 | <0.000010 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | 0.000066 | 0.000251 | 0.000418 | <0.000040 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | 2.98 | 4.22 | 3.73 | <0.020 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | 0.00014 | <0.00010 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | 0.79 | 1.13 | 1.79 | <0.10 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | 0.000036 | 0.000034 | 0.00011 | <0.000010 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | 3.59 | 3.86 | 5.92 | 0.026 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | 0.01 | 0.035 | 0.0827 | <0.00010 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | <1.00 | <1.00 | <1.00 | <1.00 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | 0.0000133 | 0.0000113 | 0.0000194 | <0.0000040 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | 0.00126 | 0.00103 | 0.000105 | <0.000010 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | 0.000158 | 0.000112 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | 0.00105 | 0.0017 | 0.00033 | <0.00020 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | 0.00066 | 0.00127 | 0.00159 | <0.00020 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | 0.00239 | 0.00951 | 0.00227 | <0.0000010 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | 0.0016 | 0.0014 | 0.0034 | <0.0010 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | 0.00207 | 0.00436 | 0.00115 | <0.000020 |
| ***Ion Balance:*** | | | | | | | |
| Major Anions | Calc. | meq/L | | 0.38 | 0.70 | 1.09 | |
| Major Cations | Calc. | meq/L | | 0.38 | 0.73 | 1.15 | |
| Difference | Calc. | meq/L | | 0.00 | 0.03 | 0.06 | |
| Balance (%) | Calc. | % | | 0.7% | 2.2% | 2.8% | |
| | | *Shake Flask Extract ID:* | | *25K1746-12* | *25K1746-13* | *25K1746-14* | *25K1746-15* |

***NOTES:***
Job No: 25K1047, 25K1217, 25K1740, 25K1746
**Date of Analysis (24 h):** November 6-13, 2025
pH of DI water used (pH Units): 5.24, 5.34, 5.39, 5.54
EC of DI water used (µS/cm): 1.24, 1.19, 1.29, 1.14

***ABBREVIATIONS:***
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliqu
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Re
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S; 750 mL DI $H_2O$: 250 g of crushed sample (85% p

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1047_B5K2603-BLK1 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.1 | mg/L | | |
| 25K1047_B5K2603-BLK1 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.1 | mg/L | | |
| 25K1047_B5K2603-BLK1 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.01 | mg/L | | |
| 25K1047_B5K2603-BLK1 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.01 | mg/L | | |
| 25K1047_B5K2603-BLK2 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.1 | mg/L | | |
| 25K1047_B5K2603-BLK2 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.1 | mg/L | | |
| 25K1047_B5K2603-BLK2 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.01 | mg/L | | |
| 25K1047_B5K2603-BLK2 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.01 | mg/L | | |
| 25K1047_B5K2603-BS1 | Chloride | 90 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-BS1 | Fluoride | 92 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-BS1 | Nitrate (as N) | 94 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-BS1 | Nitrite (as N) | 94 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-BS2 | Chloride | 89 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-BS2 | Fluoride | 89 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-BS2 | Nitrate (as N) | 89 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-BS2 | Nitrite (as N) | 93 | % | T | SC | SM 4110 B (2020) | '09 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K2603-MS1 | Nitrate (as N) | 2.73 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1047_B5K2603-MS1 | Nitrite (as N) | 2.7 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1047_B5K2603-MS2 | Fluoride | 5.73 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.2 | mg/L | 125 | 75 |
| 25K1047_B5K2603-MS2 | Nitrate (as N) | 2.52 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1047_B5K2603-MS2 | Nitrite (as N) | 2.55 | mg/L | T | REG | SM 4110 B (2020) | '09 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1047_B5K3140-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.002 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.000002 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.05 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.000005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.002 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00002 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00004 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.01 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.02 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.1 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.02 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 1 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.000004 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0002 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.0002 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.000001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.001 | mg/L | | |
| 25K1047_B5K3140-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '14 Nov 2025 | 0.00002 | mg/L | | |
| 25K1047_B5K3140-BS1 | Aluminum dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Antimony dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Arsenic dissolved | 99 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Barium dissolved | 99 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Beryllium dissolved | 103 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Bismuth dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Boron dissolved | 103 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Cadmium dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Calcium dissolved | 102 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Chromium dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Cobalt dissolved | 99 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Copper dissolved | 99 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Iron dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Lead dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Lithium dissolved | 104 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Magnesium dissolved | 102 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Manganese dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Mercury dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Molybdenum dissolved | 99 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Nickel dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Phosphorus dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1047_B5K3140-BS1 | Potassium dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Selenium dissolved | 98 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Silicon dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Silver dissolved | 98 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Sodium dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Strontium dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Sulfur dissolved | 103 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Tellurium dissolved | 99 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Thallium dissolved | 103 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Thorium dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Tin dissolved | 102 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Titanium dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Tungsten dissolved | 101 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Uranium dissolved | 102 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Vanadium dissolved | 100 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Zinc dissolved | 99 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3140-BS1 | Zirconium dissolved | 98 | % | F | SC | EPA 6020B | '14 Nov 2025 | 1 | % | 120 | 80 |
| | | | | | | | | | | | |
| 25K1047_B5K3323-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000002 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.05 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00004 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.01 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.1 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 1 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000004 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1047_B5K3323-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | | |
| | | | | | | | | | | | |
| 25K1047_B5K3323-BS1 | Aluminum dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Antimony dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Arsenic dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Barium dissolved | 103 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Beryllium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Bismuth dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Boron dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Cadmium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Calcium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Chromium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Cobalt dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Copper dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Iron dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Lead dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Lithium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Magnesium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Manganese dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Mercury dissolved | 103 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Molybdenum dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Nickel dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Phosphorus dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Potassium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Selenium dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Silicon dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Silver dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Sodium dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1047_B5K3323-BS1 | Strontium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Sulfur dissolved | 105 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Tellurium dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Thallium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Thorium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Tin dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Titanium dissolved | 103 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Tungsten dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Uranium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Vanadium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1047_B5K3323-BS1 | Zirconium dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| | | | | | | | | | | | |
| 25K1047_B5K3394-BLK1 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '17 Nov 2025 | 0.005 | mg/L | | |
| 25K1047_B5K3394-BLK2 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '17 Nov 2025 | 0.005 | mg/L | | |
| 25K1047_B5K3394-BLK3 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '17 Nov 2025 | 0.005 | mg/L | | |
| 25K1047_B5K3394-BS1 | Phosphorus Total Dissolved | 103 | % | F | SC | SM 4500-P F (2021) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K3394-BS2 | Phosphorus Total Dissolved | 102 | % | F | SC | SM 4500-P F (2021) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1047_B5K3394-BS3 | Phosphorus Total Dissolved | 100 | % | F | SC | SM 4500-P F (2021) | '17 Nov 2025 | 1 | % | 115 | 85 |
| **25K1217** | | | | | | | | | | | |
| 25K1217_B5K3113-BLK1 | Chloride | 0.18 | mg/L | T | REG | SM 4110 B (2020) | '13 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3113-BLK1 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '13 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3113-BLK1 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '13 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3113-BLK1 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '13 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3113-BLK2 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3113-BLK2 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3113-BLK2 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3113-BLK2 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3113-BLK3 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3113-BLK3 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3113-BLK3 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3113-BLK3 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.01 | mg/L | | |
| | | | | | | | | | | | |
| 25K1217_B5K3113-BS1 | Chloride | 94 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS1 | Fluoride | 99 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS1 | Nitrate (as N) | 105 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS1 | Nitrite (as N) | 95 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS2 | Chloride | 95 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS2 | Fluoride | 97 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS2 | Nitrate (as N) | 102 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS2 | Nitrite (as N) | 97 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS3 | Chloride | 108 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS3 | Fluoride | 97 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS3 | Nitrate (as N) | 109 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-BS3 | Nitrite (as N) | 108 | % | T | SC | SM 4110 B (2020) | '14 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3113-MS1 | Chloride | 10.6 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.2 | mg/L | 125 | 75 |
| 25K1217_B5K3113-MS1 | Fluoride | 5.15 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.2 | mg/L | 125 | 75 |
| 25K1217_B5K3113-MS1 | Nitrate (as N) | 2.75 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1217_B5K3113-MS1 | Nitrite (as N) | 2.67 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1217_B5K3113-MS2 | Nitrate (as N) | 2.96 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1217_B5K3113-MS2 | Nitrite (as N) | 2.8 | mg/L | T | REG | SM 4110 B (2020) | '14 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| | | | | | | | | | | | |
| 25K1217_B5K3362-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000002 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.05 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00004 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 1 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000004 | mg/L | | |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1217_B5K3362-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3362-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | | |
| | | | | | | | | | | | |
| 25K1217_B5K3362-BS1 | Aluminum dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Antimony dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Arsenic dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Barium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Beryllium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Bismuth dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Boron dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Cadmium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Calcium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Chromium dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Cobalt dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Copper dissolved | 96 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Iron dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Lead dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Lithium dissolved | 103 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Magnesium dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Manganese dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Mercury dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Molybdenum dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Nickel dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Phosphorus dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Potassium dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Selenium dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Silicon dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Sodium dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Strontium dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Sulfur dissolved | 103 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Tellurium dissolved | 97 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Thallium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Tin dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Titanium dissolved | 97 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Tungsten dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Uranium dissolved | 104 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Vanadium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Zinc dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3362-BS1 | Zirconium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| | | | | | | | | | | | |
| 25K1217_B5K3363-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000002 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.05 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00004 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 1 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000004 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000001 | mg/L | | |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1217_B5K3363-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3363-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | | |
| 25K1217_B5K3363-BS1 | Aluminum dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Antimony dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Arsenic dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Barium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Beryllium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Bismuth dissolved | 106 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Boron dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Calcium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Chromium dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Cobalt dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Copper dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Iron dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Lead dissolved | 104 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Lithium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Magnesium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Manganese dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Mercury dissolved | 105 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Molybdenum dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Nickel dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Phosphorus dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Potassium dissolved | 98 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Silicon dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Silver dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Sodium dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Strontium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Sulfur dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Tellurium dissolved | 99 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Thallium dissolved | 103 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Tin dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Titanium dissolved | 100 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Tungsten dissolved | 105 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Uranium dissolved | 104 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Vanadium dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-BS1 | Zirconium dissolved | 102 | % | F | SC | EPA 6020B | '15 Nov 2025 | 1 | % | 120 | 80 |
| 25K1217_B5K3363-MS1 | Aluminum dissolved | 4.02 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Antimony dissolved | 0.0401 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Arsenic dissolved | 0.401 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Barium dissolved | 0.062 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Beryllium dissolved | 0.0402 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Bismuth dissolved | 0.0394 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Boron dissolved | 0.391 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Cadmium dissolved | 0.0405 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000002 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Calcium dissolved | 9.87 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.05 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Chromium dissolved | 0.0392 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Cobalt dissolved | 0.0388 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Copper dissolved | 0.0388 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Iron dissolved | 3.99 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.002 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Lead dissolved | 0.0427 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Lithium dissolved | 0.059 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Magnesium dissolved | 4.33 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Manganese dissolved | 0.0706 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Mercury dissolved | 0.00421 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Molybdenum dissolved | 0.0401 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Nickel dissolved | 0.0395 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00004 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Phosphorus dissolved | 4.06 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.01 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Potassium dissolved | 7.06 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Selenium dissolved | 0.407 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Silicon dissolved | 5.67 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.1 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Silver dissolved | 0.0319 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Sodium dissolved | 8.14 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.02 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Strontium dissolved | 0.0559 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Sulfur dissolved | 40.6 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 1 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Tellurium dissolved | 0.0412 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Thallium dissolved | 0.0438 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000004 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Thorium dissolved | 0.0419 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Tin dissolved | 0.0409 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Titanium dissolved | 0.0391 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Tungsten dissolved | 0.0492 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.0002 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Uranium dissolved | 0.0421 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.000001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Vanadium dissolved | 0.0402 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Zinc dissolved | 0.414 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.001 | mg/L | 130 | 70 |
| 25K1217_B5K3363-MS1 | Zirconium dissolved | 0.041 | mg/L | F | REG | EPA 6020B | '15 Nov 2025 | 0.00002 | mg/L | 130 | 70 |
| 25K1217_B5K3394-BLK1 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '17 Nov 2025 | 0.005 | mg/L | | |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1217_B5K3394-BLK2 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '17 Nov 2025 | 0.005 | mg/L | | |
| 25K1217_B5K3394-BLK3 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '17 Nov 2025 | 0.005 | mg/L | | |
| 25K1217_B5K3394-BS1 | Phosphorus Total Dissolved | 103 | % | F | SC | SM 4500-P F (2021) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3394-BS2 | Phosphorus Total Dissolved | 102 | % | F | SC | SM 4500-P F (2021) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1217_B5K3394-BS3 | Phosphorus Total Dissolved | 100 | % | F | SC | SM 4500-P F (2021) | '17 Nov 2025 | 1 | % | 115 | 85 |
| | | | | | | | | | | | |
| 25K1217_B5K3576-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000002 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.05 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00002 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00004 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 1 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000004 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3576-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00002 | mg/L | | |
| | | | | | | | | | | | |
| 25K1217_B5K3576-BLK2 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000002 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.05 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.002 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00002 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00004 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.02 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 1 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000004 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0002 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1217_B5K3576-BLK2 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00002 | mg/L | | |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1217_B5K3576-BS1 | Aluminum dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Antimony dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Arsenic dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Barium dissolved | 104 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Beryllium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Bismuth dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Boron dissolved | 103 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Calcium dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Chromium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Cobalt dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Copper dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Iron dissolved | 103 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Lead dissolved | 103 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Lithium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Magnesium dissolved | 104 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Manganese dissolved | 103 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Mercury dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Molybdenum dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Nickel dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Phosphorus dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Potassium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Silicon dissolved | 98 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Sodium dissolved | 104 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Strontium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Sulfur dissolved | 103 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Tellurium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Thallium dissolved | 104 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Tin dissolved | 103 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Titanium dissolved | 104 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Tungsten dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Uranium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Vanadium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS1 | Zirconium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Aluminum dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Antimony dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Arsenic dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Barium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Beryllium dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Bismuth dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Boron dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Calcium dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Chromium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Cobalt dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Copper dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Iron dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Lead dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Lithium dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Magnesium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Manganese dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Mercury dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Molybdenum dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Nickel dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Phosphorus dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Potassium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Selenium dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Silicon dissolved | 98 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Silver dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Sodium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Strontium dissolved | 105 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Sulfur dissolved | 97 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Tellurium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Thallium dissolved | 105 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Thorium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Tin dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Titanium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Tungsten dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Uranium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Vanadium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Zinc dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| 25K1217_B5K3576-BS2 | Zirconium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 1 | | % | 120 | 80 |
| **25K1740** | | | | | | | | | | | |
| 25K1740_B5K3313-BLK1 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 0.1 | | mg/L | | |
| 25K1740_B5K3313-BLK1 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 0.1 | | mg/L | | |
| 25K1740_B5K3313-BLK1 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 0.01 | | mg/L | | |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1740_B5K3313-BLK1 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3313-BLK2 | Chloride | 0.1 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3313-BLK2 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3313-BLK2 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3313-BLK2 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3313-BLK3 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3313-BLK3 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3313-BLK3 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3313-BLK3 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3313-BLK4 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3313-BLK4 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3313-BLK4 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3313-BLK4 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3313-BS1 | Chloride | 98 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS1 | Fluoride | 97 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS1 | Nitrate (as N) | 114 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS1 | Nitrite (as N) | 103 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS2 | Chloride | 105 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS2 | Fluoride | 89 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS2 | Nitrate (as N) | 112 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS2 | Nitrite (as N) | 103 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS3 | Chloride | 99 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS3 | Fluoride | 91 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS3 | Nitrate (as N) | 109 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS3 | Nitrite (as N) | 101 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS4 | Chloride | 103 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS4 | Fluoride | 96 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS4 | Nitrate (as N) | 108 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-BS4 | Nitrite (as N) | 107 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3313-MS2 | Nitrate (as N) | 3.05 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1740_B5K3313-MS2 | Nitrite (as N) | 2.77 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1740_B5K3491-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000002 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.05 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00004 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 1 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000004 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3491-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| 25K1740_B5K3491-BS1 | Aluminum dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Antimony dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Arsenic dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Barium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Beryllium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Bismuth dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Boron dissolved | 106 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Calcium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Chromium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Cobalt dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1740_B5K3491-BS1 | Copper dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Iron dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Lead dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Lithium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Magnesium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Manganese dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Mercury dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Molybdenum dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Nickel dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Phosphorus dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Potassium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Silicon dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Sodium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Strontium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Sulfur dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Tellurium dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Thallium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Tin dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Titanium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Tungsten dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Uranium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Vanadium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3491-BS1 | Zirconium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| | | | | | | | | | | | |
| 25K1740_B5K3517-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000002 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.05 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00004 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 1 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000004 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3517-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| | | | | | | | | | | | |
| 25K1740_B5K3517-BS1 | Aluminum dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Antimony dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Arsenic dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Barium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Beryllium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Bismuth dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Boron dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Cadmium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Calcium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Chromium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Cobalt dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Copper dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Iron dissolved | 105 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Lead dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Lithium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Magnesium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1740_B5K3517-BS1 | Manganese dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Mercury dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Molybdenum dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Nickel dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Phosphorus dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Potassium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Silicon dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Sodium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Strontium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Sulfur dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Tellurium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Thallium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Tin dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Titanium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Tungsten dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Uranium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Vanadium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3517-BS1 | Zirconium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| | | | | | | | | | | | |
| 25K1740_B5K3520-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.002 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000002 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.05 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.002 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00002 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00004 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.02 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.02 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 1 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00005 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000004 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0002 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.0002 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.000001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.001 | mg/L | | |
| 25K1740_B5K3520-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '18 Nov 2025 | 0.00002 | mg/L | | |
| | | | | | | | | | | | |
| 25K1740_B5K3520-BS1 | Aluminum dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Antimony dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Arsenic dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Barium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Beryllium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Bismuth dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Boron dissolved | 104 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Calcium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Chromium dissolved | 98 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Cobalt dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Copper dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Iron dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Lead dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Lithium dissolved | 105 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Magnesium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Manganese dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Mercury dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Molybdenum dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Nickel dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Phosphorus dissolved | 97 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1740_B5K3520-BS1 | Potassium dissolved | 98 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Selenium dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Silicon dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Sodium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Strontium dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Sulfur dissolved | 98 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Tellurium dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Thallium dissolved | 104 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Tin dissolved | 102 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Titanium dissolved | 97 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Tungsten dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Uranium dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Vanadium dissolved | 99 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3520-BS1 | Zirconium dissolved | 100 | % | F | SC | EPA 6020B | '18 Nov 2025 | 1 | % | 120 | 80 |
| 25K1740_B5K3813-BLK3 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '20 Nov 2025 | 0.005 | mg/L | | |
| 25K1740_B5K3813-BS3 | Phosphorus Total Dissolved | 111 | % | F | SC | SM 4500-P F (2021) | '20 Nov 2025 | 1 | % | 115 | 85 |
| 25K1740_B5K3813-BS4 | Phosphorus Total Dissolved | 108 | % | F | SC | SM 4500-P F (2021) | '20 Nov 2025 | 1 | % | 115 | 85 |
| **25K1746** | | | | | | | | | | | |
| 25K1746_B5K3313-BLK1 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK1 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK1 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BLK1 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BLK2 | Chloride | 0.1 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK2 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK2 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BLK2 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BLK3 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK3 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK3 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BLK3 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BLK4 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK4 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3313-BLK4 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BLK4 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3313-BS1 | Chloride | 98 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS1 | Fluoride | 97 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS1 | Nitrate (as N) | 114 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS1 | Nitrite (as N) | 103 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS2 | Chloride | 105 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS2 | Fluoride | 89 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS2 | Nitrate (as N) | 112 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS2 | Nitrite (as N) | 103 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS3 | Chloride | 99 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS3 | Fluoride | 91 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS3 | Nitrate (as N) | 109 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS3 | Nitrite (as N) | 101 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS4 | Chloride | 103 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS4 | Fluoride | 96 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS4 | Nitrate (as N) | 108 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-BS4 | Nitrite (as N) | 107 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1746_B5K3313-MS4 | Chloride | 9.79 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.2 | mg/L | 125 | 75 |
| 25K1746_B5K3313-MS4 | Fluoride | 3.91 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.2 | mg/L | 125 | 75 |
| 25K1746_B5K3313-MS4 | Nitrate (as N) | 3.1 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1746_B5K3313-MS4 | Nitrite (as N) | 2.98 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K1746_B5K3491-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000002 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.05 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00004 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.01 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1746_B5K3491-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.1 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 1 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000004 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1746_B5K3491-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| | | | | | | | | | | | |
| 25K1746_B5K3491-BS1 | Aluminum dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Antimony dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Arsenic dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Barium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Beryllium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Bismuth dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Boron dissolved | 106 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Calcium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Chromium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Cobalt dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Copper dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Iron dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Lead dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Lithium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Magnesium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Manganese dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Mercury dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Molybdenum dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Nickel dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Phosphorus dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Potassium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Silicon dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Sodium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Strontium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Sulfur dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Tellurium dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Thallium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Tin dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Titanium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Tungsten dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Uranium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Vanadium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1746_B5K3491-BS1 | Zirconium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| | | | | | | | | | | | |
| 25K1746_B5K3491-MS1 | Aluminum dissolved | 3.98 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Antimony dissolved | 0.0421 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Arsenic dissolved | 0.402 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Barium dissolved | 0.107 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Beryllium dissolved | 0.0404 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Bismuth dissolved | 0.0393 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Boron dissolved | 0.365 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Cadmium dissolved | 0.0416 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000002 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Calcium dissolved | 8.72 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.05 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Chromium dissolved | 0.0404 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Cobalt dissolved | 0.0391 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Copper dissolved | 0.0441 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Iron dissolved | 4.05 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Lead dissolved | 0.0419 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Lithium dissolved | 0.0426 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Magnesium dissolved | 4.3 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Manganese dissolved | 0.225 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Mercury dissolved | 0.00394 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Molybdenum dissolved | 0.0406 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Nickel dissolved | 0.0392 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00004 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Phosphorus dissolved | 4.02 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.01 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Potassium dissolved | 8.32 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Selenium dissolved | 0.4 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Silicon dissolved | 4.76 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.1 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Silver dissolved | 0.0289 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Sodium dissolved | 8.05 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Strontium dissolved | 0.0567 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | 130 | 70 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B1)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 34.63 | 99.6% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 18.20 | | 92.8% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25K1047** | | | | | | | | | | | |
| 25K1746_B5K3491-MS1 | Sulfur dissolved | 38.2 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 1 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Tellurium dissolved | 0.0423 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Thallium dissolved | 0.0423 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000004 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Thorium dissolved | 0.0435 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Tin dissolved | 0.0418 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Titanium dissolved | 0.0412 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Tungsten dissolved | 0.0417 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Uranium dissolved | 0.043 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Vanadium dissolved | 0.0402 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Zinc dissolved | 0.423 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | 130 | 70 |
| 25K1746_B5K3491-MS1 | Zirconium dissolved | 0.0438 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | 130 | 70 |
| 25K1746_B5K4193-BLK1 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '24 Nov 2025 | 0.005 | mg/L | | |
| 25K1746_B5K4193-BS1 | Phosphorus Total Dissolved | 100 | % | F | SC | SM 4500-P F (2021) | '24 Nov 2025 | 1 | % | 115 | 85 |

**NOTES:**
Job No: 25K1047, 25K1217, 25K1740, 25K1746

***Abbreviations & Descriptions:***
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate

# CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

| CLIENT INFORMATION | |
|---|---|
| **Client:** | Canada Fluorspar (NL) Inc. |
| | |
| **Project Manager:** | Melissa Lambert |
| | |
| **Mailing Address** | 1 Clarke's Pond Road |
| | St. Lawrence, NL, CA A0E 2V0 |
| | |
| **Contact No:** | 1(709) 702-5960 |
| | |

| COMPANY INFORMATION | |
|---|---|
| **Legal Name:** | Global ARD Testing Services Inc. |
| | |
| **Mailing Address:** | 6891 Antrim Avenue |
| | Burnaby, BC |
| | V5J 4M5 |
| **Contact No:** | |
| | Main: (604) 428-2730 |
| | Alternate: (604) 603-1359 |
| | |

| PROJECT INFORMATION | |
|---|---|
| **Project Name:** | South Ridge |
| **Project Number:** | 2025 Geochemical Sampling |

| REPORTING | |
|---|---|
| **Global Project No:** | 2577 (B2) |
| **Report Version:** | 3 |
| **Pages (Including Cover):** | 7 |
| **Report Title:** | COA (B2) x 25 South Ridge Samples (rec'd 27-Oct25) |
| | |
| **Analysis Reviewed By:** | Prab Bhatia (Pbhatia@globalARDtesting.com) |
| **Position:** | Project Manager |
| **Report Certified By:** | Prab Bhatia |
| **Signature:** | |

| RESULTS | | |
|---|---|---|
| **Reported To:** | **1** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **2** | Nikolay Sidenko (NIKOLAY@FALKIRK.CA) |
| | **3** | Inaara Hassan (ihassan@canadafluorspar.com) |
| | **4** | Brad Smith (bsmith@canadafluorspar.com) |
| **Date Reported:** | **Version-1:** | November 27, 2025 |
| | **Version-2:** | December 4, 2025 |
| | **Version-3:** | December 12, 2025 |

| INVOICE | | |
|---|---|---|
| **Submitted To:** | **1** | Accounts Payable (ap@canadafluorspar.com) |
| | **2** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **3** | |
| | **4** | |
| | | |
| **Client PO No:** | | |
| **Global Invoice No:** | | ARD2577-1125B |
| **Date Submitted:** | | December 15, 2025 |

| NOTES |
|---|
| All samples and pulps are stored at no charge for 90 days past reporting date. |
| Please contact the lab if you would like to continue storage past 90 days. |
| Storage charges will apply. |
| |
| VERSIONS: |
| Version-1: TS/TC - Partial |
| Version-2: Full Report |
| Version-3: Sample 2 TC/TIC and NAG Result Updated |

# CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.



**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| SAMPLE RECEIPT INFO | |
|---|---|
| Date Samples Received: | October 27, 2025 |
| No of Samples Received: | 25 |
| Samples Received By: | Said Zeinab |

| ANALYTICAL INSTRUCTIONS | |
|---|---|
| From: | |
| | as per email Confirmation |
| Date: | October 28, 2025 |

| S. No. | Sample ID | Sample Description | Condition (Wet/Dry) | Wt. of Sample Rec'd (kg) | Global Notes (if any) |
|---|---|---|---|---|---|
| 1 | 261550 | Overburden | Wet | 3.70 | |
| 2 | 261551 | Overburden | Wet | 1.85 | |
| 3 | 261552 | Overburden | Wet | 4.40 | |
| 4 | 261553 | Overburden | Wet | 4.85 | |
| 5 | 261554 | Overburden | Wet | 5.15 | |
| 6 | 261555 | Overburden | Wet | 5.95 | |
| 7 | 261556 | Overburden | Wet | 4.40 | |
| 8 | 261557 | Overburden | Wet | 3.75 | |
| 9 | 261558 | Overburden | Wet | 3.80 | |
| 10 | 261559 | Overburden | Wet | 4.35 | |
| 11 | 261560 | Overburden | Wet | 4.15 | |
| 12 | 261561 | Overburden | Wet | 3.90 | |
| 13 | 261562 | Overburden | Wet | 3.10 | |
| 14 | 261563 | Overburden | Wet | 4.50 | |
| 15 | 261564 | Overburden | Wet | 2.80 | |
| 16 | 261565 | Overburden | Wet | 3.95 | |
| 17 | 261566 | Overburden | Wet | 4.00 | |
| 18 | 261567 | Overburden | Wet | 3.90 | |
| 19 | 261568 | Overburden | Wet | 4.80 | |
| 20 | 261569 | Overburden | Wet | 3.80 | |
| 21 | 261570 | Overburden | Wet | 6.05 | |
| 22 | 261571 | Overburden | Wet | 2.45 | |
| 23 | 261572 | Overburden | Wet | 3.75 | |
| 24 | 261573 | Overburden | Wet | 1.90 | |
| 25 | 261574 | Overburden | Wet | 2.50 | |

**Total wt of sample rec'd (kg):** **97.75**

| ANALYTICAL INSTRUCTIONS (Sample #2 Recheck and NAG ADDON) | |
|---|---|
| From: | |
| | as per email Confirmation |
| Date: | December 4, 2025 |

Global ARD Testing Services Inc.

# CERTIFICATE OF ANALYSIS ▪ ABA RESULTS


**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No. | Sample ID | Paste pH | Fizz Rating | Total Carbon | Total Inorganic Carbon | $CaCO_3$ (Based on TIC) Equivalents*1 | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | AP*3 | Standard Sobek NP | NNP*4 | NPR*5 | $CaCO_3$ (Based on TC) Equivalents*1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Units:* | pH Units | | wt % | wt % | kg $CaCO_3$/tonne | wt % | wt % | wt % | | kg $CaCO_3$/tonne | | | kg $CaCO_3$/tonne |
| | *Reported Detection Limit:* | *0.1* | | *0.01* | *0.02* | *1.7* | *0.01* | *0.01* | *0.01* | 0.3 | | | | *0.8* |
| 1 | 261550 | 7.03 | None | 0.07 | 0.07 | 5.8 | 0.01 | <0.01 | 0.01 | 0.3 | 11.0 | 10.7 | 35.5 | 5.8 |
| 2 | 261551 | 5.86 | None | 0.24 | <0.02 | <1.7 | 0.03 | <0.01 | 0.03 | 0.9 | 4.6 | 3.7 | 4.9 | 20.0 |
| **2** | **261551** | | | **0.29** | **0.05** | **4.2** | **0.02** | | | | | | | **24.2** |
| 3 | 261552 | 5.72 | None | 0.32 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 3.9 | 3.3 | 6.2 | 26.7 |
| 4 | 261553 | 6.48 | None | 0.07 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 6.4 | 5.8 | 10.2 | 5.8 |
| 5 | 261554 | 5.86 | None | 0.06 | 0.03 | 2.5 | 0.01 | <0.01 | 0.01 | 0.3 | 5.3 | 5.0 | 17.1 | 5.0 |
| 6 | 261555 | 6.06 | None | 0.09 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 5.6 | 5.0 | 8.9 | 7.5 |
| 7 | 261556 | 5.71 | None | 0.24 | <0.02 | <1.7 | 0.01 | <0.01 | 0.01 | 0.3 | 10.3 | 10.0 | 33.2 | 20.0 |
| 8 | 261557 | 5.58 | None | 0.08 | 0.03 | 2.5 | 0.01 | <0.01 | 0.01 | 0.3 | 2.9 | 2.6 | 9.4 | 6.7 |
| 9 | 261558 | 5.22 | None | 0.36 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 3.0 | 2.4 | 4.8 | 30.0 |
| 10 | 261559 | 5.70 | None | 0.15 | 0.03 | 2.5 | 0.02 | 0.01 | 0.01 | 0.3 | 6.4 | 6.1 | 20.7 | 12.5 |
| 11 | 261560 | 5.40 | None | 0.32 | 0.03 | 2.5 | 0.02 | <0.01 | 0.02 | 0.6 | 4.6 | 4.0 | 7.3 | 26.7 |
| 12 | 261561 | 5.58 | None | 0.11 | 0.06 | 5.0 | 0.01 | <0.01 | 0.01 | 0.3 | 2.7 | 2.4 | 8.7 | 9.2 |
| 13 | 261562 | 5.62 | None | 0.09 | 0.03 | 2.5 | 0.01 | <0.01 | 0.01 | 0.3 | 2.8 | 2.5 | 9.0 | 7.5 |
| 14 | 261563 | 5.67 | None | 0.13 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 4.5 | 3.9 | 7.1 | 10.8 |
| 15 | 261564 | 5.54 | None | 0.12 | 0.04 | 3.3 | 0.01 | <0.01 | 0.01 | 0.3 | 5.9 | 5.6 | 19.0 | 10.0 |
| 16 | 261565 | 5.26 | None | 0.20 | 0.05 | 4.2 | 0.02 | <0.01 | 0.02 | 0.6 | 3.5 | 2.9 | 5.6 | 16.7 |
| 17 | 261566 | 5.23 | None | 0.21 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 2.9 | 2.3 | 4.6 | 17.5 |
| 18 | 261567 | 6.28 | None | 0.06 | 0.04 | 3.3 | 0.02 | <0.01 | 0.02 | 0.6 | 15.7 | 15.1 | 24.9 | 5.0 |
| 19 | 261568 | 5.49 | None | 0.06 | <0.02 | <1.7 | 0.02 | <0.01 | 0.02 | 0.6 | 4.3 | 3.7 | 6.8 | 5.0 |
| 20 | 261569 | 5.28 | None | 0.28 | 0.12 | 10.0 | 0.03 | 0.01 | 0.02 | 0.6 | 5.5 | 4.9 | 8.7 | 23.3 |
| 21 | 261570 | 6.03 | None | 0.05 | 0.06 | 5.0 | 0.02 | <0.01 | 0.02 | 0.6 | 6.6 | 6.0 | 10.5 | 4.2 |
| 22 | 261571 | 6.13 | None | 0.05 | 0.05 | 4.2 | 0.01 | <0.01 | 0.01 | 0.3 | 4.8 | 4.5 | 15.5 | 4.2 |
| 23 | 261572 | 5.41 | None | 0.12 | 0.05 | 4.2 | 0.02 | <0.01 | 0.02 | 0.6 | 6.2 | 5.6 | 9.8 | 10.0 |
| 24 | 261573 | 5.77 | None | 0.17 | 0.04 | 3.3 | 0.04 | <0.01 | 0.04 | 1.3 | 5.5 | 4.3 | 4.4 | 14.2 |
| 25 | 261574 | 6.30 | None | 0.05 | 0.06 | 5.0 | 0.01 | <0.01 | 0.01 | 0.3 | 5.3 | 5.0 | 17.1 | 4.2 |
| | **QUALITY ASSURANCE / QUALITY CONTROL** | | | | | | | | | | | | | |
| | ***Pulp Replicates:*** | | | | | | | | | | | | | |
| 10 | 261559 | 5.7 | None | 0.15 | 0.03 | | 0.02 | 0.01 | | | 6.4 | | | |
| 10R | 261559 R | 5.7 | None | 0.13 | 0.05 | | 0.02 | 0.01 | | | 7.3 | | | |
| | **%RPD** | 0% | | 14% | -50% | | 0% | 0% | | | -13% | | | |
| 20 | 261569 | 5.3 | None | 0.28 | 0.12 | | 0.03 | 0.01 | | | 5.5 | | | |
| 20R | 261569 R | 5.3 | None | 0.28 | 0.08 | | 0.03 | 0.01 | | | 4.9 | | | |
| | **%RPD** | 0% | | 0% | 40% | | 0% | 0% | | | 12% | | | |
| | ***Reference Material Analysis:*** | | | | | | | | | | | | | |
| | Reference Material | | | OREAS 279 | KZK-1 | | OREAS 20a | RTS-3a | | | 1) KZK-1 (Slight)<br>2) KZK-1 (Moderate) | | | |
| | **Ref. Material Certified Value** | | | **1.13** | **0.92** | | **0.06** | **1.10** | | | **1) 59.0<br>2) 64.8** | | | |
| | Reference Material Results | | | 1.09 | 0.89 | | 0.07 | 1.04 | | | 1) 55.5<br>2) N/A | | | |
| | ***Acceptance Range:*** | | | ***90% - 110%*** | ***80% - 120%*** | | ***90% - 110%*** | ***90% - 110%*** | | | ***90% - 110%*** | | | |
| | ***Method Blank Analysis:*** | | | | | | | | | | | | | |
| | Method Blank Results | | | <0.01 | <0.02 | | <0.01 | <0.01 | | | | | | |
| | ***GLOBAL SOP NO./METHOD:*** | *ARD-005* | *ARD-005* | *LECO* | *$HClO_4$ Leach $CO_2$ Coulometer* | *Calc.* | *LECO* | *ARD-010 (HCl Leach)* | *Calc.* | *Calc.* | *ARD-007* | *Calc.* | *Calc.* | |

***NOTES:***
Job No: 20251119

**Date of Analysis :** December 1, 2025
pH of DI water used (pH units): 5.27
EC of DI water used (µS/cm): 1.44

***METHODS:***
Total Sulphur by LECO.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved $CO_2$ analysed by $CO_2$ Coulometer.

***ABBREVIATIONS:***
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

***CALCULATIONS:***
*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
*3 AP (Acid Potential): Sulphide-sulphur x 31.25
*4 NNP (Net Neutralization Potential): NP - AP
*5 NPR (Neutralization Potential Ratio): NP/AP

***REFERENCES:***
**Sample Preparation:** ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
**ABA:** Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
**Surface Rinse-pH**: MEND Report 1.20.1, Version 0 (2009).
**Modified ABA (Sobek) NP:** MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
**STD Sobek NP / Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Sulphate Sulphur:** Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).
**Sulphur Speciation:** Sequential HCl and $HNO_3$ leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Global ARD Testing Services Inc.

## CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS



**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No. | Sample ID | Method | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | Silver (Ag) | Aluminum (Al) | Arsenic (As) | Gold (Au) | Boron (B) | Barium (Ba) | Beryllium (Be) | Bismuth (Bi) | Calcium (Ca) | Cadmium (Cd) | Cerium (Ce) | Cobalt (Co) | Chromium (Cr) | Cesium (Cs) | Copper (Cu) | Iron (Fe) | Gallium (Ga) | Germanium (Ge) | Hafnium (Hf) | Mercury (Hg) | Indium (In) | Potassium (K) | Lanthanum (La) | Lithium (Li) | Magnesium (Mg) | Manganese (Mn) |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | % | ppm |
| | | MDL | 0.01 | 0.01 | 0.1 | 0.0005 | 10 | 10 | 0.05 | 0.01 | 0.01 | 0.01 | 0.02 | 0.1 | 1 | 0.05 | 0.2 | 0.01 | 0.05 | 0.05 | 0.02 | 0.005 | 0.005 | 0.01 | 0.2 | 0.1 | 0.01 | 5 |
| | | Sample Type | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 261550 | Pulp | 0.06 | 0.96 | 4.9 | 0.0058 | <10 | 58 | 1.41 | 0.38 | 0.69 | 0.22 | 87.53 | 4.7 | 74 | 2.84 | 11.8 | 1.87 | 4.48 | 0.06 | 2.75 | 0.01 | 0.078 | 0.23 | 40.0 | 17.1 | 0.23 | 418 |
| 2 | 261551 | Pulp | 0.05 | 1.10 | 5.6 | 0.0023 | <10 | 37 | 1.20 | 0.54 | 0.42 | 0.14 | 51.59 | 5.6 | 54 | 2.11 | 12.2 | 2.23 | 4.12 | <0.05 | 0.95 | 0.01 | 0.047 | 0.17 | 21.8 | 20.9 | 0.38 | 461 |
| 3 | 261552 | Pulp | 0.04 | 1.10 | 4.9 | 0.0020 | <10 | 31 | 1.07 | 0.29 | 0.30 | 0.10 | 54.19 | 5.5 | 59 | 2.28 | 9.5 | 2.20 | 3.99 | <0.05 | 0.70 | 0.01 | 0.049 | 0.18 | 18.3 | 25.3 | 0.35 | 414 |
| 4 | 261553 | Pulp | 0.06 | 1.25 | 5.6 | 0.0026 | <10 | 71 | 1.37 | 0.32 | 0.33 | 0.17 | 78.51 | 8.7 | 73 | 2.71 | 13.5 | 2.66 | 4.57 | 0.07 | 1.18 | 0.01 | 0.060 | 0.18 | 41.0 | 30.1 | 0.47 | 375 |
| 5 | 261554 | Pulp | 0.04 | 1.19 | 4.0 | 0.0025 | <10 | 57 | 1.21 | 0.30 | 0.28 | 0.18 | 85.73 | 7.6 | 49 | 2.55 | 15.0 | 2.30 | 4.76 | <0.05 | 1.01 | <0.005 | 0.051 | 0.21 | 40.4 | 27.7 | 0.41 | 387 |
| 6 | 261555 | Pulp | 0.05 | 0.97 | 3.7 | 0.0015 | <10 | 40 | 0.94 | 0.37 | 0.23 | 0.12 | 47.19 | 5.1 | 56 | 2.60 | 8.9 | 1.50 | 4.12 | <0.05 | 0.73 | <0.005 | 0.053 | 0.18 | 21.6 | 23.2 | 0.36 | 354 |
| 7 | 261556 | Pulp | 0.06 | 0.82 | 4.2 | 0.0044 | <10 | 40 | 1.21 | 0.35 | 0.54 | 0.09 | 77.58 | 3.3 | 63 | 2.00 | 9.2 | 1.67 | 3.80 | <0.05 | 2.12 | 0.01 | 0.083 | 0.18 | 34.3 | 13.7 | 0.20 | 288 |
| 8 | 261557 | Pulp | 0.05 | 0.82 | 4.6 | 0.0021 | <10 | 31 | 1.06 | 0.46 | 0.19 | 0.11 | 83.28 | 5.3 | 57 | 2.30 | 11.1 | 2.03 | 3.69 | <0.05 | 0.95 | 0.01 | 0.074 | 0.14 | 29.7 | 18.5 | 0.28 | 315 |
| 9 | 261558 | Pulp | 0.05 | 0.97 | 5.4 | 0.0018 | <10 | 33 | 0.99 | 0.38 | 0.22 | 0.07 | 60.82 | 5.1 | 58 | 2.08 | 7.6 | 2.20 | 4.07 | <0.05 | 0.74 | 0.01 | 0.082 | 0.16 | 20.6 | 20.3 | 0.32 | 398 |
| 10 | 261559 | Pulp | 0.08 | 0.99 | 4.9 | 0.0033 | <10 | 45 | 1.10 | 0.47 | 0.44 | 0.13 | 107.78 | 5.3 | 58 | 2.33 | 13.0 | 1.88 | 4.43 | <0.05 | 1.61 | 0.01 | 0.176 | 0.18 | 44.4 | 17.7 | 0.25 | 498 |
| 11 | 261560 | Pulp | 0.08 | 1.00 | 4.5 | 0.0026 | <10 | 38 | 0.99 | 0.42 | 0.25 | 0.14 | 89.45 | 5.9 | 52 | 2.20 | 10.6 | 1.97 | 3.98 | <0.05 | 1.12 | 0.01 | 0.125 | 0.16 | 27.3 | 21.1 | 0.29 | 431 |
| 12 | 261561 | Pulp | 0.04 | 0.54 | 3.6 | 0.0025 | <10 | 19 | 1.11 | 0.48 | 0.14 | 0.11 | 77.39 | 3.4 | 50 | 1.59 | 7.7 | 1.62 | 2.77 | <0.05 | 0.92 | 0.01 | 0.075 | 0.09 | 23.8 | 10.3 | 0.18 | 286 |
| 13 | 261562 | Pulp | 0.04 | 0.73 | 5.6 | 0.0021 | <10 | 22 | 1.01 | 0.37 | 0.21 | 0.13 | 68.00 | 4.7 | 38 | 1.83 | 11.0 | 1.80 | 3.17 | 0.05 | 0.79 | 0.01 | 0.060 | 0.11 | 20.5 | 15.0 | 0.25 | 373 |
| 14 | 261563 | Pulp | 0.05 | 1.11 | 5.1 | 0.0031 | <10 | 36 | 1.15 | 0.53 | 0.25 | 0.13 | 70.96 | 7.2 | 54 | 2.32 | 12.0 | 2.34 | 4.20 | <0.05 | 0.77 | 0.01 | 0.059 | 0.16 | 23.9 | 24.6 | 0.38 | 456 |
| 15 | 261564 | Pulp | 0.06 | 0.77 | 4.9 | 0.0033 | <10 | 34 | 1.22 | 0.41 | 0.40 | 0.12 | 95.55 | 4.6 | 53 | 2.42 | 10.3 | 1.82 | 4.10 | <0.05 | 1.82 | 0.01 | 0.091 | 0.16 | 43.7 | 14.4 | 0.21 | 396 |
| 16 | 261565 | Pulp | 0.04 | 0.81 | 5.0 | 0.0026 | <10 | 28 | 1.01 | 0.33 | 0.23 | 0.12 | 65.13 | 4.7 | 48 | 2.08 | 9.2 | 1.94 | 3.58 | <0.05 | 0.77 | 0.01 | 0.060 | 0.13 | 19.2 | 16.3 | 0.29 | 368 |
| 17 | 261566 | Pulp | 0.03 | 1.03 | 5.0 | 0.0016 | <10 | 27 | 1.09 | 0.31 | 0.18 | 0.09 | 59.79 | 6.1 | 56 | 2.28 | 7.6 | 2.20 | 3.76 | <0.05 | 0.64 | 0.01 | 0.062 | 0.17 | 19.3 | 23.4 | 0.36 | 355 |
| 18 | 261567 | Pulp | 0.13 | 1.56 | 5.2 | 0.0064 | <10 | 112 | 1.73 | 0.70 | 1.74 | 0.20 | 92.65 | 4.4 | 73 | 3.19 | 13.2 | 1.87 | 6.13 | 0.08 | 3.14 | 0.01 | 0.088 | 0.66 | 43.9 | 17.0 | 0.26 | 436 |
| 19 | 261568 | Pulp | 0.06 | 0.79 | 4.8 | 0.0025 | <10 | 39 | 1.17 | 0.37 | 0.22 | 0.15 | 80.20 | 5.6 | 63 | 2.22 | 10.9 | 2.05 | 3.95 | <0.05 | 1.16 | 0.01 | 0.065 | 0.15 | 33.2 | 17.3 | 0.31 | 327 |
| 20 | 261569 | Pulp | 0.05 | 1.09 | 4.1 | 0.0025 | <10 | 54 | 1.19 | 0.48 | 0.26 | 0.12 | 69.14 | 6.8 | 69 | 3.21 | 9.8 | 1.99 | 5.62 | <0.05 | 0.83 | 0.01 | 0.067 | 0.22 | 23.0 | 25.1 | 0.38 | 464 |
| 21 | 261570 | Pulp | 0.06 | 0.89 | 4.8 | 0.0039 | <10 | 54 | 1.19 | 0.39 | 0.36 | 0.19 | 80.84 | 5.1 | 56 | 2.58 | 14.7 | 2.04 | 4.31 | 0.05 | 1.54 | 0.01 | 0.067 | 0.18 | 40.5 | 18.5 | 0.30 | 356 |
| 22 | 261571 | Pulp | 0.06 | 1.07 | 5.0 | 0.0025 | <10 | 96 | 1.23 | 0.55 | 0.26 | 0.22 | 77.89 | 7.3 | 54 | 3.20 | 12.8 | 2.15 | 4.61 | 0.10 | 1.25 | 0.01 | 0.056 | 0.25 | 39.4 | 25.2 | 0.40 | 486 |
| 23 | 261572 | Pulp | 0.05 | 1.08 | 4.8 | 0.0016 | <10 | 43 | 1.11 | 0.34 | 0.25 | 0.11 | 52.27 | 5.4 | 52 | 2.29 | 12.3 | 1.73 | 4.15 | <0.05 | 0.84 | 0.01 | 0.054 | 0.16 | 24.3 | 22.4 | 0.35 | 319 |
| 24 | 261573 | Pulp | 0.05 | 1.10 | 7.2 | 0.0020 | <10 | 38 | 1.15 | 0.31 | 0.37 | 0.17 | 52.02 | 6.3 | 44 | 2.37 | 16.2 | 2.30 | 4.19 | <0.05 | 0.82 | <0.005 | 0.048 | 0.18 | 21.8 | 25.4 | 0.39 | 538 |
| 25 | 261574 | Pulp | 0.05 | 1.07 | 5.0 | 0.0020 | <10 | 55 | 1.07 | 0.33 | 0.25 | 0.21 | 75.36 | 6.9 | 62 | 2.16 | 11.6 | 2.17 | 4.17 | <0.05 | 0.89 | <0.005 | 0.049 | 0.18 | 39.1 | 21.4 | 0.37 | 481 |
| ***QUALITY ASSURANCE / QUALITY CONTROL*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 261566 | Pulp | 0.03 | 1.03 | 5.0 | 0.0016 | <10 | 27 | 1.09 | 0.31 | 0.18 | 0.09 | 59.79 | 6.1 | 56 | 2.28 | 7.6 | 2.20 | 3.76 | <0.05 | 0.64 | 0.01 | 0.062 | 0.17 | 19.3 | 23.4 | 0.36 | 355 |
| 17R | 261566 (Rep) | Pulp | 0.03 | 1.02 | 4.8 | 0.0021 | <10 | 27 | 1.04 | 0.33 | 0.17 | 0.09 | 62.11 | 6.2 | 53 | 2.31 | 8.1 | 2.20 | 3.75 | <0.05 | 0.67 | 0.005 | 0.060 | 0.16 | 20.2 | 23.7 | 0.36 | 345 |
| | | %RPD | 0% | 1% | 4% | -27% | | 0% | 5% | -6% | 6% | 0% | -4% | -2% | 6% | -1% | -6% | 0% | 0% | | -5% | 67% | 3% | 6% | -5% | -1% | 0% | 3% |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 601C | | | 48.51 | 0.770 | 374.0 | 0.995 | 11 | 157 | 0.59 | 21.36 | 0.72 | 2.67 | 35.0 | 4.30 | 14.0 | 1.32 | 1112.6 | 1.85 | 3.86 | 0.07 | 0.98 | 0.216 | 0.499 | 0.300 | 17.4 | 7.60 | 0.080 | 205 |
| **True Value STD OREAS 601C** | | | **50.41** | **0.663** | **378.2** | | **< 10** | | **0.59** | **21.32** | **0.78** | **2.70** | **34.7** | **4.27** | **14.7** | **1.32** | **1157.6** | **1.84** | **3.86** | **0.08** | **0.97** | **0.216** | **0.497** | **0.254** | **17.3** | **7.56** | **0.084** | **213** |
| % Difference | | | -4% | 16% | -1% | | | | 0% | 0% | -8% | -1% | 1% | 1% | -5% | 0% | -4% | 1% | 0% | -16% | 1% | 0% | 0% | 18% | 1% | 1% | -5% | -4% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.01 | <0.01 | <0.1 | <0.0005 | <10 | <10 | <0.05 | <0.01 | <0.01 | <0.01 | <0.02 | <0.1 | <1 | <0.05 | <0.2 | <0.01 | <0.05 | <0.05 | <0.02 | <0.005 | <0.005 | <0.01 | <0.2 | <0.1 | <0.01 | <5 |

***Notes:***
Job No: YVR2511289

***Analytical Methods (IMS-130):***
A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

***Abbreviations:***
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

***On Cerfified Reference Material and Tolerance:***
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

**CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS**

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No. | Sample ID | Method | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | Molybdenum (Mo) | Sodium (Na) | Niobium (Nb) | Nickel (Ni) | s (P) | Lead (Pb) | Rubidium (Rb) | Rhenium (Re) | Sulphur (S) | Antimony (Sb) | Scandium (Sc) | Selenium (Se) | Tin (Sn) | Stronium (Sr) | Tantalum (Ta) | Tellurium (Te) | Thorium (Th) | Titanium (Ti) | Thallium (Tl) | Uranium (U) | Vanadium (V) | Tungsten (W) | Yttrium (Y) | Zinc (Zn) | Zirconium (Zr) |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| | | MDL | 0.05 | 0.01 | 0.05 | 0.2 | 10 | 0.2 | 0.1 | 0.001 | 0.01 | 0.05 | 0.1 | 0.2 | 0.2 | 0.2 | 0.01 | 0.01 | 0.2 | 0.005 | 0.02 | 0.05 | 1 | 0.05 | 0.05 | 1 | 0.5 |
| | | Sample Typ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 261550 | Pulp | 1.31 | 0.04 | 18.03 | 7.4 | 234 | 75.2 | 20.4 | 0.001 | <0.01 | 0.81 | 2.9 | <0.2 | 5.3 | 18.9 | 0.02 | 0.04 | 13.8 | 0.091 | 0.14 | 3.11 | 22 | 1.62 | 59.05 | 61 | 74.6 |
| 2 | 261551 | Pulp | 0.99 | 0.03 | 7.98 | 11.0 | 369 | 29.9 | 13.1 | <0.001 | 0.02 | 0.58 | 3.1 | <0.2 | 2.9 | 18.9 | <0.01 | 0.1 | 8.8 | 0.126 | 0.11 | 1.75 | 32 | 1.07 | 22.86 | 70 | 29.8 |
| 3 | 261552 | Pulp | 1.22 | 0.03 | 7.54 | 11.2 | 300 | 30.7 | 14.5 | <0.001 | <0.01 | 0.5 | 2.6 | <0.2 | 3 | 13.3 | <0.01 | 0.04 | 8.8 | 0.105 | 0.18 | 1.81 | 28 | 0.9 | 19.42 | 57 | 23.7 |
| 4 | 261553 | Pulp | 1.51 | 0.03 | 3.94 | 16.0 | 350 | 35.2 | 14.5 | <0.001 | 0.01 | 0.64 | 2.5 | <0.2 | 3.7 | 11.3 | 0.01 | 0.04 | 11.3 | 0.085 | 0.11 | 2.47 | 27 | 1.03 | 39.15 | 97 | 34.2 |
| 5 | 261554 | Pulp | 0.85 | 0.03 | 2.79 | 13.5 | 385 | 29.6 | 16.8 | <0.001 | <0.01 | 0.51 | 3.2 | <0.2 | 3 | 13 | 0.01 | 0.04 | 9.7 | 0.11 | 0.14 | 2.28 | 32 | 0.86 | 33.29 | 79 | 28.3 |
| 6 | 261555 | Pulp | 1.24 | 0.03 | 4.31 | 10.4 | 282 | 45.1 | 15.2 | <0.001 | <0.01 | 0.63 | 2.6 | <0.2 | 3.3 | 10.4 | 0.01 | 0.04 | 8.9 | 0.104 | 0.14 | 2.03 | 23 | 1.03 | 20.45 | 63 | 22.2 |
| 7 | 261556 | Pulp | 1.17 | 0.03 | 19.87 | 6.5 | 184 | 35.4 | 14.5 | 0.001 | <0.01 | 0.82 | 2.4 | <0.2 | 5.2 | 14.3 | 0.02 | 0.04 | 12.7 | 0.084 | 0.11 | 2.69 | 20 | 1.55 | 46.93 | 46 | 61.6 |
| 8 | 261557 | Pulp | 1.39 | 0.02 | 6.88 | 9.0 | 246 | 33.1 | 12.3 | <0.001 | <0.01 | 0.59 | 2.1 | <0.2 | 4.8 | 8.8 | 0.01 | 0.04 | 13.3 | 0.084 | 0.11 | 2.38 | 21 | 1.39 | 28.75 | 55 | 27.5 |
| 9 | 261558 | Pulp | 1.25 | 0.02 | 12.46 | 9.7 | 230 | 35.8 | 13.2 | <0.001 | <0.01 | 0.68 | 2.1 | <0.2 | 4.4 | 11.8 | 0.01 | 0.05 | 11.5 | 0.091 | 0.13 | 2.03 | 23 | 1.22 | 23.86 | 49 | 25.6 |
| 10 | 261559 | Pulp | 1.22 | 0.03 | 12.78 | 7.8 | 189 | 57.9 | 15.0 | 0.001 | <0.01 | 0.71 | 2.6 | <0.2 | 5.4 | 14 | 0.02 | 0.04 | 14.1 | 0.093 | 0.13 | 2.81 | 23 | 1.79 | 55.73 | 64 | 47.6 |
| 11 | 261560 | Pulp | 1.21 | 0.02 | 12.23 | 10.6 | 202 | 54.4 | 13.0 | <0.001 | <0.01 | 0.6 | 2.0 | <0.2 | 4.6 | 9.3 | 0.01 | 0.03 | 13.9 | 0.068 | 0.13 | 2.54 | 19 | 1.44 | 34.65 | 61 | 35 |
| 12 | 261561 | Pulp | 1.29 | 0.02 | 10.57 | 5.5 | 164 | 23.0 | 8.2 | 0.001 | <0.01 | 0.74 | 1.4 | <0.2 | 5.6 | 7.2 | 0.02 | 0.03 | 12.8 | 0.062 | 0.07 | 2.31 | 16 | 1.43 | 27.13 | 37 | 27.4 |
| 13 | 261562 | Pulp | 0.93 | 0.02 | 6.03 | 7.8 | 269 | 29.6 | 9.6 | <0.001 | <0.01 | 0.63 | 1.9 | <0.2 | 4 | 9.9 | 0.01 | 0.03 | 10.9 | 0.077 | 0.09 | 1.89 | 20 | 1.09 | 22.37 | 55 | 23.1 |
| 14 | 261563 | Pulp | 1.19 | 0.02 | 5.10 | 12.4 | 353 | 32.9 | 13.7 | <0.001 | <0.01 | 0.59 | 2.6 | <0.2 | 3.6 | 11.6 | 0.01 | 0.06 | 10.1 | 0.091 | 0.12 | 1.77 | 27 | 1 | 25.15 | 66 | 24.9 |
| 15 | 261564 | Pulp | 1.21 | 0.03 | 15.85 | 7.0 | 207 | 52.3 | 14.8 | 0.001 | <0.01 | 0.78 | 2.1 | <0.2 | 6 | 12.2 | 0.02 | 0.04 | 14.5 | 0.075 | 0.11 | 2.68 | 19 | 1.62 | 50.54 | 46 | 52.8 |
| 16 | 261565 | Pulp | 1.27 | 0.02 | 10.74 | 8.9 | 230 | 31.9 | 11.8 | <0.001 | <0.01 | 0.61 | 2.1 | <0.2 | 4.9 | 14.4 | 0.02 | 0.02 | 10.9 | 0.083 | 0.1 | 2.08 | 21 | 1.33 | 26.25 | 61 | 24.9 |
| 17 | 261566 | Pulp | 1.23 | 0.02 | 9.41 | 12.6 | 232 | 25.7 | 13.2 | <0.001 | 0.01 | 0.65 | 2.1 | <0.2 | 4.3 | 8.5 | 0.01 | 0.03 | 10.5 | 0.083 | 0.12 | 1.87 | 23 | 1.12 | 23.43 | 50 | 21.3 |
| 18 | 261567 | Pulp | 1.32 | 0.22 | 24.50 | 9.3 | 283 | 47.9 | 47.3 | 0.002 | <0.01 | 0.87 | 3.2 | <0.2 | 5.6 | 34.9 | 0.02 | 0.06 | 14.5 | 0.089 | 0.29 | 3.26 | 24 | 1.81 | 77.44 | 55 | 89.3 |
| 19 | 261568 | Pulp | 1.55 | 0.03 | 6.52 | 10.7 | 243 | 32.0 | 14.6 | 0.001 | <0.01 | 0.67 | 2.6 | <0.2 | 5.1 | 12.8 | 0.02 | 0.03 | 13.6 | 0.092 | 0.11 | 2.33 | 22 | 1.37 | 34.19 | 52 | 34.4 |
| 20 | 261569 | Pulp | 1.37 | 0.03 | 10.69 | 12.3 | 281 | 34.5 | 19.9 | <0.001 | 0.02 | 0.67 | 2.9 | <0.2 | 4.8 | 15.8 | <0.01 | 0.05 | 10.7 | 0.124 | 0.19 | 2.24 | 28 | 1.26 | 26.56 | 61 | 29.2 |
| 21 | 261570 | Pulp | 1.28 | 0.03 | 6.31 | 9.7 | 266 | 115.7 | 15.5 | 0.001 | <0.01 | 0.64 | 2.7 | <0.2 | 4.3 | 12.7 | 0.01 | 0.04 | 11.9 | 0.091 | 0.12 | 2.55 | 24 | 1.17 | 58.23 | 66 | 45.8 |
| 22 | 261571 | Pulp | 1.52 | 0.03 | 4.05 | 14.5 | 353 | 31.4 | 24.1 | 0.001 | <0.01 | 0.69 | 3.6 | <0.2 | 3.9 | 12.9 | 0.02 | 0.12 | 11.1 | 0.106 | 0.21 | 2.31 | 30 | 1.12 | 42.15 | 80 | 36.9 |
| 23 | 261572 | Pulp | 1.00 | 0.03 | 5.65 | 12.2 | 290 | 31.5 | 13.7 | <0.001 | <0.01 | 0.69 | 2.5 | <0.2 | 3.5 | 13.2 | 0.01 | 0.05 | 10.0 | 0.094 | 0.13 | 1.90 | 24 | 1 | 22.21 | 57 | 26.4 |
| 24 | 261573 | Pulp | 1.12 | 0.03 | 5.26 | 11.9 | 396 | 29.2 | 14.6 | <0.001 | 0.03 | 0.67 | 2.9 | <0.2 | 2.8 | 14 | <0.01 | 0.06 | 8.5 | 0.111 | 0.14 | 1.76 | 27 | 0.87 | 21.68 | 77 | 25.8 |
| 25 | 261574 | Pulp | 1.25 | 0.03 | 2.81 | 11.9 | 304 | 29.8 | 13.8 | <0.001 | <0.01 | 0.53 | 2.5 | <0.2 | 3.5 | 12 | 0.01 | 0.04 | 10.2 | 0.093 | 0.12 | 1.97 | 25 | 0.9 | 37.30 | 69 | 26.8 |
| ***QUALITY ASSURANCE / QUALIT*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 261566 | Pulp | 1.23 | 0.02 | 9.41 | 12.6 | 232 | 25.7 | 13.2 | <0.001 | 0.01 | 0.65 | 2.1 | <0.2 | 4.3 | 8.5 | 0.01 | 0.03 | 10.5 | 0.083 | 0.12 | 1.87 | 23 | 1.12 | 23.43 | 50 | 21.3 |
| 17R | 261566 (Rep) | Pulp | 1.32 | 0.02 | 10.42 | 12.9 | 254 | 27.3 | 13.1 | <0.001 | 0.01 | 0.7 | 2 | <0.2 | 4.4 | 7.9 | 0.01 | 0.04 | 11 | 0.081 | 0.11 | 1.93 | 23 | 1.21 | 23.38 | 50 | 21.3 |
| | | %RPD | -7% | 0% | -10% | -2% | -9% | -6% | 1% | | 0% | -7% | 5% | | -2% | 7% | 0% | -29% | -5% | 2% | 9% | -3% | 0% | -8% | 0% | 0% | 0% |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 601C | | | 3.09 | 0.06 | 0.47 | 6.0 | 241 | 250.7 | 13.6 | 0.001 | 0.93 | 30.52 | 1.00 | 8.0 | 1.70 | 36.3 | <0.01 | 7.38 | 6.1 | 0.012 | 1.19 | 2.05 | 5.00 | 1.17 | 5.13 | 387 | 33.6 |
| **True Value STD OREAS 601C** | | | **3.35** | **0.05** | **<1** | **6.0** | **243** | **248.1** | **12.4** | **< 0.001** | **0.91** | **29.73** | **1.03** | **8.0** | **1.59** | **36.3** | **< 0.05** | **7.22** | **6.1** | **0.010** | **1.20** | **2.04** | **4.75** | **1.16** | **5.10** | **381** | **33.5** |
| % Difference | | | -8% | 14% | | 0% | -1% | 1% | 9% | | 2% | 3% | -3% | 0% | 7% | 0% | | 2% | 0% | 26% | 0% | 0% | 5% | 0% | 1% | 2% | 0% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.05 | <0.01 | <0.05 | <0.2 | <10 | <0.2 | <0.1 | <0.001 | <0.01 | <0.05 | <0.1 | <0.2 | <0.2 | <0.2 | <0.01 | <0.01 | <0.2 | <0.005 | <0.02 | <0.05 | <1 | <0.05 | <0.05 | <1 | <0.5 |

## CERTIFICATE OF ANALYSIS ▪ SINGLE ADDITION NAG RESULTS (EGi Method)

Global ARD Testing Services Inc.



**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

| S. No: | Sample ID | Pulp Sample Weight (g) | Vol. of 15% $H_2O_2$ (mL) | NAG pH (pH Units) | NaOH to pH 4.5 (mL) | NaOH to pH 7.0 (mL) | NaOH Conc. (N) | NAG Acidity pH 4.5 (kg $H_2SO_4$/tonne) | NAG Acidity pH 7.0 (kg $H_2SO_4$/tonne) | % RPD to pH 4.5 | % RPD to pH 7.0 | % RPD Acceptance Criteria |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| 2 | 261551 | 2.5 | 250 | 5.58 | 0.00 | 4.43 | 0.1 | 0.0 | 8.7 | | | |
| **QUALITY ASSURANCE / QUALITY CONTROL** | | | | | | | | | | | | |
| ***Replicates:*** | | | | | | | | | | | | |
| | | | | | | | | | | | | 10% |
| | | | | | | | | | | | | |
| ***Method Blank Analysis:*** | | | | | | | | | | | | |
| Method Blank (15% $H_2O_2$ Solution) | | N/A | 250 | 5.07 | 0.00 | 11.86 | 0.1 | | | | | |
| ***GLOBAL SOP NO:*** | | ***ARD-017*** | | | | | | | | | | |

***NOTES:***
**Date of Analysis:** December 4-5, 2025

pH (pH Units) of 15% $H_2O_2$ (buffered with 0.5 N NaOH): 5.18
EC (µS/cm) of 15% $H_2O_2$ (buffered with 0.5 N NaOH): 21.56
pH (pH Units) of DI water used: 5.26
EC (µS/cm) of DI water used: 1.48

Solid:Liquid ratio used: 1:100; 2.5 g Pulp Sample: 250 mL 15% $H_2O_2$.
pH measurement of 15% $H_2O_2$ solution was conducted at room temperature & buffered with 0.5N NaOH solution to ensure a pH between 4 and 7.
NAG pH & method blank pH measurements were taken after digesting with peroxide solution and making up the solution to its original volume of 250 mL with DI water.
On client's request the NAG procedure is repeated using 1 g of pulp sample when the NAG value for pH 4.5 exceeds 25 kg $H_2SO_4$ per tonne.

***ABBREVIATIONS:***
R = Replicate (i.e. using a pulp sample from the same bag).
D = Duplicate (i.e. client sample is processed to produced a 2nd pulp bag & analyzed as a duplicate).
RPD = Relative Percent Difference.
EC = Electrical Conductivity
ORP = Oxidation Reduction Potential
RDL = Reportable Detection Limit.
EDL = Estimated Detection Limit
SIE = Selective Ion Electrode
IC = Ion Chromatography
Calc. = Calculation

***REFERENCE:***
Egi - Environmental Geochemistry International; Single Addition Net Acid Generation (NAG) Test Procedure; Miller et al; Revised Dec. 2006; Page 2 to 4.

## CERTIFICATE OF ANALYSIS • MEND SHAKE FLASK EXTRACTION RESULTS


GLOBAL PROJECT NO: 2577 (B2)
CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
PROJECT NO: 2025 Geochemical Sampling
REPORT VERSION: 3

CERTIFICATE OF ANALYSIS • MEND SHAKE FLASK EXTRACTION RESULTS
PAGE: 6 of 7
GLOBAL PROJECT NO: 2577 (B2)
CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
PROJECT NO: 2025 Geochemical Sampling
REPORT VERSION: 3

| Parameter | Method | Unit | RDL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | Method Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 261550 | 261551 | 261552 | 261553 | 261554 | 261555 | 261556 | 261557 | 261558 | 261559 | 261560 | 261561 | 261562 | 261563 | 261564 | 261565 | 261566 | 261567 | 261568 | 261569 | 261570 | 261571 | 261572 | 261573 | 261574 | |
| Weight of dry sample used | Weighing Scale | g | 0.01 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | N/A |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | Meter | pH units | 0.01 | 5.9 | 6.1 | 5.8 | 5.8 | 5.7 | 5.6 | 5.7 | 5.8 | 5.6 | 5.6 | 5.6 | 5.9 | 5.7 | 5.7 | 5.7 | 5.8 | 5.5 | 6.0 | 5.9 | 5.8 | 5.9 | 5.8 | 5.9 | 6.0 | 5.6 | 5.6 |
| EC | Meter | µS/cm | 1 | 43 | 15 | 11 | 15 | 9 | 17 | 17 | 10 | 13 | 19 | 20 | 9 | 8 | 8 | 14 | 10 | 8 | 19 | 10 | 12 | 14 | 12 | 8 | 13 | 12 | 1.33 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 16.2 | 8.0 | 9.1 | 7.7 | 8.6 | 9.0 | 12.6 | 6.5 | 10.9 | 10.4 | 11.8 | 5.4 | 5.3 | 5.3 | 11.5 | 8.4 | 7.1 | 10.2 | 9.5 | 8.2 | 9.2 | 7.0 | 6.7 | 8.4 | 7.6 | 4.1 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 17.5 | 4.3 | 3.1 | 3.0 | 2.3 | 2.9 | 2.9 | 3.8 | 1.9 | 3.0 | 3.0 | 0.9 | 2.7 | 0.8 | 3.3 | 3.1 | 2.7 | 4.2 | 2.4 | 1.6 | 2.5 | 4.4 | 3.0 | 4.3 | 3.5 | 1.6 |
| Sulphate | Turbidimetric | mg/L | 0.5 | <0.5 | 0.5 | 0.6 | 0.7 | 3.5 | 2.2 | 1.7 | 0.9 | 1.5 | 1.0 | 1.3 | <0.5 | <0.5 | <0.5 | 2.0 | 1.0 | 0.5 | 2.1 | 1.5 | 1.4 | 0.7 | 1.2 | 3.0 | 0.5 | 0.6 | |
| Chloride | IC | mg/L | 0.1 | 1.09 | 0.89 | 0.67 | 0.81 | 0.53 | 0.89 | 1.26 | 0.80 | 0.80 | 1.09 | 1.65 | 1.00 | 0.78 | 0.95 | 0.78 | 0.76 | 0.69 | 1.06 | 1.26 | 0.86 | 0.77 | 0.62 | 0.91 | 0.48 | 0.60 | |
| Fluoride | IC | mg/L | 0.1 | 0.41 | 0.32 | 0.30 | 1.02 | 0.94 | 0.58 | 1.24 | 0.40 | 0.68 | 0.97 | 0.62 | 0.20 | <0.10 | <0.10 | 1.00 | 0.31 | 0.11 | 1.83 | 0.54 | 0.38 | 1.15 | 0.82 | 0.22 | 0.60 | 0.77 | |
| Nitrate | IC | mg/L | 0.01 | 0.031 | 0.084 | 0.042 | 0.016 | 0.014 | 0.016 | 0.020 | 0.013 | 0.021 | 0.024 | 0.049 | 0.013 | 0.019 | 0.016 | 0.035 | 0.013 | 0.017 | 0.016 | 0.011 | 0.022 | 0.013 | 0.016 | 0.208 | 0.018 | 0.014 | |
| Nitrite | IC | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | |
| Nitrate+ Nitrite as N | | mg/L | 0.01 | 0.031 | 0.084 | 0.042 | 0.016 | 0.014 | 0.016 | 0.020 | 0.013 | 0.021 | 0.024 | 0.049 | 0.013 | 0.019 | 0.016 | 0.035 | 0.013 | 0.017 | 0.016 | 0.011 | 0.022 | 0.013 | 0.016 | 0.208 | 0.018 | 0.014 | |
| Phosphorus, Total Dissolved | | mg/L | 0.005 | <0.0050 | 0.0075 | <0.0050 | <0.0050 | 0.0115 | <0.0050 | 0.0086 | 0.0064 | 0.0101 | <0.0050 | 0.0060 | <0.0050 | <0.0050 | <0.0050 | 0.0076 | 0.0074 | <0.0050 | 0.0071 | <0.0050 | 0.0065 | <0.0050 | <0.0050 | 0.0087 | 0.0080 | <0.0050 | |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Hardness ($CaCO_3$) | ICP-MS | mg/L | 0.125 | 20.7 | 5.66 | 3.89 | 3.96 | 0.94 | 2.54 | 2.99 | 0.92 | 2.04 | 4.52 | 4.48 | 0.75 | 0.78 | 0.73 | 3.21 | 1.92 | 0.97 | 4.41 | 0.40 | 1.03 | 2.10 | 1.25 | 0.46 | 4.18 | 1.25 | <0.125 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | 0.0203 | 0.142 | 0.199 | 0.204 | 1.01 | 0.323 | 1.02 | 0.267 | 0.688 | 0.489 | 0.369 | 0.0313 | 0.0391 | 0.0196 | 0.914 | 0.428 | 0.276 | 0.705 | 0.347 | 0.211 | 0.411 | 0.388 | 0.698 | 0.162 | 0.225 | <0.0010 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | 0.00009 | 0.000095 | 0.000533 | 0.000091 | 0.000074 | 0.000111 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | 0.000052 | <0.000050 | <0.000050 | 0.000098 | 0.000063 | 0.000232 | 0.00011 | 0.00005 | 0.000462 | 0.000176 | 0.000052 | <0.000050 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | 0.000068 | 0.00019 | 0.000127 | 0.000255 | 0.00148 | 0.00541 | <0.00120 | <0.000900 | 0.000564 | <0.000150 | <0.000300 | <0.000100 | <0.000100 | <0.000050 | <0.000850 | <0.000300 | <0.000200 | <0.000700 | 0.00189 | 0.000607 | 0.000824 | 0.000173 | 0.00558 | 0.000154 | 0.000152 | <0.000050 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0059 | 0.00143 | 0.00066 | 0.00535 | 0.00652 | 0.0041 | 0.00522 | 0.00074 | 0.00073 | 0.00185 | 0.00218 | 0.00096 | 0.0011 | 0.00071 | 0.00221 | 0.00081 | 0.00125 | 0.0142 | 0.00326 | 0.00134 | 0.00992 | 0.00355 | 0.00365 | 0.00177 | 0.0023 | <0.00010 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | 0.000091 | 0.000035 | 0.000145 | 0.000853 | 0.000204 | 0.000181 | 0.000062 | 0.00008 | 0.000112 | 0.000047 | 0.000023 | 0.000018 | 0.000013 | 0.000085 | 0.000043 | 0.000032 | 0.0003 | 0.000276 | 0.000108 | 0.000411 | 0.000182 | 0.000247 | 0.000137 | 0.000162 | <0.000010 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000023 | 0.000014 | 0.000026 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000021 | 0.000017 | <0.000010 | <0.000010 | <0.000010 | 0.000033 | <0.000010 | <0.000010 | <0.000010 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | 0.0039 | 0.0033 | 0.0042 | 0.0029 | 0.0037 | 0.0033 | 0.0037 | 0.0034 | 0.0041 | 0.0025 | 0.003 | 0.0033 | 0.003 | 0.0031 | 0.0044 | 0.0037 | 0.0029 | 0.0041 | 0.0043 | 0.0031 | 0.0036 | 0.0031 | 0.0026 | 0.0028 | <0.0020 | <0.0020 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | 0.0000195 | 0.0000223 | 0.0000037 | 0.0000221 | 0.0000456 | 0.0000511 | 0.0000293 | 0.0000148 | 0.0000145 | 0.0000214 | 0.0000143 | 0.0000051 | 0.0000051 | 0.0000038 | 0.0000268 | 0.00001 | 0.0000092 | 0.000158 | 0.0000266 | 0.0000081 | 0.00014 | 0.0000194 | 0.0000242 | 0.0000124 | 0.0000158 | <0.0000020 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | 7.06 | 1.85 | 1.22 | 1.17 | 0.22 | 0.65 | 0.83 | 0.21 | 0.50 | 1.33 | 1.35 | 0.17 | 0.20 | 0.17 | 0.95 | 0.52 | 0.15 | 1.19 | 0.08 | 0.14 | 0.59 | 0.30 | 0.07 | 1.30 | 0.31 | <0.050 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | 0.0007 | 0.0009 | 0.0006 | <0.00050 | 0.0007 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | 0.0006 | 0.0006 | 0.0005 | <0.00050 | 0.0007 | <0.00050 | <0.00050 | <0.00050 | 0.0021 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | 0.0000095 | 0.0000265 | 0.0000393 | 0.000557 | 0.000791 | 0.000313 | 0.000542 | 0.000581 | 0.000266 | 0.0000889 | 0.000184 | 0.0000416 | 0.0000439 | 0.0000661 | 0.000127 | 0.000158 | 0.000223 | 0.000469 | 0.000195 | 0.0000934 | 0.000901 | 0.000091 | 0.0000674 | 0.0000551 | 0.0000536 | <0.0000050 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | 0.00021 | 0.00183 | 0.00148 | 0.00095 | 0.00544 | 0.00254 | 0.00467 | 0.00285 | 0.00249 | 0.00081 | 0.00134 | 0.00087 | 0.00105 | 0.00055 | 0.0034 | 0.00344 | 0.00363 | 0.00346 | 0.00709 | 0.00111 | 0.00333 | 0.00075 | 0.00562 | 0.00393 | 0.00066 | <0.00010 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | 0.0067 | 0.0104 | 0.0428 | 0.0736 | 0.373 | 0.0898 | 0.226 | 0.0967 | 0.201 | 0.0325 | 0.0325 | 0.0047 | 0.0044 | 0.0038 | 0.263 | 0.0987 | 0.0853 | 0.302 | 0.182 | 0.0244 | 0.0659 | 0.104 | 0.263 | 0.0072 | 0.0457 | <0.0020 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | 0.000097 | 0.000277 | 0.000626 | 0.000715 | 0.00413 | 0.0042 | 0.00437 | 0.00123 | 0.00258 | 0.000453 | 0.000558 | 0.000106 | 0.000115 | 0.000118 | 0.00241 | 0.00112 | 0.00101 | 0.00349 | 0.00278 | 0.000289 | 0.00817 | 0.000633 | 0.00269 | 0.000191 | 0.000288 | <0.000050 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | 0.0006 | 0.0003 | 0.0002 | 0.0017 | 0.0031 | 0.0027 | 0.0009 | 0.0003 | 0.0002 | 0.0011 | 0.0007 | 0.0002 | 0.0002 | 0.0003 | 0.0006 | 0.0004 | 0.0007 | 0.0018 | 0.0012 | 0.0009 | 0.0018 | 0.0015 | 0.0008 | 0.0006 | 0.0013 | <0.0000050 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | 0.750 | 0.249 | 0.205 | 0.254 | 0.093 | 0.221 | 0.220 | 0.094 | 0.195 | 0.288 | 0.269 | 0.080 | 0.067 | 0.077 | 0.202 | 0.151 | 0.141 | 0.349 | 0.048 | 0.182 | 0.149 | 0.119 | 0.068 | 0.226 | 0.114 | <0.0050 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | 0.004 | 0.00718 | 0.00624 | 0.0718 | 0.0283 | 0.025 | 0.219 | 0.198 | 0.0767 | 0.0378 | 0.0506 | 0.013 | 0.0163 | 0.0192 | 0.0532 | 0.0399 | 0.0477 | 0.392 | 0.0332 | 0.022 | 0.204 | 0.0183 | 0.00456 | 0.00863 | 0.014 | <0.000050 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | 0.000519 | 0.000108 | 0.000088 | 0.00009 | 0.000065 | 0.00147 | 0.000152 | 0.000059 | 0.000129 | 0.000039 | 0.000058 | 0.00005 | 0.000059 | 0.000028 | 0.00006 | 0.000053 | <0.000010 | 0.000089 | 0.000068 | 0.000103 | 0.000111 | 0.000083 | 0.000888 | 0.000148 | 0.000037 | <0.000010 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | <0.000040 | 0.000082 | 0.000104 | 0.000274 | 0.000634 | 0.000464 | 0.000332 | 0.000132 | 0.000143 | 0.000176 | 0.00022 | 0.00005 | 0.000079 | 0.000076 | 0.000292 | 0.000145 | 0.000181 | 0.000599 | 0.000172 | 0.000093 | 0.000483 | 0.000212 | 0.00029 | 0.000126 | 0.000155 | <0.000040 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | 0.496 | 0.293 | 0.219 | 0.491 | 0.426 | 0.729 | 0.628 | 0.48 | 0.409 | 0.52 | 0.789 | 0.336 | 0.263 | 0.299 | 0.413 | 0.351 | 0.232 | 0.804 | 0.554 | 0.507 | 0.639 | 0.311 | 0.252 | 0.338 | 0.284 | <0.020 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00045 | 0.00011 | 0.0001 | 0.00024 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | 0.41 | 0.54 | 0.44 | 0.92 | 1.39 | 0.73 | 0.98 | 0.71 | 0.73 | 0.88 | 0.91 | 0.58 | 0.54 | 0.66 | 0.8 | 0.51 | 0.49 | 1.26 | 0.83 | 0.73 | 0.78 | 1.07 | 0.87 | 0.58 | 0.87 | <0.10 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000013 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000011 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | 1.92 | 0.961 | 0.859 | 1.62 | 1.61 | 1.78 | 1.67 | 1.25 | 1.36 | 1.4 | 1.37 | 1.07 | 0.836 | 0.888 | 1.28 | 1.08 | 0.806 | 1.83 | 1.59 | 1.82 | 1.62 | 2 | 1.35 | 0.924 | 1.75 | <0.020 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | 0.00797 | 0.00275 | 0.00197 | 0.0035 | 0.00132 | 0.00316 | 0.00224 | 0.00082 | 0.00157 | 0.00256 | 0.00299 | 0.00099 | 0.00098 | 0.00083 | 0.00173 | 0.00133 | 0.0009 | 0.00362 | 0.00056 | 0.00104 | 0.00233 | 0.00132 | 0.00082 | 0.00289 | 0.00115 | <0.00010 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 2.4 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | 0.0000051 | <0.0000040 | 0.0000057 | 0.0000052 | 0.000016 | 0.0000349 | 0.0000285 | 0.000021 | 0.0000219 | 0.0000106 | 0.0000189 | 0.0000079 | 0.0000088 | 0.0000081 | 0.0000125 | 0.0000152 | 0.0000084 | 0.000024 | 0.0000144 | 0.0000067 | 0.0000226 | 0.0000062 | 0.0000079 | 0.0000058 | 0.0000051 | <0.0000040 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | 0.00021 | 0.000581 | 0.000069 | 0.00086 | 0.000393 | 0.0023 | 0.00154 | 0.00232 | 0.000087 | 0.00032 | 0.000076 | 0.000139 | 0.000023 | 0.00179 | 0.00169 | 0.000704 | 0.000911 | 0.00203 | 0.000116 | 0.000335 | 0.000087 | 0.00125 | 0.000103 | 0.000042 | <0.000010 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | <0.000100 | 0.000135 | 0.000409 | 0.000687 | 0.000354 | 0.000101 | 0.000255 | 0.000214 | <0.000100 | 0.00017 | <0.000100 | 0.000115 | 0.000179 | 0.000114 | <0.000100 | <0.000100 | 0.000186 | 0.000132 | 0.000131 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | 0.00042 | 0.0007 | 0.00138 | 0.00296 | 0.0121 | 0.00764 | 0.00985 | 0.00517 | 0.00492 | 0.00202 | 0.0021 | 0.00052 | 0.00064 | 0.00026 | 0.0153 | 0.0028 | 0.00192 | 0.0115 | 0.0055 | 0.0019 | 0.00298 | 0.00496 | 0.0185 | 0.00052 | 0.00226 | <0.00020 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | <0.00020 | 0.00033 | <0.00020 | <0.00020 | <0.00020 | 0.00028 | 0.00028 | <0.00020 | 0.00025 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | 0.0000255 | 0.000112 | 0.000136 | 0.0000652 | 0.00102 | 0.00087 | 0.000747 | 0.000837 | 0.000342 | 0.0000673 | 0.000151 | 0.0000449 | 0.0000714 | 0.000021 | 0.000362 | 0.000319 | 0.000196 | 0.000363 | 0.000827 | 0.0000987 | 0.000451 | 0.0000366 | 0.000894 | 0.0000803 | 0.0000234 | <0.0000010 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | 0.0011 | 0.00262 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | 0.00117 | <0.00100 | <0.00100 | 0.00843 | <0.00100 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | <0.0010 | 0.0014 | <0.0010 | 0.0044 | 0.0080 | 0.0041 | 0.0030 | 0.0013 | 0.0016 | 0.0022 | 0.0018 | 0.0014 | 0.0017 | 0.0012 | 0.0035 | 0.0017 | 0.0023 | 0.0086 | 0.0027 | 0.0012 | 0.0072 | 0.0038 | 0.0026 | 0.0038 | 0.0028 | <0.0010 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | 0.00008 | 0.00047 | 0.00086 | 0.00054 | 0.00590 | 0.00137 | 0.00953 | 0.00376 | 0.00306 | 0.00031 | 0.00062 | 0.00017 | 0.00031 | 0.00006 | 0.00551 | 0.00199 | 0.00091 | 0.00442 | 0.00463 | 0.00022 | 0.00336 | 0.00050 | 0.00359 | 0.00028 | 0.00017 | <0.00020 |
| ***Ion Balance:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Major Anions | Calc. | meq/L | | 0.40 | 0.14 | 0.11 | 0.15 | 0.18 | 0.16 | 0.19 | 0.14 | 0.13 | 0.16 | 0.16 | 0.06 | 0.08 | 0.04 | 0.18 | 0.12 | 0.09 | 0.25 | 0.14 | 0.10 | 0.15 | 0.17 | 0.16 | 0.14 | 0.14 | |
| Major Cations | Calc. | meq/L | | 0.52 | 0.18 | 0.15 | 0.19 | 0.23 | 0.19 | 0.28 | 0.13 | 0.20 | 0.22 | 0.22 | 0.08 | 0.07 | 0.07 | 0.25 | 0.15 | 0.10 | 0.29 | 0.14 | 0.14 | 0.19 | 0.17 | 0.16 | 0.15 | 0.14 | |
| Difference | Calc. | meq/L | | 0.11 | 0.04 | 0.04 | 0.04 | 0.05 | 0.03 | 0.09 | -0.01 | 0.07 | 0.06 | 0.05 | 0.02 | -0.01 | 0.02 | 0.07 | 0.03 | 0.01 | 0.04 | 0.00 | 0.04 | 0.04 | 0.00 | 0.00 | 0.01 | 0.00 | |
| Balance (%) | Calc. | % | | 12.3% | 13.1% | 15.0% | 11.6% | 11.7% | 8.9% | 18.1% | -4.0% | 22.5% | 15.8% | 13.8% | 14.8% | -6.1% | 21.2% | 15.2% | 10.7% | 5.0% | 17.2% | -0.9% | 14.8% | 12.3% | -1.0% | 1.5% | 3.8% | -0.6% | |
| | *Shake Flask Extract ID:* | | | *25K2650-01* | *25K2650-02* | *25K2650-03* | *25K2650-04* | *25K2650-05* | *25K2650-06* | *25K2650-07* | *25K2650-08* | *25K2650-09* | *25K2650-10* | *25K2650-11* | *25K2650-12* | *25K2650-13* | *25K2650-14* | *25K2650-15* | *25K2650-16* | *25K2650-17* | *25K2650-18* | *25K2650-19* | *25K2650-20* | *25K2650-21* | *25K2650-22* | *25K2650-23* | *25K2650-24* | *25K2650-25* | *25K2431-07* |

***NOTES:***
Job No: 25K2650
**Date of Analysis (24 h):** November 19-21, 2025
pH of DI water used (pH Units): 5.29, 5.22
EC of DI water used (µS/cm): 1.22 1.24

***ABBREVIATIONS:***
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S; 750 mL DI $H_2O$: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 37.52 | 107.9% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 17.93 | | 91.4% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25K2650_B5K4144-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.002 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.000002 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.05 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.000005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.002 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Manganese dissolved | 0.000063 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00002 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00004 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.01 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.02 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.1 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.02 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 1 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.000004 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0002 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.0002 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.000001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4144-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '23 Nov 2025 | 0.00002 | mg/L | | |
| 25K2650_B5K4144-BS1 | Aluminum dissolved | 99 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Antimony dissolved | 97 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Arsenic dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Barium dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Beryllium dissolved | 99 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Bismuth dissolved | 104 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Boron dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Cadmium dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Calcium dissolved | 102 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Chromium dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Cobalt dissolved | 99 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Copper dissolved | 98 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Iron dissolved | 99 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Lead dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Lithium dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Magnesium dissolved | 103 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Manganese dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Mercury dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Molybdenum dissolved | 99 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Nickel dissolved | 99 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Phosphorus dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Potassium dissolved | 98 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Silicon dissolved | 98 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Silver dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Sodium dissolved | 98 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Strontium dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Sulfur dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Tellurium dissolved | 96 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Thallium dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Tin dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Titanium dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Tungsten dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Uranium dissolved | 101 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Vanadium dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Zinc dissolved | 100 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4144-BS1 | Zirconium dissolved | 98 | % | F | SC | EPA 6020B | '23 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 37.52 | 107.9% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 17.93 | | 91.4% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25K2650_B5K4177-BLK1 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.1 | mg/L | | |
| 25K2650_B5K4177-BLK1 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.1 | mg/L | | |
| 25K2650_B5K4177-BLK1 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.01 | mg/L | | |
| 25K2650_B5K4177-BLK1 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.01 | mg/L | | |
| 25K2650_B5K4177-BLK2 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.1 | mg/L | | |
| 25K2650_B5K4177-BLK2 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.1 | mg/L | | |
| 25K2650_B5K4177-BLK2 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.01 | mg/L | | |
| 25K2650_B5K4177-BLK2 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '25 Nov 2025 | 0.01 | mg/L | | |
| 25K2650_B5K4177-BS1 | Chloride | 93 | % | T | SC | SM 4110 B (2020) | '25 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-BS1 | Fluoride | 83 | % | T | SC | SM 4110 B (2020) | '25 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-BS1 | Nitrate (as N) | 108 | % | T | SC | SM 4110 B (2020) | '25 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-BS1 | Nitrite (as N) | 102 | % | T | SC | SM 4110 B (2020) | '25 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-BS2 | Chloride | 99 | % | T | SC | SM 4110 B (2020) | '26 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-BS2 | Fluoride | 86 | % | T | SC | SM 4110 B (2020) | '26 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-BS2 | Nitrate (as N) | 106 | % | T | SC | SM 4110 B (2020) | '26 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-BS2 | Nitrite (as N) | 104 | % | T | SC | SM 4110 B (2020) | '26 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4177-MS2 | Chloride | 3.6 | mg/L | T | REG | SM 4110 B (2020) | '26 Nov 2025 | 0.2 | mg/L | 125 | 75 |
| 25K2650_B5K4177-MS2 | Fluoride | 1.66 | mg/L | T | REG | SM 4110 B (2020) | '26 Nov 2025 | 0.2 | mg/L | 125 | 75 |
| 25K2650_B5K4177-MS2 | Nitrate (as N) | 3 | mg/L | T | REG | SM 4110 B (2020) | '26 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K2650_B5K4177-MS2 | Nitrite (as N) | 2.93 | mg/L | T | REG | SM 4110 B (2020) | '26 Nov 2025 | 0.02 | mg/L | 125 | 75 |
| 25K2650_B5K4219-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.002 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.000002 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.05 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.000005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.002 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00002 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00004 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.01 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.02 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.1 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.02 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 1 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.000004 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0002 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.0002 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.000001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4219-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '24 Nov 2025 | 0.00002 | mg/L | | |
| 25K2650_B5K4219-BS1 | Aluminum dissolved | 105 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Antimony dissolved | 101 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Arsenic dissolved | 105 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Barium dissolved | 102 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Beryllium dissolved | 102 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Bismuth dissolved | 104 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Boron dissolved | 103 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Cadmium dissolved | 102 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Calcium dissolved | 103 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Chromium dissolved | 106 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Cobalt dissolved | 106 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Copper dissolved | 106 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Iron dissolved | 108 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Lead dissolved | 102 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Lithium dissolved | 101 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Magnesium dissolved | 108 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Manganese dissolved | 106 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS



**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 37.52 | 107.9% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 17.93 | | 91.4% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25K2650_B5K4219-BS1 | Mercury dissolved | 102 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Molybdenum dissolved | 101 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Nickel dissolved | 103 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Phosphorus dissolved | 104 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Potassium dissolved | 107 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Silicon dissolved | 98 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Silver dissolved | 104 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Sodium dissolved | 108 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Strontium dissolved | 107 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Sulfur dissolved | 100 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Tellurium dissolved | 101 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Thallium dissolved | 102 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Thorium dissolved | 104 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Tin dissolved | 103 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Titanium dissolved | 105 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Tungsten dissolved | 102 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Uranium dissolved | 101 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Vanadium dissolved | 105 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Zinc dissolved | 106 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4219-BS1 | Zirconium dissolved | 103 | % | F | SC | EPA 6020B | '24 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.002 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.000002 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.05 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.000005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.002 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00002 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00004 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.01 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.02 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.1 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.02 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 1 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00005 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.000004 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0002 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.0002 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.000001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.001 | mg/L | | |
| 25K2650_B5K4225-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '26 Nov 2025 | 0.00002 | mg/L | | |
| 25K2650_B5K4225-BS1 | Aluminum dissolved | 104 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Antimony dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Arsenic dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Barium dissolved | 102 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Beryllium dissolved | 104 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Bismuth dissolved | 102 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Boron dissolved | 103 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Calcium dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Chromium dissolved | 102 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Cobalt dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Copper dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Iron dissolved | 103 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Lead dissolved | 102 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Lithium dissolved | 103 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Magnesium dissolved | 104 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Manganese dissolved | 102 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS


**GLOBAL PROJECT NO:** 2577 (B2)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 3

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 37.52 | 107.9% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 17.93 | | 91.4% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25K2650_B5K4225-BS1 | Mercury dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Molybdenum dissolved | 102 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Nickel dissolved | 100 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Phosphorus dissolved | 103 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Potassium dissolved | 102 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Selenium dissolved | 97 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Silicon dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Sodium dissolved | 106 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Strontium dissolved | 104 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Sulfur dissolved | 100 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Tellurium dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Thallium dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Thorium dissolved | 100 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Tin dissolved | 104 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Titanium dissolved | 103 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Tungsten dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Uranium dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Vanadium dissolved | 100 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4225-BS1 | Zirconium dissolved | 105 | % | F | SC | EPA 6020B | '27 Nov 2025 | 1 | % | 120 | 80 |
| 25K2650_B5K4606-BLK1 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '27 Nov 2025 | 0.005 | mg/L | | |
| 25K2650_B5K4606-BS1 | Phosphorus Total Dissolved | 105 | % | F | SC | SM 4500-P F (2021) | '27 Nov 2025 | 1 | % | 115 | 85 |
| 25K2650_B5K4606-MS1 | Phosphorus Total Dissolved | 0.107 | mg/L | F | REG | SM 4500-P F (2021) | '27 Nov 2025 | 0.005 | mg/L | 125 | 70 |

**NOTES:**
Job No: 25K2650

***Abbreviations & Descriptions:***
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate
SRM = Standard Reference Materials

# CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

| CLIENT INFORMATION | |
|---|---|
| **Client:** | Canada Fluorspar (NL) Inc. |
| | |
| **Project Manager:** | Melissa Lambert |
| | |
| **Mailing Address** | 1 Clarke's Pond Road |
| | St. Lawrence, NL, CA A0E 2V0 |
| | |
| **Contact No:** | 1(709) 702-5960 |
| | |

| COMPANY INFORMATION | |
|---|---|
| **Legal Name:** | Global ARD Testing Services Inc. |
| | |
| **Mailing Address:** | 6891 Antrim Avenue |
| | Burnaby, BC |
| | V5J 4M5 |
| **Contact No:** | |
| | Main: (604) 428-2730 |
| | Alternate: (604) 603-1359 |
| | |

| PROJECT INFORMATION | |
|---|---|
| **Project Name:** | South Ridge |
| **Project Number:** | 2025 Geochemical Sampling |

| REPORTING | |
|---|---|
| **Global Project No:** | 2577 (B3) |
| **Report Version:** | 1 |
| **Pages (Including Cover):** | 6 |
| **Report Title:** | COA (B3) x 4 South Ridge Samples (rec'd 27-Oct25) |
| | |
| **Analysis Reviewed By:** | Prab Bhatia (Pbhatia@globalARDtesting.com) |
| **Position:** | Project Manager |
| **Report Certified By:** | Prab Bhatia |
| **Signature:** | |

| RESULTS | | |
|---|---|---|
| **Reported To:** | **1** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **2** | Nikolay Sidenko (NIKOLAY@FALKIRK.CA) |
| | **3** | Inaara Hassan (ihassan@canadafluorspar.com) |
| | **4** | Brad Smith (bsmith@canadafluorspar.com) |
| **Date Reported:** | | |
| | **Version-1:** | November 27, 2025 |
| | **Version-2:** | December 4, 2025 |

| INVOICE | | |
|---|---|---|
| **Submitted To:** | **1** | Accounts Payable (ap@canadafluorspar.com) |
| | **2** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **3** | |
| | **4** | |
| | | |
| **Client PO No:** | | |
| **Global Invoice No:** | | ARD2577-1125C |
| **Date Submitted:** | | December 15, 2025 |

| NOTES |
|---|
| All samples and pulps are stored at no charge for 90 days past reporting date. |
| Please contact the lab if you would like to continue storage past 90 days. |
| Storage charges will apply. |
| |
| VERSIONS: |
| Version-1: TS/TC - Partial |
| Version-2: Full Report |
| |

# CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.



**GLOBAL PROJECT NO:** 2577 (B3)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 1

| SAMPLE RECEIPT INFO | |
|---|---|
| Date Samples Received: | October 27, 2025 |
| No of Samples Received: | 4 |
| Samples Received By: | Said Zeinab |

| ANALYTICAL INSTRUCTIONS | |
|---|---|
| From: | |
| | as per email Confirmation |
| Date: | October 28, 2025 |

| S. No. | Sample ID | Sample Description | Condition (Wet/Dry) | Wt. of Sample Rec'd (kg) | Global Notes (if any) |
|---|---|---|---|---|---|
| 1 | 262347 | Historic Tailings | Wet | 1.40 | |
| 2 | 262348 | Historic Tailings | Wet | 1.85 | |
| 3 | 262349 | Historic Tailings | Wet | 2.05 | |
| 4 | 262350 | Historic Tailings | Wet | 2.25 | |

**Total wt of sample rec'd (kg): 7.55**

## CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

**GLOBAL PROJECT NO:** 2577 (B3)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 1

| S. No. | Sample ID | Paste pH | Fizz Rating | Total Carbon | Total Inorganic Carbon | $CaCO_3$ Equivalents[*1] | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | AP[*3] | Standard Sobek NP | NNP[*4] | NPR[*5] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***Units:*** | **pH Units** | | **wt %** | **wt %** | **kg $CaCO_3$/tonne** | **wt %** | **wt %** | **wt %** | | **kg $CaCO_3$/tonne** | | |
| | ***Reported Detection Limit:*** | ***0.1*** | | ***0.01*** | ***0.02*** | ***1.7*** | ***0.01*** | ***0.01*** | ***0.01*** | **0.3** | ***0.5*** | | |
| 1 | 262347 | 7.38 | Slight | 0.38 | 0.24 | 19.8 | 0.15 | 0.03 | 0.12 | 3.8 | 43.1 | 39.4 | 11.5 |
| 2 | 262348 | 7.30 | Slight | 0.31 | 0.26 | 21.4 | 0.11 | <0.01 | 0.11 | 3.4 | 42.5 | 39.1 | 12.4 |
| 3 | 262349 | 7.48 | Slight | 0.50 | 0.42 | 34.9 | 0.19 | 0.05 | 0.14 | 4.4 | 54.6 | 50.2 | 12.5 |
| 4 | 262350 | 7.43 | Slight | 0.43 | 0.34 | 28.6 | 0.07 | <0.01 | 0.07 | 2.2 | 50.2 | 48.0 | 22.9 |
| | **QUALITY ASSURANCE / QUALITY CONTROL** | | | | | | | | | | | | |
| | ***Pulp Replicates:*** | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | **%RPD** | | | | | | | | | | | | |
| | ***Reference Material Analysis:*** | | | | | | | | | | | | |
| | Reference Material | | | OREAS 279 | KZK-1 | | OREAS 20a | RTS-3a | | | 2) KZK-1 (Moderate) | | |
| | **Ref. Material Certified Value** | | | **1.13** | **0.92** | | **0.06** | **1.10** | | | **1) 59.0 2) 64.8** | | |
| | Reference Material Results | | | 1.12 | 0.82 | | 0.06 | 1.03 | | | 1) 55.5 2) N/A | | |
| | ***Acceptance Range:*** | | | ***90% - 110%*** | ***80% - 120%*** | | ***90% - 110%*** | ***90% - 110%*** | | | ***90% - 110%*** | | |
| | ***Method Blank Analysis:*** | | | | | | | | | | | | |
| | Method Blank Results | | | <0.01 | <0.02 | | <0.01 | <0.01 | | | | | |
| | ***GLOBAL SOP NO./METHOD:*** | *ARD-005* | *ARD-005* | *LECO* | *$HClO_4$ Leach $CO_2$ Coulometer* | *Calc.* | *LECO* | *ARD-010 (HCl Leach)* | *Calc.* | *Calc.* | *ARD-007* | *Calc.* | *Calc.* |

***NOTES:***
Job No: 20251112

**Date of Analysis (24 h):** December 1, 2025
pH of DI water used (pH units): 5.27
EC of DI water used (µS/cm): 1.44

***METHODS:***
Total Sulphur by LECO.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved $CO_2$ analysed by $CO_2$ Coulometer.

***ABBREVIATIONS:***
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

***CALCULATIONS:***
*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
*3 AP (Acid Potential): Sulphide-sulphur x 31.25
*4 NNP (Net Neutralization Potential): NP - AP
*5 NPR (Neutralization Potential Ratio): NP/AP

***REFERENCES:***
**Sample Preparation:** ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
**ABA:** Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
**Surface Rinse-pH**: MEND Report 1.20.1, Version 0 (2009).
**Modified ABA (Sobek) NP:** MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
**STD Sobek NP / Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Sulphate Sulphur:** Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).
**Sulphur Speciation:** Sequential HCl and $HNO_3$ leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Global
ARD Testing Services Inc.

## CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS


**GLOBAL PROJECT NO:** 2577 (B3)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 1

| S. No. | Sample ID | Method | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | Silver (Ag) | Aluminum (Al) | Arsenic (As) | Gold (Au) | Boron (B) | Barium (Ba) | Beryllium (Be) | Bismuth (Bi) | Calcium (Ca) | Cadmium (Cd) | Cerium (Ce) | Cobalt (Co) | Chromium (Cr) | Cesium (Cs) | Copper (Cu) | Iron (Fe) | Gallium (Ga) | Germanium (Ge) | Hafnium (Hf) | Mercury (Hg) | Indium (In) | Potassium (K) | Lanthanum (La) | Lithium (Li) | Magnesium (Mg) | Manganese (Mn) |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | % | ppm |
| | | MDL | 0.01 | 0.01 | 0.1 | 0.0005 | 10 | 10 | 0.05 | 0.01 | 0.01 | 0.01 | 0.02 | 0.1 | 1 | 0.05 | 0.2 | 0.01 | 0.05 | 0.05 | 0.02 | 0.005 | 0.005 | 0.01 | 0.2 | 0.1 | 0.01 | 5 |
| | | Sample Type | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 262347 | Pulp | 0.31 | 2.88 | 9.0 | 0.0067 | 817 | 2838 | 2.05 | 0.79 | 15.88 | 3.22 | 72.35 | 3.7 | 51 | 3.42 | 96.3 | 1.41 | 8.77 | 0.34 | 1.95 | 0.09 | 0.637 | 1.55 | 29.0 | 32.9 | 0.16 | 1309 |
| 2 | 262348 | Pulp | 0.37 | 2.56 | 12.7 | 0.0078 | 678 | 2375 | 2.53 | 1.19 | 15.55 | 4.78 | 90.75 | 3.4 | 45 | 3.92 | 134.3 | 1.19 | 9.28 | 0.22 | 1.79 | 0.14 | 1.044 | 1.46 | 32.7 | 49.8 | 0.09 | 1858 |
| 3 | 262349 | Pulp | 0.48 | 2.55 | 13.1 | 0.0083 | 848 | 3312 | 2.75 | 1.25 | 17.32 | 7.01 | 89.73 | 3.7 | 38 | 5.19 | 173.8 | 1.21 | 9.46 | 0.15 | 1.59 | 0.14 | 1.062 | 1.37 | 30.9 | 52.2 | 0.11 | 2169 |
| 4 | 262350 | Pulp | 0.74 | 3.50 | 25.4 | 0.0110 | 602 | 1388 | 3.02 | 2.62 | 21.42 | 6.76 | 152.65 | 5.4 | 29 | 5.14 | 252.8 | 1.57 | 13.17 | 0.14 | 1.81 | 0.51 | 3.338 | 1.58 | 43.4 | 139.8 | 0.10 | 1853 |
| ***QUALITY ASSURANCE / QUALITY CONTROL*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | **%RPD** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 601C | | | 48.51 | 0.770 | 374.0 | 0.995 | 11 | 157 | 0.59 | 21.36 | 0.72 | 2.67 | 35.0 | 4.30 | 14.0 | 1.32 | 1112.6 | 1.85 | 3.86 | 0.07 | 0.98 | 0.216 | 0.499 | 0.300 | 17.4 | 7.60 | 0.080 | 205 |
| **True Value STD OREAS 601C** | | | **50.41** | **0.663** | **378.2** | | **< 10** | | **0.59** | **21.32** | **0.78** | **2.70** | **34.7** | **4.27** | **14.7** | **1.32** | **1157.6** | **1.84** | **3.86** | **0.08** | **0.97** | **0.216** | **0.497** | **0.254** | **17.3** | **7.56** | **0.084** | **213** |
| % Difference | | | -4% | 16% | -1% | | | | 0% | 0% | -8% | -1% | 1% | 1% | -5% | 0% | -4% | 1% | 0% | -16% | 1% | 0% | 0% | 18% | 1% | 1% | -5% | -4% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.01 | <0.01 | <0.1 | <0.0005 | <10 | <10 | <0.05 | <0.01 | <0.01 | <0.01 | <0.02 | <0.1 | <1 | <0.05 | <0.2 | <0.01 | <0.05 | <0.05 | <0.02 | <0.005 | <0.005 | <0.01 | <0.2 | <0.1 | <0.01 | <5 |

***Notes:***
Job No: YVR2511288

***Analytical Methods (IMS-130):***
A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

***Abbreviations:***
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

***On Cerfified Reference Material and Tolerance:***
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

**CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS**

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B3)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 1

| S. No. | Sample ID | Method / Analyte / Unit / MDL / Sample Typ | Molybdenum (Mo) ppm 0.05 | Sodium (Na) % 0.01 | Niobium (Nb) ppm 0.05 | Nickel (Ni) ppm 0.2 | Phosphorous (P) ppm 10 | Lead (Pb) ppm 0.2 | Rubidium (Rb) ppm 0.1 | Rhenium (Re) ppm 0.001 | Sulphur (S) % 0.01 | Antimony (Sb) ppm 0.05 | Scandium (Sc) ppm 0.1 | Selenium (Se) ppm 0.2 | Tin (Sn) ppm 0.2 | Stronium (Sr) ppm 0.2 | Tantalum (Ta) ppm 0.01 | Tellurium (Te) ppm 0.01 | Thorium (Th) ppm 0.2 | Titanium (Ti) % 0.005 | Thallium (Tl) ppm 0.02 | Uranium (U) ppm 0.05 | Vanadium (V) ppm 1 | Tungsten (W) ppm 0.05 | Yttrium (Y) ppm 0.05 | Zinc (Zn) ppm 1 | Zirconium (Zr) ppm 0.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 262347 | Pulp | 10.43 | 0.65 | 18.11 | 6.8 | 197 | 1297.8 | 96.6 | 0.002 | 0.10 | 1.06 | 2.4 | <0.2 | 3.6 | 78 | 0.18 | 0.03 | 8.0 | 0.045 | 0.54 | 3.11 | 24 | 2.41 | 214.92 | 673 | 59.9 |
| 2 | 262348 | Pulp | 12.12 | 0.43 | 19.44 | 6.2 | 131 | 1657.1 | 96.4 | 0.003 | 0.08 | 1.46 | 2.0 | <0.2 | 4.8 | 64.2 | 0.19 | 0.04 | 7.6 | 0.042 | 0.56 | 3.76 | 23 | 3.5 | 239.82 | 1013 | 55.3 |
| 3 | 262349 | Pulp | 14.10 | 0.41 | 15.56 | 6.6 | 151 | 2392.5 | 96.8 | 0.003 | 0.11 | 1.7 | 2.5 | <0.2 | 4.6 | 93.1 | 0.24 | 0.04 | 6.2 | 0.05 | 0.65 | 4.12 | 25 | 3.56 | 259.38 | 1280 | 49.8 |
| 4 | 262350 | Pulp | 22.24 | 0.69 | 24.84 | 7.6 | 183 | 2620.7 | 111.3 | 0.005 | 0.06 | 2.97 | 2.9 | 0.3 | 11.5 | 68.5 | 0.34 | 0.05 | 10.5 | 0.053 | 0.69 | 6.90 | 28 | 4.14 | 318.28 | 1870 | 56.1 |
| ***QUALITY ASSURANCE / QUALITY*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | **%RPD** | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 601C | | | 3.09 | 0.06 | 0.47 | 6.0 | 241 | 250.7 | 13.6 | 0.001 | 0.93 | 30.52 | 1.00 | 8.0 | 1.70 | 36.3 | <0.01 | 7.38 | 6.1 | 0.012 | 1.19 | 2.05 | 5.00 | 1.17 | 5.13 | 387 | 33.6 |
| **True Value STD OREAS 601C** | | | **3.35** | **0.05** | **<1** | **6.0** | **243** | **248.1** | **12.4** | **< 0.001** | **0.91** | **29.73** | **1.03** | **8.0** | **1.59** | **36.3** | **< 0.05** | **7.22** | **6.1** | **0.010** | **1.20** | **2.04** | **4.75** | **1.16** | **5.10** | **381** | **33.5** |
| % Difference | | | -8% | 14% | | 0% | -1% | 1% | 9% | | 2% | 3% | -3% | 0% | 7% | 0% | | 2% | 0% | 26% | 0% | 0% | 5% | 0% | 1% | 2% | 0% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.05 | <0.01 | <0.05 | <0.2 | <10 | <0.2 | <0.1 | <0.001 | <0.01 | <0.05 | <0.1 | <0.2 | <0.2 | <0.2 | <0.01 | <0.01 | <0.2 | <0.005 | <0.02 | <0.05 | <1 | <0.05 | <0.05 | <1 | <0.5 |

## CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B3)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 1

| Parameter | Method | Unit | RDL | 1 | 2 | 3 | 4 | Method Blank |
|---|---|---|---|---|---|---|---|---|
| | | | | 262347 | 262348 | 262349 | 262350 | |
| Weight of dry sample used | Weighing Scale | g | 0.01 | 250 | 250 | 250 | 250 | N/A |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 | 750 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | | | | |
| pH | Meter | pH units | 0.01 | 5.9 | 6.1 | 6.2 | 6.2 | 6.0 |
| EC | Meter | µS/cm | 1 | 58 | 63 | 91 | 119 | 1.14 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 19.7 | 19.5 | 23.2 | 27.1 | 4.1 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 21.9 | 21.9 | 34.6 | 36.8 | 1.5 |
| Sulphate | Turbidimetric | mg/L | 0.5 | 1.6 | 1.2 | 4.2 | 5.0 | |
| Chloride | IC | mg/L | 0.1 | 1.1 | 2.2 | 2.9 | 7.7 | |
| Fluoride | IC | mg/L | 0.1 | 2.49 | 3.64 | 2.71 | 2.83 | |
| Nitrate | IC | mg/L | 0.01 | 0.060 | 0.056 | 0.069 | 0.304 | |
| Nitrite | IC | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | 0.012 | |
| Nitrate+ Nitrite as N | Calc. | mg/L | 0.01 | 0.060 | 0.056 | 0.069 | 0.304 | |
| Phosphorus, Total Dissolved | Colourimetric | mg/L | 0.005 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | | | | |
| Dissolved Hardness (CaCO3) | ICP-MS | mg/L | 0.125 | 29.2 | 31.7 | 44.5 | 53.5 | <0.125 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | 0.0778 | 0.0689 | 0.192 | 0.0787 | <0.0010 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | 0.000133 | 0.000133 | 0.000228 | 0.000518 | <0.000050 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | 0.000126 | 0.0001 | 0.000276 | 0.000405 | <0.000050 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | 0.41 | 0.523 | 0.351 | 0.222 | <0.00010 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000033 | 0.000028 | 0.000056 | 0.000024 | <0.000010 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 | 0.000012 | <0.000010 | <0.000010 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | 0.0037 | 0.0029 | 0.003 | 0.0052 | <0.0020 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | 0.00153 | 0.00147 | 0.00243 | 0.00154 | <0.0000020 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | 11.5 | 12.4 | 17.5 | 20.8 | <0.050 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | 0.0009 | <0.00050 | 0.0008 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | 0.0000155 | 0.0000082 | 0.0000495 | 0.0000186 | <0.0000050 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | 0.00363 | 0.00116 | 0.00507 | 0.00288 | <0.00010 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | 0.0205 | 0.0139 | 0.0697 | 0.0263 | <0.0020 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | 0.00854 | 0.00633 | 0.0175 | 0.0129 | <0.000050 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | 0.0010 | 0.0012 | 0.0153 | 0.0126 | <0.000050 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | 0.084 | 0.128 | 0.178 | 0.356 | <0.0050 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | 0.0305 | 0.0137 | 0.0661 | 0.0424 | <0.000050 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | 0.000039 | 0.000035 | 0.00003 | 0.00003 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | 0.0131 | 0.0275 | 0.0302 | 0.0476 | <0.000010 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | 0.000072 | 0.000045 | 0.000091 | 0.000061 | <0.000040 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | 0.784 | 0.415 | 0.938 | 0.899 | <0.020 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | <0.00010 | <0.00010 | 0.00012 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | 0.49 | 0.48 | 1 | 1.45 | <0.10 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | 0.000043 | 0.000038 | 0.000071 | 0.000041 | <0.000010 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | 0.606 | 1.07 | 2.07 | 4.6 | 0.026 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0191 | 0.0248 | 0.0674 | 0.101 | <0.00010 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | 1.2 | <1.00 | 2.2 | 3.0 | <1.00 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | 0.0000216 | 0.0000133 | 0.0000287 | 0.0000349 | <0.0000040 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000026 | 0.000019 | 0.000055 | 0.000034 | <0.000010 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | 0.000123 | <0.000100 | <0.000100 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | 0.0006 | 0.00058 | 0.00227 | 0.00108 | <0.00020 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | 0.00029 | 0.00034 | 0.00054 | 0.00043 | <0.00020 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | 0.000501 | 0.000488 | 0.00112 | 0.00428 | <0.0000010 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 | <0.00100 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | 0.054 | 0.037 | 0.052 | 0.036 | <0.0010 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | 0.000081 | 0.000048 | 0.000161 | 0.000098 | <0.000020 |
| ***Ion Balance:*** | | | | | | | | |
| Major Anions | Calc. | meq/L | | 0.63 | 0.72 | 1.00 | 1.21 | |
| Major Cations | Calc. | meq/L | | 0.65 | 0.71 | 1.04 | 1.31 | |
| Difference | Calc. | meq/L | | 0.01 | -0.01 | 0.03 | 0.10 | |
| Balance (%) | Calc. | % | | 1.1% | -0.8% | 1.7% | 4.1% | |
| | | *Shake Flask Extract ID:* | | *25K1745-01* | *25K1745-02* | *25K1745-03* | *25K1745-04* | *25K1746-15* |

***NOTES:***
Job No: 25K1745
**Date of Analysis (24 h):** November 13-14, 2025
pH of DI water used (pH Units): 5.54
EC of DI water used (µS/cm): 1.14

***ABBREVIATIONS:***
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S; 750 mL DI $H_2O$: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B3)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 1

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 37.52 | 107.9% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 17.93 | | 91.4% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 25K1745_B5K3313-BLK1 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK1 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK1 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BLK1 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BLK2 | Chloride | 0.1 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK2 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK2 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BLK2 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '17 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BLK3 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK3 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK3 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BLK3 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BLK4 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK4 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3313-BLK4 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BLK4 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '18 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3313-BS1 | Chloride | 98 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS1 | Fluoride | 97 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS1 | Nitrate (as N) | 114 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS1 | Nitrite (as N) | 103 | % | T | SC | SM 4110 B (2020) | '17 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS2 | Chloride | 105 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS2 | Fluoride | 89 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS2 | Nitrate (as N) | 112 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS2 | Nitrite (as N) | 103 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS3 | Chloride | 99 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS3 | Fluoride | 91 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS3 | Nitrate (as N) | 109 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS3 | Nitrite (as N) | 101 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS4 | Chloride | 103 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS4 | Fluoride | 96 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS4 | Nitrate (as N) | 108 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3313-BS4 | Nitrite (as N) | 107 | % | T | SC | SM 4110 B (2020) | '18 Nov 2025 | 1 | % | 115 | 85 |
| 25K1745_B5K3491-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000002 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.05 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.002 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00004 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.01 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.1 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.02 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 1 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00005 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000004 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.0002 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.000001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.001 | mg/L | | |
| 25K1745_B5K3491-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '19 Nov 2025 | 0.00002 | mg/L | | |
| 25K1745_B5K3491-BS1 | Aluminum dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Antimony dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Arsenic dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Barium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Beryllium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Bismuth dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Boron dissolved | 106 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Cadmium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Calcium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Chromium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global
ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B3)
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 1

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 37.52 | 107.9% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 17.93 | | 91.4% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25K1745_B5K3491-BS1 | Cobalt dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Copper dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Iron dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Lead dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Lithium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Magnesium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Manganese dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Mercury dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Molybdenum dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Nickel dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Phosphorus dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Potassium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Selenium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Silicon dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Silver dissolved | 99 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Sodium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Strontium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Sulfur dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Tellurium dissolved | 100 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Thallium dissolved | 104 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Tin dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Titanium dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Tungsten dissolved | 102 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Uranium dissolved | 103 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Vanadium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Zinc dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K3491-BS1 | Zirconium dissolved | 101 | % | F | SC | EPA 6020B | '19 Nov 2025 | 1 | % | 120 | 80 |
| 25K1745_B5K4193-BLK1 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '24 Nov 2025 | 0.005 | mg/L | | |
| 25K1745_B5K4193-BS1 | Phosphorus Total Dissolved | 100 | % | F | SC | SM 4500-P F (2021) | '24 Nov 2025 | 1 | % | 115 | 85 |

**NOTES:**
Job No: 25K1745

***Abbreviations & Descriptions:***
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate

# *QUANTITATIVE PHASE ANALYSIS OF SIX POWDER SAMPLES USING THE RIETVELD METHOD AND X-RAY POWDER DIFFRACTION DATA*

***Global Project No.: 2577 (B1)***
***Global CoC No.: GL25-2573***

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***Electron Microbeam/X-Ray Diffraction Facility (EMXDF)***
***Dept. of Earth, Ocean & Atmospheric Sciences***
***The University of British Columbia***
***6339 Stores Road***
***Vancouver, BC  V6T 1Z4***

***Reference number: 25-0581-COM-GARDT***

***December 12, 2025***

## METHOD

The six samples of **Project No.: 2577 (B1)** were reduced to the optimum grain-size range for quantitative X-ray analysis (<10 μm) by grinding under ethanol in a vibratory McCrone XRD Mill (Retsch GmbH, Germany) for 10 minutes. Continuous-scan X-ray powder-diffraction data were collected over a range of 4-80°2θ with CoKα radiation on a Bruker D8 Endeavor Bragg-Brentano diffractometer equipped a LynxEye-XE-T detector.

## RESULTS

The X-ray diffractograms were analyzed using the International Centre for Diffraction Database PDF-5+ and Search-Match EVA 4.2 (Bruker AXS). X-ray powder-diffraction data of the samples were refined with Rietveld program Topas 4.2 (Bruker AXS). The results of quantitative phase analysis by Rietveld refinements are given in Table 1 (separate file, ***25-0581-COM-GARDT Results 2025-12-12 - Proj 2577 (B1) CoC GL25-2573 - 6 samples.xlsx***). These amounts represent the relative amounts of crystalline phases normalized to 100%. The Rietveld refinement plots are shown in Figures 1 – 6. Ideal formulae of the mineral phases present are shown in Table 2.

One of the phases present was a poorly crystalline clay. To fit this phase, an empirical model for poorly crystalline clays has been calibrated against reference minerals from the Source Clays Project (The Clay Minerals Society) using the PONKCS method (Scarlett and Madsen, *Powder Diffr., Vol. 21, No. 4*, December 2006).

**Table 2. Ideal formulae for phases present, Proj# 2577 (B1), CoC# GL25-2573, Ref# 25-0581-COM-GARDT**

| **Mineral** | **Ideal Formula** |
|---|---|
| Apatite | $Ca_5(PO_4)_3(F,Cl,OH)$ |
| Baryte | $BaSO_4$ |
| Calcite | $CaCO_3$ |
| Clinochlore | $(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$ |
| Fluorite | $CaF_2$ |
| Hematite | $\alpha$-$Fe_2O_3$ |
| Illite – Muscovite 2M1 & 1M | $\sim K_{0.65}Al_{2.0}(Al_{0.65}Si_{3.35}O_{10})(OH)_2 – KAl_2(AlSi_3O_{10})(OH)_2$ |
| Illite – Smectite (mixed layer) | $\sim K_{0.65}Al_{2.0}(Al_{0.65}Si_{3.35}O_{10})(OH)_2 – (Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot nH_2O$ |
| Kaolinite | $Al_2Si_2O_5(OH)_4$ |
| K-feldspar (orthoclase; microcline) | $KAlSi_3O_8$ |
| Plagioclase (albite) | $NaAlSi_3O_8 – CaAl_2Si_2O_8$ |
| Pyrite | $FeS_2$ |
| Quartz | $SiO_2$ |

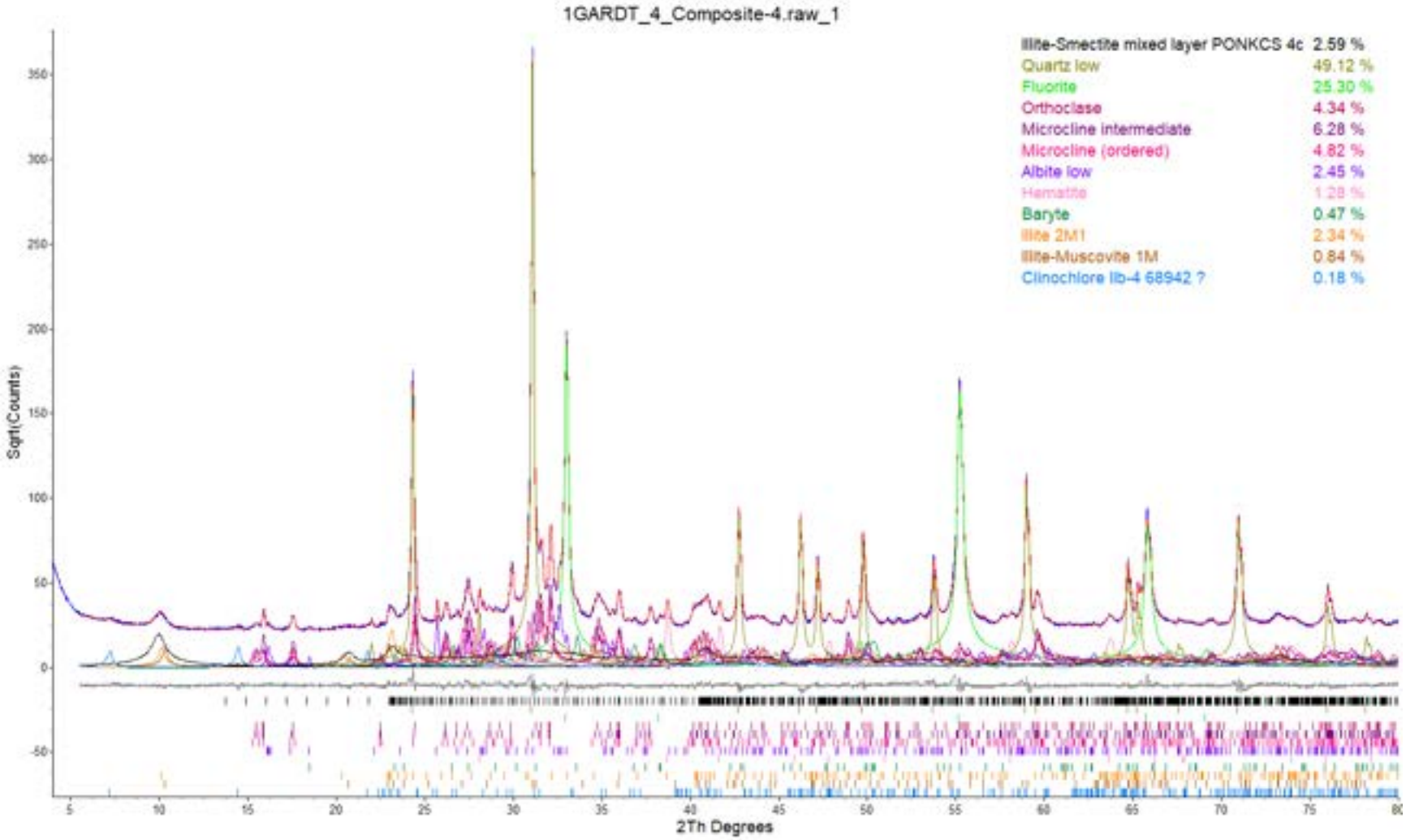


Figure 1. Rietveld refinement plot of sample **Global ARD Testing Services – #4: Composite-4** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

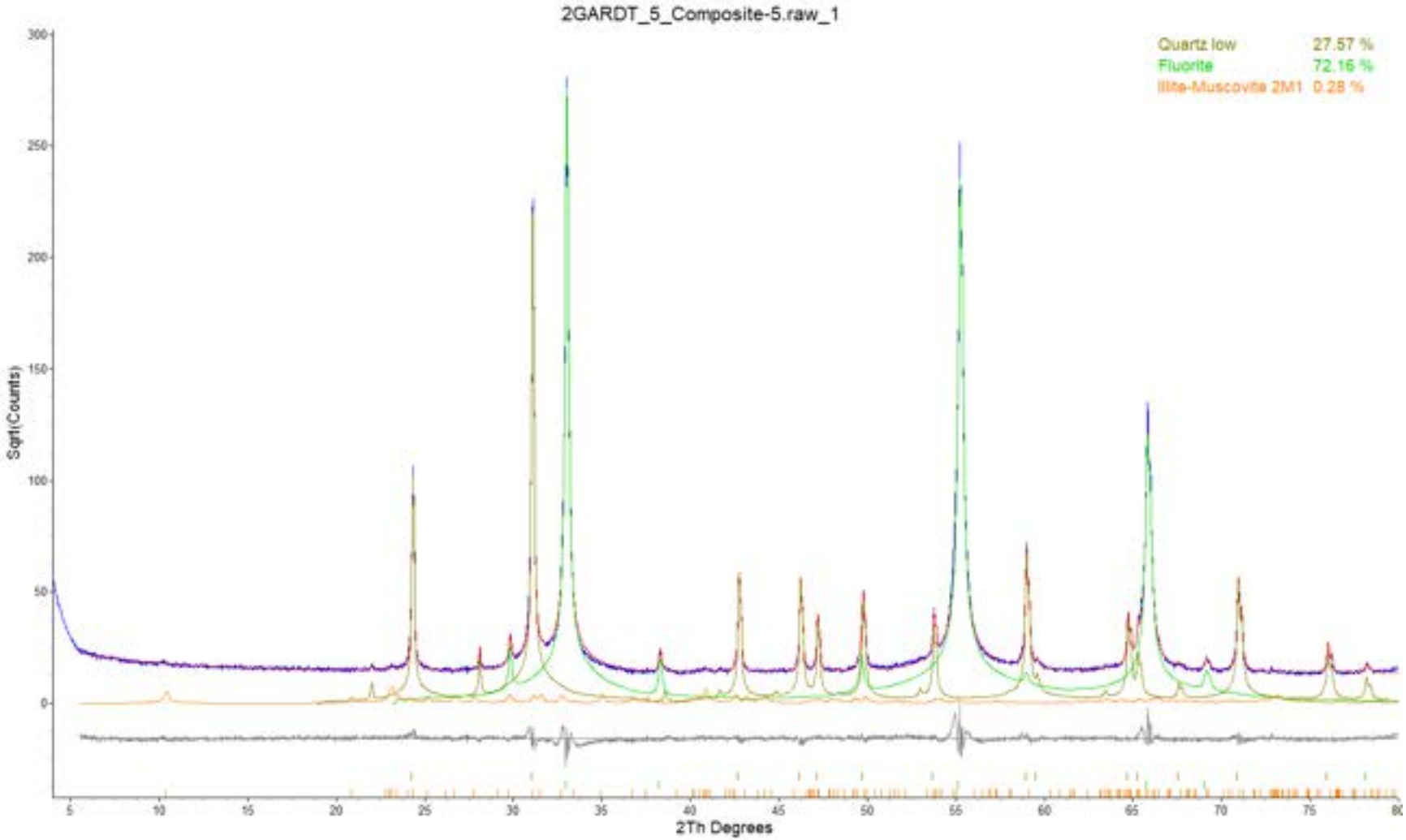


Figure 2. Rietveld refinement plot of sample **Global ARD Testing Services – #5: Composite-5** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

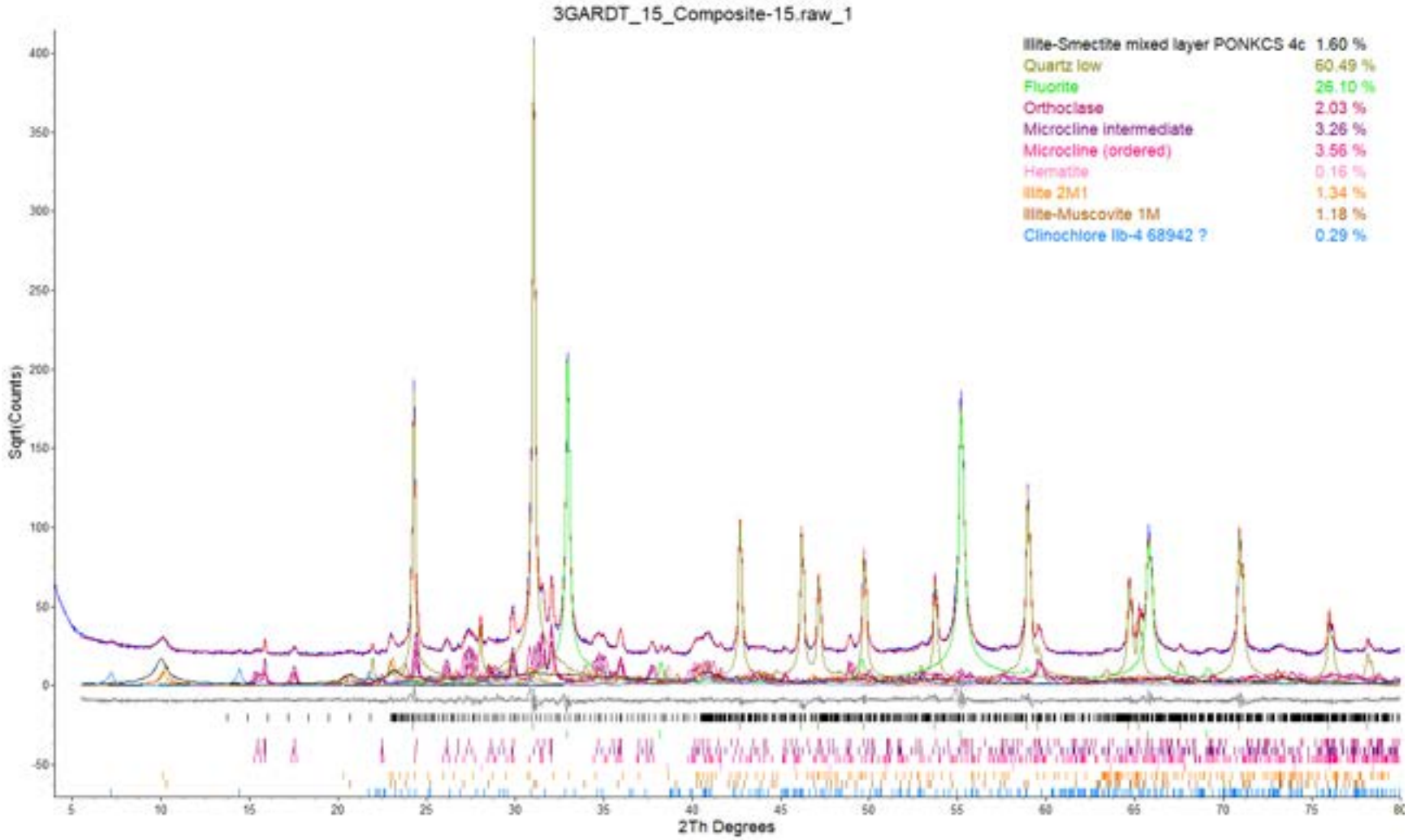


Figure 3. Rietveld refinement plot of sample **Global ARD Testing Services – #15: Composite-15** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

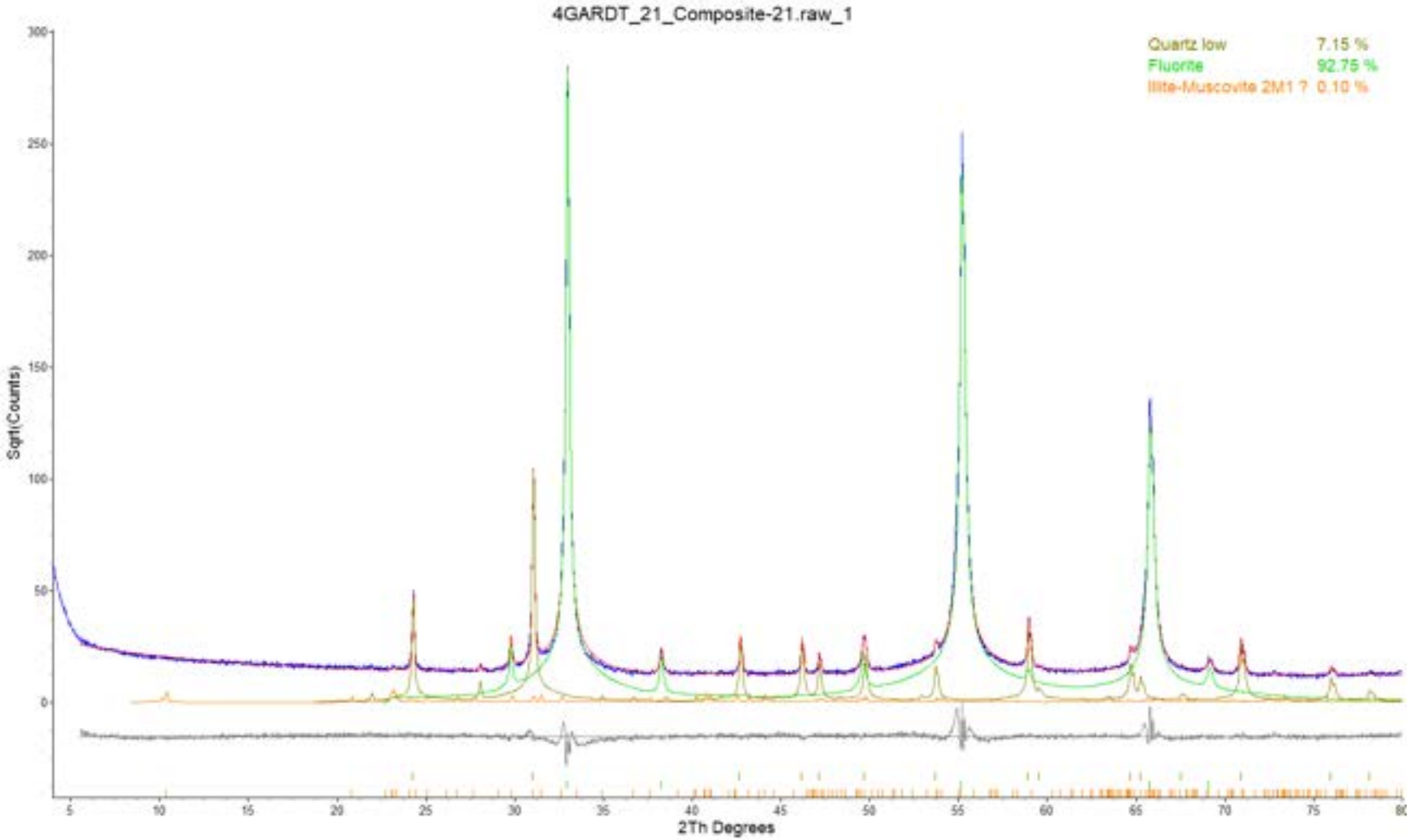


Figure 4. Rietveld refinement plot of sample **Global ARD Testing Services – #21: Composite-21** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

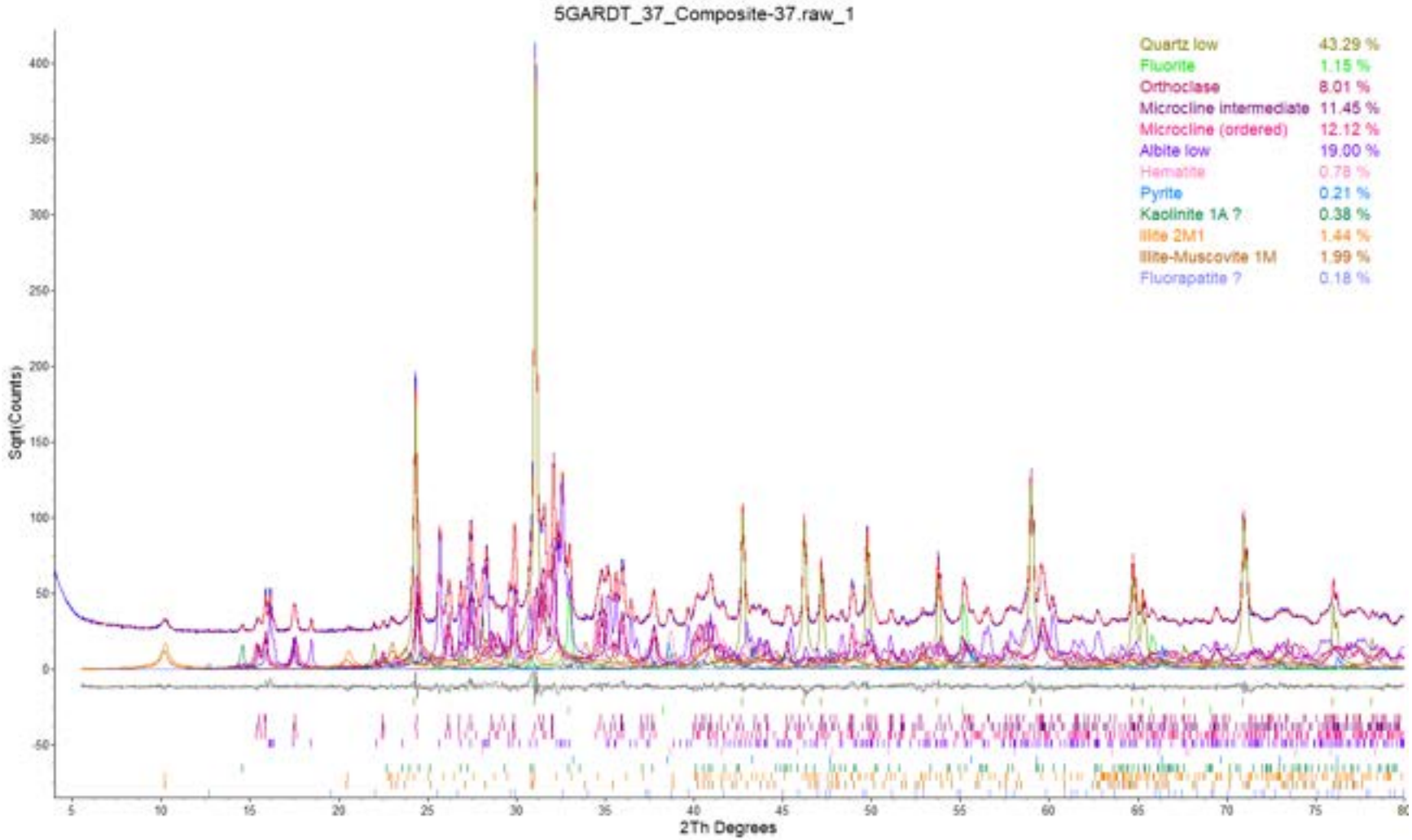


Figure 5. Rietveld refinement plot of sample **Global ARD Testing Services – #37: Composite-37** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

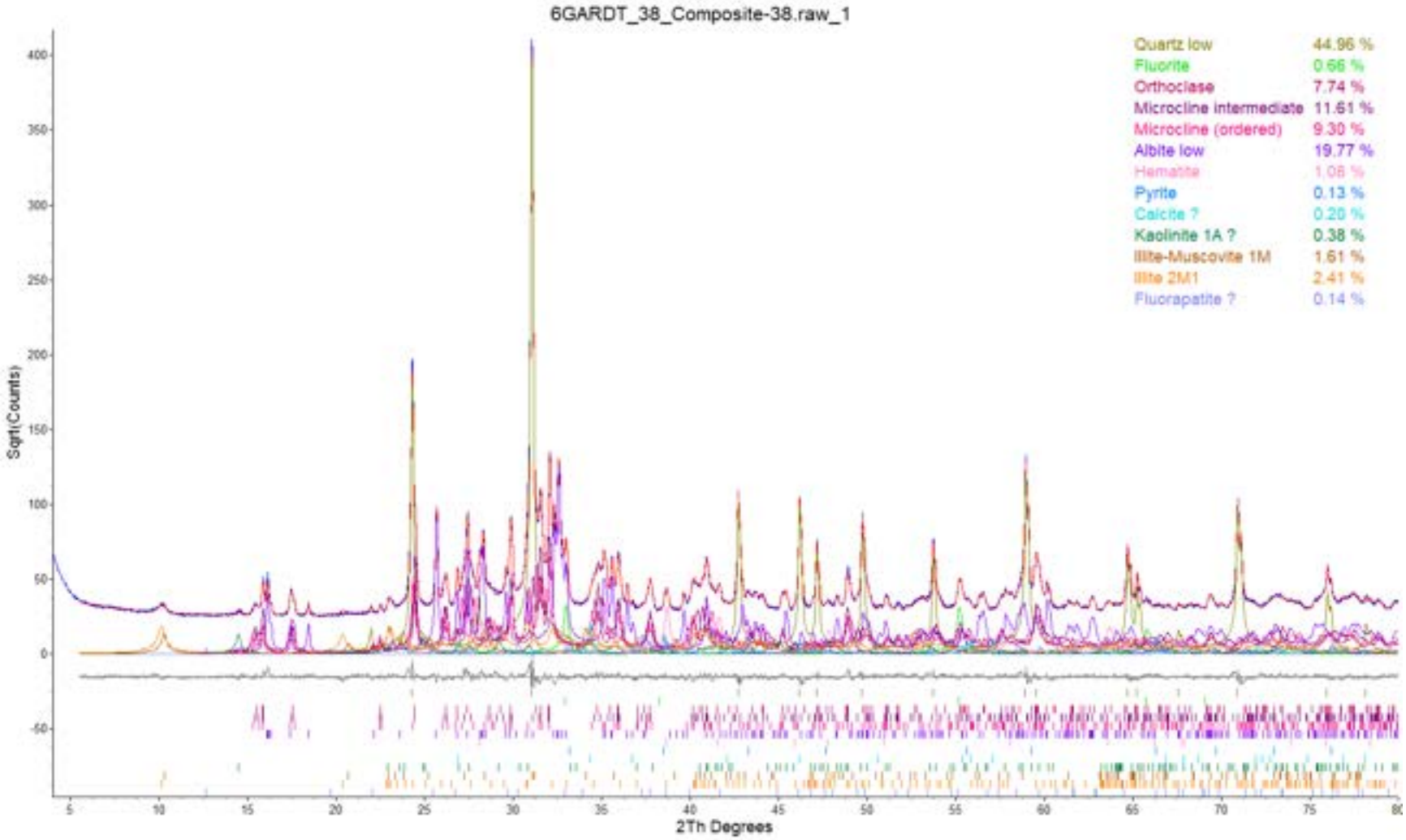


Figure 6. Rietveld refinement plot of sample **Global ARD Testing Services – #38: Composite-38** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

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CLIENT NAME: CANADA FLUORSPAR (NL) INC.
P.O.BOX 337
ST. LAWRENCE, NL A0E 2V0
(709) 873-3331
ATTENTION TO: Gillian Kearney
PROJECT: South Ridge
AGAT WORK ORDER: 25K366638
WATER ANALYSIS REVIEWED BY: Kaliegh Cullen, Report Writer
DATE REPORTED: Dec 03, 2025
PAGES (INCLUDING COVER): 20
VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*Notes

VERSION 2:Version 2 supersedes Version 1. Workorder 25K366638, version 1, issued November 24, 2025. Version 2 of this report was issued to change the units from ug/L to mg/L for packages Standard Water Analysis + Total Metals + Bromide, Dissolved Metals (Lab Filtered) + Calcium + Magnesium and Mercury Analysis in Water (Dissolved). December 03, 2025. VJ

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- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
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- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*



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Western Enviro-Agricultural Laboratory Association (WEALA)
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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## AGAT Halifax - Low Level Total Phosphorous - 0.002 mg/L

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

| Parameter | Unit | G / S | RDL | SAMPLE DESCRIPTION: DIRECTOR-HISTORIC-01 | DIRECTOR-HISTORIC-02 | DIRECTOR-HISTORIC-03 | DIRECTOR-HISTORIC-04 | DIRECTOR-HISTORIC-05 | AGS-WASTE-01 | AGS-WASTE-02 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE TYPE: | | | | Water | Water | Water | Water | Water | Water | Water |
| DATE SAMPLED: | | | | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 |
| | | | | 7219085 | 7219103 | 7219104 | 7219105 | 7219106 | 7219107 | 7219108 |
| Total Phosphorus | mg/L | Fact Sheet | 0.002 | 0.003 | <0.002 | 0.004 | 0.020 | 0.004 | 0.010 | <0.002 |

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME FWAL - update 2015
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

7219085-7219108 Total Phosphorous RDL is the calculated MDL.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Kaliegh Cullen



Results relate only to the items tested. Results apply to samples as received.

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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## DOC

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

| SAMPLE DESCRIPTION: | | | | DIRECTOR-HISTORIC-01 | DIRECTOR-HISTORIC-02 | DIRECTOR-HISTORIC-03 | DIRECTOR-HISTORIC-04 | DIRECTOR-HISTORIC-05 | AGS-WASTE-01 | AGS-WASTE-02 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE TYPE: | | | | Water | Water | Water | Water | Water | Water | Water |
| DATE SAMPLED: | | | | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 |
| Parameter | Unit | G / S | RDL | 7219085 | 7219103 | 7219104 | 7219105 | 7219106 | 7219107 | 7219108 |
| Dissolved Organic Carbon | mg/L | | 0.50 | 8.4 | 3.4 | 3.2 | 4.3 | 12.1 | 1.9 | 5.6 |

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Kaliegh Cullen



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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## Dissolved Mercury Analysis in Water (mg/L)

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

| SAMPLE DESCRIPTION: | | | | DIRECTOR-HISTORIC-01 | DIRECTOR-HISTORIC-02 | DIRECTOR-HISTORIC-03 | DIRECTOR-HISTORIC-04 | DIRECTOR-HISTORIC-05 | AGS-WASTE-01 | AGS-WASTE-02 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE TYPE: | | | | Water | Water | Water | Water | Water | Water | Water |
| DATE SAMPLED: | | | | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 |
| Parameter | Unit | G / S | RDL | 7219085 | 7219103 | 7219104 | 7219105 | 7219106 | 7219107 | 7219108 |
| Dissolved Mercury | mg/L | | 0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 | <0.000026 |

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Kaliegh Cullen



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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## Dissolved Metals (mg/L) + Calcium, Magnesium

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

| SAMPLE DESCRIPTION: | | | | DIRECTOR-HISTORIC-01 | DIRECTOR-HISTORIC-02 | DIRECTOR-HISTORIC-03 | DIRECTOR-HISTORIC-04 | DIRECTOR-HISTORIC-05 | AGS-WASTE-01 | AGS-WASTE-02 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE TYPE: | | | | Water | Water | Water | Water | Water | Water | Water |
| DATE SAMPLED: | | | | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 |
| Parameter | Unit | G / S | RDL | 7219085 | 7219103 | 7219104 | 7219105 | 7219106 | 7219107 | 7219108 |
| Dissolved Aluminum | mg/L | | 0.005 | 0.208 | 0.162 | 0.067 | 0.038 | 0.108 | 0.473 | 0.061 |
| Dissolved Antimony | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Arsenic | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Barium | mg/L | | 0.005 | 0.031 | 0.087 | 0.129 | 0.342 | 0.012 | 0.036 | 0.022 |
| Dissolved Beryllium | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Bismuth | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Boron | mg/L | | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Dissolved Cadmium | mg/L | | 0.00009 | <0.00009 | 0.00017 | 0.00036 | 0.00122 | <0.00009 | 0.00103 | 0.00031 |
| Dissolved Chromium | mg/L | | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dissolved Cobalt | mg/L | | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.004 | <0.001 |
| Dissolved Copper | mg/L | | 0.002 | <0.002 | <0.002 | 0.002 | 0.007 | <0.002 | <0.002 | <0.002 |
| Dissolved Iron | mg/L | | 0.05 | 0.30 | 0.66 | <0.05 | <0.05 | 0.41 | <0.05 | 0.06 |
| Dissolved Lead | mg/L | | 0.0005 | <0.0005 | 0.0020 | 0.0054 | 0.0130 | <0.0005 | <0.0005 | 0.0006 |
| Dissolved Manganese | mg/L | | 0.002 | 0.152 | 0.006 | 0.013 | 0.032 | 0.048 | 0.184 | 0.005 |
| Dissolved Molybdenum | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | 0.004 | <0.002 | <0.002 | 0.008 |
| Dissolved Nickel | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Selenium | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Silver | mg/L | | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Strontium | mg/L | | 0.005 | 0.025 | 0.042 | 0.039 | 0.058 | 0.010 | 0.051 | 0.108 |
| Dissolved Thallium | mg/L | | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Tin | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Titanium | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Uranium | mg/L | | 0.0001 | <0.0001 | 0.0002 | 0.0007 | 0.0028 | <0.0001 | <0.0001 | 0.0025 |
| Dissolved Vanadium | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Dissolved Zinc | mg/L | | 0.005 | 0.005 | 0.013 | 0.011 | 0.039 | <0.005 | 0.118 | 0.026 |
| Dissolved Calcium | mg/L | | 0.1 | 7.0 | 13.7 | 13.6 | 30.1 | 1.7 | 9.9 | 29.4 |
| Dissolved Magnesium | mg/L | | 0.1 | 1.7 | 1.3 | 1.4 | 3.0 | 0.9 | 2.6 | 2.9 |

Certified By: Kaleigh Cullen



Results relate only to the items tested. Results apply to samples as received.

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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## Dissolved Metals (mg/L) + Calcium, Magnesium

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7219085-7219108 Metals analysis completed on a filtered sample.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Kaliegh Cullen



Results relate only to the items tested. Results apply to samples as received.

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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## Standard Water Analysis + Total Metals (mg/L) + Bromide

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

| SAMPLE DESCRIPTION: | | | | DIRECTOR-HISTORIC-01 | DIRECTOR-HISTORIC-02 | DIRECTOR-HISTORIC-03 | DIRECTOR-HISTORIC-04 | DIRECTOR-HISTORIC-05 | AGS-WASTE-01 | AGS-WASTE-02 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE TYPE: | | | | Water | Water | Water | Water | Water | Water | Water |
| DATE SAMPLED: | | | | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 |
| Parameter | Unit | G / S | RDL | 7219085 | 7219103 | 7219104 | 7219105 | 7219106 | 7219107 | 7219108 |
| pH | pH units | | | 7.51 | 5.77 | 5.74 | 5.94 | 5.41 | 5.00 | 5.83 |
| Reactive Silica as SiO2 | mg/L | | 0.5 | 4.3 | 5 | 4.3 | 3.4 | 27 | 4.4 | 7.3 |
| Chloride | mg/L | | 1 | 21 | 14 | 19 | 72 | 13 | 24 | 10 |
| Fluoride | mg/L | | 0.12 | 1.29 | 1.77 | 2.02 | 1.67 | 0.29 | 1.15 | 2.22 |
| Sulphate | mg/L | | 2 | 4 | 4 | 5 | 13 | 3 | 26 | 51 |
| Alkalinity | mg/L | | 5 | 28 | 44 | 41 | 63 | 6 | 5 | 46 |
| True Color | TCU | | 5 | 59 | 12 | 11 | 16 | 98 | <5 | 26 |
| Turbidity | NTU | | 0.5 | 3.07 | 1.20 | 12.5 | 39.5 | 5.05 | 7.69 | 4.38 |
| Electrical Conductivity | umho/cm | | 1 | 126 | 139 | 149 | 379 | 67 | 165 | 247 |
| Nitrate + Nitrite as N | mg/L | | 0.05 | 0.74 | 0.83 | 1.18 | 1.13 | 0.58 | 1.69 | 1.98 |
| Nitrate as N | mg/L | | 0.05 | 0.25 | 0.83 | 0.70 | 0.80 | 0.17 | 1.21 | 1.98 |
| Nitrite as N | mg/L | | 0.05 | 0.49 | <0.05 | 0.48 | 0.33 | 0.41 | 0.48 | <0.05 |
| Ammonia as N | mg/L | | 0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |
| Total Organic Carbon | mg/L | | 0.5 | 8.3 | 3.6 | 3.6 | 4.4 | 13 | 2.6 | 5.7 |
| Ortho-Phosphate as P | mg/L | | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total Sodium | mg/L | | 0.1 | 9.5 | 8.3 | 10.3 | 34.4 | 8.0 | 14.6 | 11.1 |
| Total Potassium | mg/L | | 0.1 | 1.0 | 0.7 | 0.8 | 2.2 | 0.6 | 1.1 | 2.4 |
| Total Calcium | mg/L | | 0.1 | 6.8 | 14.8 | 15.1 | 31.9 | 2.1 | 9.9 | 29.6 |
| Total Magnesium | mg/L | | 0.1 | 1.7 | 1.5 | 1.5 | 3.3 | 1.2 | 2.9 | 3.0 |
| Bicarb. Alkalinity (as CaCO3) | mg/L | | 5 | 28 | 44 | 41 | 63 | 6 | 5 | 46 |
| Carb. Alkalinity (as CaCO3) | mg/L | | 10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Hydroxide | mg/L | | 5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Calculated TDS | mg/L | | 1 | 65 | 74 | 82 | 201 | 35 | 91 | 144 |
| Hardness | mg/L | | | 24.0 | 43.1 | 43.9 | 93.2 | 10.2 | 36.7 | 86.3 |
| Langelier Index (@20C) | NA | | | -1.78 | -2.99 | -3.05 | -2.37 | -5.03 | -4.89 | -2.64 |
| Langelier Index (@ 4C) | NA | | | -2.10 | -3.31 | -3.37 | -2.69 | -5.35 | -5.21 | -2.96 |
| Saturation pH (@ 20C) | NA | | | 9.29 | 8.76 | 8.79 | 8.31 | 10.4 | 9.89 | 8.47 |
| Saturation pH (@ 4C) | NA | | | 9.61 | 9.08 | 9.11 | 8.63 | 10.8 | 10.2 | 8.79 |
| Anion Sum | me/L | | | 1.29 | 1.42 | 1.54 | 3.64 | 0.59 | 1.44 | 2.40 |

Certified By: Kaleigh Cullen



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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## Standard Water Analysis + Total Metals (mg/L) + Bromide

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

| SAMPLE DESCRIPTION: | | | | DIRECTOR-HISTORIC-01 | DIRECTOR-HISTORIC-02 | DIRECTOR-HISTORIC-03 | DIRECTOR-HISTORIC-04 | DIRECTOR-HISTORIC-05 | AGS-WASTE-01 | AGS-WASTE-02 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE TYPE: | | | | Water | Water | Water | Water | Water | Water | Water |
| DATE SAMPLED: | | | | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 | 2025-11-06 |
| Parameter | Unit | G / S | RDL | 7219085 | 7219103 | 7219104 | 7219105 | 7219106 | 7219107 | 7219108 |
| Cation sum | me/L | | | 0.96 | 1.25 | 1.37 | 3.46 | 0.61 | 1.50 | 2.26 |
| % Difference/ Ion Balance | % | | | 14.8 | 6.10 | 5.82 | 2.62 | 1.53 | 2.03 | 3.06 |
| Total Aluminum | mg/L | | 0.005 | 0.279 | 0.217 | 0.272 | 0.387 | 0.165 | 0.882 | 0.128 |
| Total Antimony | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Arsenic | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Barium | mg/L | | 0.005 | 0.030 | 0.096 | 0.150 | 0.403 | 0.016 | 0.042 | 0.023 |
| Total Beryllium | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Bismuth | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Boron | mg/L | | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Total Cadmium | mg/L | | 0.000017 | 0.000031 | 0.000192 | 0.000380 | 0.00174 | 0.000025 | 0.00116 | 0.000266 |
| Total Chromium | mg/L | | 0.001 | <0.001 | <0.001 | <0.001 | 0.005 | <0.001 | 0.001 | <0.001 |
| Total Cobalt | mg/L | | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.004 | <0.001 |
| Total Copper | mg/L | | 0.001 | <0.001 | <0.001 | 0.006 | 0.024 | <0.001 | <0.001 | <0.001 |
| Total Iron | mg/L | | 0.05 | 0.53 | 0.06 | 0.22 | 0.45 | 0.83 | 0.39 | 0.19 |
| Total Lead | mg/L | | 0.0005 | 0.0007 | 0.0049 | 0.0538 | 0.179 | 0.0011 | 0.0038 | 0.0023 |
| Total Manganese | mg/L | | 0.002 | 0.159 | 0.005 | 0.060 | 0.213 | 0.086 | 0.201 | 0.007 |
| Total Molybdenum | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | 0.004 | <0.002 | <0.002 | 0.008 |
| Total Nickel | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 | 0.002 |
| Total Phosphorous | mg/L | | 0.1 | 1.2 | 1.3 | 1.1 | 1.3 | 0.7 | 1.5 | 2.2 |
| Total Selenium | mg/L | | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Total Silver | mg/L | | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Total Strontium | mg/L | | 0.005 | 0.025 | 0.046 | 0.040 | 0.061 | 0.012 | 0.053 | 0.109 |
| Total Thallium | mg/L | | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Total Tin | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Titanium | mg/L | | 0.002 | <0.002 | <0.002 | 0.003 | 0.006 | <0.002 | 0.006 | <0.002 |
| Total Uranium | mg/L | | 0.0002 | <0.0002 | 0.0003 | 0.0008 | 0.0034 | <0.0002 | <0.0002 | 0.0026 |
| Total Vanadium | mg/L | | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Zinc | mg/L | | 0.005 | 0.007 | 0.016 | 0.054 | 0.165 | <0.005 | 0.136 | 0.035 |
| Bromide | mg/L | | 0.05 | 1.32 | 1.40 | 1.34 | 0.44 | <0.05 | 1.23 | <0.05 |

Certified By: Kaleigh Cullen



Results relate only to the items tested. Results apply to samples as received.

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# Certificate of Analysis

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## Standard Water Analysis + Total Metals (mg/L) + Bromide

DATE RECEIVED: 2025-11-07

DATE REPORTED: 2025-12-03

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7219085-7219108 % Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.
pH has been analyzed past the recommended holding time of 15 minutes from sampling. Field measurement recommended for most accurate result

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Kaleigh Cullen



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# Quality Assurance

CLIENT NAME: CANADA FLUORSPAR (NL) INC.
AGAT WORK ORDER: 25K366638
PROJECT: South Ridge
ATTENTION TO: Gillian Kearney
SAMPLING SITE:
SAMPLED BY:

## Water Analysis

RPT Date: Dec 03, 2025

| PARAMETER | Batch | Sample Id | DUPLICATE | | | Method Blank | REFERENCE MATERIAL | | | METHOD BLANK SPIKE | | | MATRIX SPIKE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Dup #1 | Dup #2 | RPD | | Measured Value | Acceptable Limits | | Recovery | Acceptable Limits | | Recovery | Acceptable Limits | |
| | | | | | | | | Lower | Upper | | Lower | Upper | | Lower | Upper |
| Standard Water Analysis + Total Metals+Bromide | | | | | | | | | | | | | | | |
| pH | 7219103 | 7219103 | 5.77 | 5.76 | 0.2% | < | 101% | 80% | 120% | NA | | | NA | | |
| Reactive Silica as SiO2 | 7219085 | | 0.7 | <0.5 | NA | < 0.5 | 95% | 80% | 120% | 104% | 80% | 120% | NA | 80% | 120% |
| Chloride | 7219148 | | <1 | <1 | NA | < 1 | 84% | 80% | 120% | NA | 80% | 120% | 104% | 70% | 130% |
| Fluoride | 7219148 | | <0.12 | <0.12 | NA | < 0.12 | 89% | 80% | 120% | NA | 80% | 120% | 119% | 70% | 130% |
| Sulphate | 7219148 | | <2 | <2 | NA | < 2 | 85% | 80% | 120% | NA | 80% | 120% | 84% | 70% | 130% |
| Alkalinity | 7219103 | 7219103 | 44 | 43 | 2.0% | < 5 | 98% | 80% | 120% | NA | | | NA | | |
| True Color | 7205494 | 7205494 | <5 | <5 | NA | < 5 | 93% | 80% | 120% | 99% | 80% | 120% | NA | | |
| Turbidity | 7219085 | 7219085 | 3.07 | 3.02 | 1.6% | < 0.5 | 103% | 80% | 120% | NA | | | NA | | |
| Electrical Conductivity | 7219103 | 7219103 | 139 | 139 | 0.1% | < 1 | 98% | 90% | 110% | NA | | | NA | | |
| Nitrate as N | 7219148 | | 0.11 | 0.10 | NA | < 0.05 | 107% | 80% | 120% | NA | 80% | 120% | 114% | 70% | 130% |
| Nitrite as N | 7219148 | | <0.05 | <0.05 | NA | < 0.05 | 103% | 80% | 120% | NA | 80% | 120% | 83% | 70% | 130% |
| Ammonia as N | 7206248 | | <0.03 | <0.03 | NA | < 0.03 | 101% | 80% | 120% | 97% | 80% | 120% | 96% | 70% | 130% |
| Ortho-Phosphate as P | 7205494 | 7205494 | <0.01 | <0.01 | NA | < 0.01 | 90% | 80% | 120% | 95% | 80% | 120% | 91% | 80% | 120% |
| Total Sodium | 7219275 | | 10.8 | 10.5 | 2.7% | < 0.1 | 108% | 70% | 130% | 105% | 80% | 120% | 86% | 70% | 130% |
| Total Potassium | 7219275 | | 1.1 | 1.1 | 3.4% | < 0.1 | 108% | 70% | 130% | 107% | 80% | 120% | 89% | 70% | 130% |
| Total Calcium | 7219275 | | 8.0 | 7.4 | 8.8% | < 0.1 | 103% | 70% | 130% | 107% | 80% | 120% | 89% | 70% | 130% |
| Total Magnesium | 7219275 | | 2.0 | 1.9 | 2.0% | < 0.1 | 108% | 80% | 130% | 106% | 80% | 120% | 91% | 70% | 130% |
| Bicarb. Alkalinity (as CaCO3) | 7219103 | 7219103 | 44 | 43 | 2.0% | < 5 | NA | 80% | 120% | NA | | | NA | | |
| Carb. Alkalinity (as CaCO3) | 7219103 | 7219103 | <10 | <10 | NA | < 10 | NA | 80% | 120% | NA | | | NA | | |
| Hydroxide | 7219103 | 7219103 | <5 | <5 | NA | < 5 | NA | 80% | 120% | NA | | | NA | | |
| Total Aluminum | 7219275 | | 332 | 314 | 5.6% | < 5 | 111% | 70% | 130% | 109% | 80% | 120% | NA | 70% | 130% |
| Total Antimony | 7219275 | | <2 | <2 | NA | < 2 | 107% | 70% | 130% | 103% | 80% | 120% | 88% | 70% | 130% |
| Total Arsenic | 7219275 | | <2 | <2 | NA | < 2 | 108% | 70% | 130% | 103% | 80% | 120% | 89% | 70% | 130% |
| Total Barium | 7219275 | | 33 | 33 | 0.4% | < 5 | 104% | 70% | 130% | 103% | 80% | 120% | 88% | 70% | 130% |
| Total Beryllium | 7219275 | | <2 | <2 | NA | < 2 | 105% | 70% | 130% | 103% | 80% | 120% | 86% | 70% | 130% |
| Total Bismuth | 7219275 | | <2 | <2 | NA | < 2 | 109% | 70% | 130% | 107% | 80% | 120% | 91% | 70% | 130% |
| Total Boron | 7219275 | | <50 | <50 | NA | < 50 | 103% | 70% | 130% | 103% | 80% | 120% | 81% | 70% | 130% |
| Total Cadmium | 7219275 | | <0.09 | <0.09 | NA | < 0.09 | 107% | 70% | 130% | 104% | 80% | 120% | 88% | 70% | 130% |
| Total Chromium | 7219275 | | 1 | 1 | NA | < 1 | 109% | 70% | 130% | 105% | 80% | 120% | 91% | 70% | 130% |
| Total Cobalt | 7219275 | | <1 | <1 | NA | < 1 | 108% | 70% | 130% | 105% | 80% | 120% | 90% | 70% | 130% |
| Total Copper | 7219275 | | <1 | <1 | NA | < 1 | 110% | 70% | 130% | 105% | 80% | 120% | 91% | 70% | 130% |
| Total Iron | 7219275 | | 652 | 631 | 3.3% | < 50 | 108% | 70% | 130% | 105% | 80% | 120% | 90% | 70% | 130% |
| Total Lead | 7219275 | | 0.8 | 0.8 | NA | < 0.5 | 108% | 70% | 130% | 106% | 80% | 120% | 91% | 70% | 130% |
| Total Manganese | 7219275 | | 186 | 176 | 5.2% | < 2 | 108% | 70% | 130% | 105% | 80% | 120% | 82% | 70% | 130% |
| Total Molybdenum | 7219275 | | <2 | <2 | NA | < 2 | 106% | 70% | 130% | 101% | 80% | 120% | 87% | 70% | 130% |
| Total Nickel | 7219275 | | <2 | <2 | NA | < 2 | 111% | 70% | 130% | 107% | 80% | 120% | 93% | 70% | 130% |
| Total Phosphorous | 7219275 | | 1.25 | 1.29 | 2.7% | < 0.02 | 106% | 70% | 130% | 102% | 80% | 120% | 84% | 70% | 130% |
| Total Selenium | 7219275 | | <1 | <1 | NA | < 1 | 109% | 70% | 130% | 104% | 80% | 120% | 87% | 70% | 130% |
| Total Silver | 7219275 | | <0.1 | <0.1 | NA | < 0.1 | 109% | 70% | 130% | 106% | 80% | 120% | 63% | 70% | 130% |



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# Quality Assurance

CLIENT NAME: CANADA FLUORSPAR (NL) INC.
AGAT WORK ORDER: 25K366638
PROJECT: South Ridge
ATTENTION TO: Gillian Kearney
SAMPLING SITE:
SAMPLED BY:

## Water Analysis (Continued)

| RPT Date: Dec 03, 2025 | | | DUPLICATE | | | | REFERENCE MATERIAL | | | METHOD BLANK SPIKE | | | MATRIX SPIKE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER | Batch | Sample Id | Dup #1 | Dup #2 | RPD | Method Blank | Measured Value | Acceptable Limits | | Recovery | Acceptable Limits | | Recovery | Acceptable Limits | |
| | | | | | | | | Lower | Upper | | Lower | Upper | | Lower | Upper |
| Total Strontium | 7219275 | | 28 | 27 | 2.2% | < 5 | 109% | 70% | 130% | 106% | 80% | 120% | 90% | 70% | 130% |
| Total Thallium | 7219275 | | <0.1 | <0.1 | NA | < 0.1 | 108% | 70% | 130% | 106% | 80% | 120% | 92% | 70% | 130% |
| Total Tin | 7219275 | | <2 | <2 | NA | < 2 | 107% | 70% | 130% | 104% | 80% | 120% | 89% | 70% | 130% |
| Total Titanium | 7219275 | | <2 | <2 | NA | < 2 | 108% | 70% | 130% | 104% | 80% | 120% | 90% | 70% | 130% |
| Total Uranium | 7219275 | | <0.2 | <0.2 | NA | < 0.2 | 106% | 70% | 130% | 103% | 80% | 120% | 91% | 70% | 130% |
| Total Vanadium | 7219275 | | <2 | <2 | NA | < 2 | 108% | 70% | 130% | 103% | 80% | 120% | 89% | 70% | 130% |
| Total Zinc | 7219275 | | 8 | 7 | NA | < 5 | 106% | 70% | 130% | 97% | 80% | 120% | 102% | 70% | 130% |
| Bromide | 7219148 | | <0.05 | <0.05 | NA | < 0.05 | 111% | 80% | 120% | NA | 80% | 120% | 95% | 80% | 120% |
| Dissolved Metals (Lab Filtered)+Calcium+Magnesium | | | | | | | | | | | | | | | |
| Dissolved Aluminum | 7217904 | | 5 | <5 | NA | < 5 | 114% | 70% | 130% | 103% | 80% | 120% | 107% | 70% | 130% |
| Dissolved Antimony | 7217904 | | <2 | <2 | NA | < 2 | 115% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Arsenic | 7217904 | | <2 | <2 | NA | < 2 | 115% | 70% | 130% | 100% | 80% | 120% | 104% | 70% | 130% |
| Dissolved Barium | 7217904 | | 211 | 200 | 5.7% | < 5 | 113% | 70% | 130% | 100% | 80% | 120% | NA | 70% | 130% |
| Dissolved Beryllium | 7217904 | | <2 | <2 | NA | < 2 | 112% | 70% | 130% | 102% | 80% | 120% | 102% | 70% | 130% |
| Dissolved Bismuth | 7217904 | | <2 | <2 | NA | < 2 | 116% | 70% | 130% | 104% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Boron | 7217904 | | <50 | <50 | NA | < 50 | 117% | 70% | 130% | 101% | 80% | 120% | 101% | 70% | 130% |
| Dissolved Cadmium | 7217904 | | <0.09 | <0.09 | NA | < 0.09 | 113% | 70% | 130% | 102% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Chromium | 7217904 | | <1 | <1 | NA | < 1 | 117% | 70% | 130% | 101% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Cobalt | 7217904 | | <1 | <1 | NA | < 1 | 116% | 70% | 130% | 103% | 80% | 120% | 107% | 70% | 130% |
| Dissolved Copper | 7217904 | | <2 | <2 | NA | < 2 | 117% | 70% | 130% | 104% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Iron | 7217904 | | 55 | <50 | NA | < 50 | 115% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Lead | 7217904 | | <0.5 | <0.5 | NA | < 0.5 | 115% | 70% | 130% | 102% | 80% | 120% | 104% | 70% | 130% |
| Dissolved Manganese | 7217904 | | 1460 | 1380 | 5.3% | < 2 | 115% | 70% | 130% | 102% | 80% | 120% | NA | 70% | 130% |
| Dissolved Molybdenum | 7217904 | | <2 | <2 | NA | < 2 | 112% | 70% | 130% | 100% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Nickel | 7217904 | | <2 | <2 | NA | < 2 | 116% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Selenium | 7217904 | | <1 | <1 | NA | < 1 | 114% | 70% | 130% | 101% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Silver | 7217904 | | <0.1 | <0.1 | NA | < 0.1 | 114% | 70% | 130% | 104% | 80% | 120% | 78% | 70% | 130% |
| Dissolved Strontium | 7217904 | | 268 | 252 | 6.5% | < 5 | 116% | 70% | 130% | 102% | 80% | 120% | NA | 70% | 130% |
| Dissolved Thallium | 7217904 | | <0.1 | <0.1 | NA | < 0.1 | 115% | 70% | 130% | 104% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Tin | 7217904 | | <2 | <2 | NA | < 2 | 114% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Titanium | 7217904 | | <2 | <2 | NA | < 2 | 116% | 70% | 130% | 100% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Uranium | 7217904 | | 0.7 | 0.6 | 17.1% | < 0.1 | 114% | 70% | 130% | 101% | 80% | 120% | 103% | 70% | 130% |
| Dissolved Vanadium | 7217904 | | <2 | <2 | NA | < 2 | 115% | 70% | 130% | 99% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Zinc | 7217904 | | <5 | <5 | NA | < 5 | 103% | 70% | 130% | 124% | 80% | 120% | 97% | 70% | 130% |
| Dissolved Calcium | 7217904 | | 64.4 | 59.2 | 8.5% | < 0.1 | 116% | 70% | 130% | 102% | 80% | 120% | NA | 70% | 130% |
| Dissolved Magnesium | 7217904 | | 13.1 | 12.1 | 7.4% | < 0.1 | 117% | 70% | 130% | 103% | 80% | 120% | 104% | 70% | 130% |

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.
More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.



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# Quality Assurance

CLIENT NAME: CANADA FLUORSPAR (NL) INC.
AGAT WORK ORDER: 25K366638
PROJECT: South Ridge
ATTENTION TO: Gillian Kearney
SAMPLING SITE:
SAMPLED BY:

## Water Analysis (Continued)

| RPT Date: Dec 03, 2025 | | | DUPLICATE | | | | REFERENCE MATERIAL | | | METHOD BLANK SPIKE | | | MATRIX SPIKE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER | Batch | Sample Id | Dup #1 | Dup #2 | RPD | Method Blank | Measured Value | Acceptable Limits | | Recovery | Acceptable Limits | | Recovery | Acceptable Limits | |
| | | | | | | | | Lower | Upper | | Lower | Upper | | Lower | Upper |
| Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.<br>Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated. | | | | | | | | | | | | | | | |
| AGAT Halifax - Low Level Total Phosphorous - 0.002 mg/L | | | | | | | | | | | | | | | |
| Total Phosphorus | 7219105 | 7219105 | 0.020 | 0.020 | 0.0% | < 0.002 | 97% | 70% | 130% | 107% | 80% | 120% | 95% | 70% | 130% |
| Comments: NA signifies Not Applicable.<br>Duplicate NA: results are under 5X the RDL and will not be calculated. | | | | | | | | | | | | | | | |
| DOC | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | 7219107 | 7219107 | 2.7 | 2.7 | 0.9% | < 0.5 | 103% | 80% | 120% | NA | 80% | 120% | 102% | 80% | 120% |
| Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated. | | | | | | | | | | | | | | | |
| Standard Water Analysis + Total Metals (mg/L) + Bromide | | | | | | | | | | | | | | | |
| pH | 7215928 | | 6.36 | 6.35 | 0.1% | < | 101% | 80% | 120% | NA | 80% | 120% | NA | 80% | 120% |
| Reactive Silica as SiO2 | 7218737 | | 9.6 | 11.0 | 13.6% | < 0.5 | 95% | 80% | 120% | NA | 80% | 120% | NA | 80% | 120% |
| Alkalinity | 7215928 | | 128 | 129 | 0.7% | < 5 | 108% | 80% | 120% | NA | | | NA | | |
| True Color | 7218737 | | <5 | <5 | NA | < 5 | 94% | 80% | 120% | 99% | 80% | 120% | NA | | |
| Turbidity | 7219085 | 7219085 | 3.07 | 3.02 | 1.6% | < 0.5 | 103% | 80% | 120% | | | | | | |
| Electrical Conductivity | 7215928 | | 316 | 319 | 0.9% | < 1 | 104% | 90% | 110% | NA | | | NA | | |
| Ammonia as N | 7206248 | | <0.03 | <0.03 | NA | < 0.03 | 101% | 80% | 120% | 97% | 80% | 120% | 96% | 70% | 130% |
| Ortho-Phosphate as P | 7218737 | 7218737 | 0.27 | 0.26 | 3.8% | < 0.01 | 87% | 80% | 120% | 96% | 80% | 120% | 100% | 80% | 120% |
| Total Sodium | 7219275 | | 10.8 | 10.5 | 2.7% | < 0.1 | 108% | 70% | 130% | 105% | 80% | 120% | 86% | 80% | 120% |
| Total Potassium | 7219275 | | 1.1 | 1.1 | 3.4% | < 0.1 | 108% | 70% | 130% | 107% | 80% | 120% | 89% | 80% | 120% |
| Total Calcium | 7219275 | | 8.0 | 7.4 | 8.8% | < 0.1 | 103% | 70% | 130% | 107% | 80% | 120% | 89% | 80% | 120% |
| Total Magnesium | 7219275 | | 2.0 | 1.9 | 2.0% | < 0.1 | 108% | 80% | 130% | 106% | 80% | 120% | 91% | 70% | 130% |
| Bicarb. Alkalinity (as CaCO3) | 7215928 | | 128 | 129 | 0.7% | < 5 | NA | 80% | 120% | NA | 80% | 120% | NA | 80% | 120% |
| Carb. Alkalinity (as CaCO3) | 7215928 | | <10 | <10 | NA | < 10 | NA | 80% | 120% | NA | 80% | 120% | NA | 80% | 120% |
| Hydroxide | 7215928 | | <5 | <5 | NA | < 5 | NA | 80% | 120% | NA | 80% | 120% | NA | 80% | 120% |
| Total Aluminum | 7219275 | | 0.332 | 0.314 | 5.6% | < 0.005 | 111% | 70% | 130% | 109% | 80% | 120% | NA | 70% | 130% |
| Total Antimony | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 107% | 70% | 130% | 103% | 80% | 120% | 88% | 70% | 130% |
| Total Arsenic | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 108% | 70% | 130% | 103% | 80% | 120% | 89% | 70% | 130% |
| Total Barium | 7219275 | | 0.033 | 0.033 | 0.4% | < 0.005 | 104% | 70% | 130% | 103% | 80% | 120% | 88% | 70% | 130% |
| Total Beryllium | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 105% | 70% | 130% | 103% | 80% | 120% | 86% | 70% | 130% |
| Total Bismuth | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 109% | 70% | 130% | 107% | 80% | 120% | 91% | 70% | 130% |
| Total Boron | 7219275 | | <0.05 | <0.05 | NA | < 0.05 | 103% | 70% | 130% | 103% | 80% | 120% | 81% | 70% | 130% |
| Total Cadmium | 7219275 | | 0.000043 | 0.000040 | NA | < 0.000017 | 107% | 70% | 130% | 104% | 80% | 120% | 88% | 70% | 130% |
| Total Chromium | 7219275 | | 0.001 | 0.001 | NA | < 0.001 | 109% | 70% | 130% | 105% | 80% | 120% | 91% | 70% | 130% |
| Total Cobalt | 7219275 | | <0.001 | <0.001 | NA | < 0.001 | 108% | 70% | 130% | 105% | 80% | 120% | 90% | 70% | 130% |
| Total Copper | 7219275 | | (-0.003) | (-0.003) | NA | < 0.001 | 110% | 70% | 130% | 105% | 80% | 120% | 91% | 70% | 130% |
| Total Iron | 7219275 | | 0.65 | 0.63 | 3.3% | < 0.05 | 108% | 70% | 130% | 105% | 80% | 120% | 90% | 70% | 130% |
| Total Lead | 7219275 | | 0.0008 | 0.0008 | NA | < 0.0005 | 108% | 70% | 130% | 106% | 80% | 120% | 91% | 70% | 130% |



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AGAT Laboratories

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# Quality Assurance

CLIENT NAME: CANADA FLUORSPAR (NL) INC.
AGAT WORK ORDER: 25K366638
PROJECT: South Ridge
ATTENTION TO: Gillian Kearney
SAMPLING SITE:
SAMPLED BY:

## Water Analysis (Continued)

RPT Date: Dec 03, 2025

| PARAMETER | Batch | Sample Id | DUPLICATE | | | Method Blank | REFERENCE MATERIAL | | | METHOD BLANK SPIKE | | | MATRIX SPIKE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Dup #1 | Dup #2 | RPD | | Measured Value | Acceptable Limits | | Recovery | Acceptable Limits | | Recovery | Acceptable Limits | |
| | | | | | | | | Lower | Upper | | Lower | Upper | | Lower | Upper |
| Total Manganese | 7219275 | | 0.186 | 0.176 | 5.2% | < 0.002 | 108% | 70% | 130% | 105% | 80% | 120% | 82% | 70% | 130% |
| Total Molybdenum | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 106% | 70% | 130% | 101% | 80% | 120% | 87% | 70% | 130% |
| Total Nickel | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 111% | 70% | 130% | 107% | 80% | 120% | 93% | 70% | 130% |
| Total Phosphorous | 7219275 | | 1.3 | 1.3 | 2.7% | < 0.1 | 106% | 70% | 130% | 102% | 80% | 120% | 84% | 70% | 130% |
| Total Selenium | 7219275 | | <0.001 | <0.001 | NA | < 0.001 | 109% | 70% | 130% | 104% | 80% | 120% | 87% | 70% | 130% |
| Total Silver | 7219275 | | <0.0001 | <0.0001 | NA | < 0.0001 | 109% | 70% | 130% | 106% | 80% | 120% | 63% | 70% | 130% |
| Total Strontium | 7219275 | | 0.028 | 0.027 | 2.2% | < 0.005 | 109% | 70% | 130% | 106% | 80% | 120% | 90% | 70% | 130% |
| Total Thallium | 7219275 | | <0.0001 | <0.0001 | NA | < 0.0001 | 108% | 70% | 130% | 106% | 80% | 120% | 92% | 70% | 130% |
| Total Tin | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 107% | 70% | 130% | 104% | 80% | 120% | 89% | 70% | 130% |
| Total Titanium | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 108% | 70% | 130% | 104% | 80% | 120% | 90% | 70% | 130% |
| Total Uranium | 7219275 | | <0.0002 | <0.0002 | NA | < 0.0002 | 106% | 70% | 130% | 103% | 80% | 120% | 91% | 70% | 130% |
| Total Vanadium | 7219275 | | <0.002 | <0.002 | NA | < 0.002 | 108% | 70% | 130% | 103% | 80% | 120% | 89% | 70% | 130% |
| Total Zinc | 7219275 | | 0.008 | 0.007 | NA | < 0.005 | 106% | 70% | 130% | 97% | 80% | 120% | 102% | 70% | 130% |

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Dissolved Metals (mg/L) + Calcium, Magnesium

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | 7217904 | | 0.005 | <0.005 | NA | < 0.005 | 114% | 70% | 130% | 103% | 80% | 120% | 107% | 70% | 130% |
| Dissolved Antimony | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 115% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Arsenic | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 115% | 70% | 130% | 100% | 80% | 120% | 104% | 70% | 130% |
| Dissolved Barium | 7217904 | | 0.211 | 0.200 | 5.7% | < 0.005 | 113% | 70% | 130% | 100% | 80% | 120% | NA | 70% | 130% |
| Dissolved Beryllium | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 112% | 70% | 130% | 102% | 80% | 120% | 102% | 70% | 130% |
| Dissolved Bismuth | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 116% | 70% | 130% | 104% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Boron | 7217904 | | <0.05 | <0.05 | NA | < 0.05 | 117% | 70% | 130% | 101% | 80% | 120% | 101% | 70% | 130% |
| Dissolved Cadmium | 7217904 | | <0.00009 | <0.00009 | NA | < 0.00009 | 113% | 70% | 130% | 102% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Chromium | 7217904 | | <0.001 | <0.001 | NA | < 0.001 | 117% | 70% | 130% | 101% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Cobalt | 7217904 | | <0.001 | <0.001 | NA | < 0.001 | 116% | 70% | 130% | 103% | 80% | 120% | 107% | 70% | 130% |
| Dissolved Copper | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 117% | 70% | 130% | 104% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Iron | 7217904 | | 0.05 | <0.05 | NA | < 0.05 | 115% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Lead | 7217904 | | <0.0005 | <0.0005 | NA | < 0.0005 | 115% | 70% | 130% | 102% | 80% | 120% | 104% | 70% | 130% |
| Dissolved Manganese | 7217904 | | 1.46 | 1.38 | 5.3% | < 0.002 | 115% | 70% | 130% | 102% | 80% | 120% | NA | 70% | 130% |
| Dissolved Molybdenum | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 112% | 70% | 130% | 100% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Nickel | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 116% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Selenium | 7217904 | | <0.002 | <0.002 | NA | < 0.001 | 114% | 70% | 130% | 101% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Silver | 7217904 | | <0.0001 | <0.0001 | NA | < 0.0001 | 114% | 70% | 130% | 104% | 80% | 120% | 78% | 70% | 130% |
| Dissolved Strontium | 7217904 | | 0.268 | 0.252 | 6.5% | < 0.005 | 116% | 70% | 130% | 102% | 80% | 120% | NA | 70% | 130% |
| Dissolved Thallium | 7217904 | | <0.0001 | <0.0001 | NA | < 0.0001 | 115% | 70% | 130% | 104% | 80% | 120% | 105% | 70% | 130% |
| Dissolved Tin | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 114% | 70% | 130% | 102% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Titanium | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 116% | 70% | 130% | 100% | 80% | 120% | 106% | 70% | 130% |
| Dissolved Uranium | 7217904 | | 0.0007 | 0.0006 | 17.1% | < 0.0001 | 114% | 70% | 130% | 101% | 80% | 120% | 103% | 70% | 130% |
| Dissolved Vanadium | 7217904 | | <0.002 | <0.002 | NA | < 0.002 | 115% | 70% | 130% | 99% | 80% | 120% | 105% | 70% | 130% |



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# Quality Assurance

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

## Water Analysis (Continued)

| RPT Date: Dec 03, 2025 | | | DUPLICATE | | | | REFERENCE MATERIAL | | | METHOD BLANK SPIKE | | | MATRIX SPIKE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER | Batch | Sample Id | Dup #1 | Dup #2 | RPD | Method Blank | Measured Value | Acceptable Limits | | Recovery | Acceptable Limits | | Recovery | Acceptable Limits | |
| | | | | | | | | Lower | Upper | | Lower | Upper | | Lower | Upper |
| Dissolved Zinc | 7217904 | | <0.005 | <0.005 | NA | < 0.005 | 103% | 70% | 130% | NA | 80% | 120% | 97% | 70% | 130% |
| Dissolved Calcium | 7217904 | | 64.4 | 59.2 | 8.5% | < 0.1 | 116% | 70% | 130% | 102% | 80% | 120% | NA | 70% | 130% |
| Dissolved Magnesium | 7217904 | | 13.1 | 12.1 | 7.4% | < 0.1 | 117% | 70% | 130% | 103% | 80% | 120% | 104% | 70% | 130% |

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Dissolved Mercury Analysis in Water (mg/L)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dissolved Mercury | 7219085 | | < 0.000026 | < 0.000026 | NA | < 0.000026 | 102% | 80% | 120% | 99% | 80% | 120% | 109% | 70% | 130% |

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By: Kaliegh Cullen



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# QC Exceedance

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

ATTENTION TO: Gillian Kearney

RPT Date: Dec 03, 2025

| PARAMETER | Sample Id | REFERENCE MATERIAL | | | METHOD BLANK SPIKE | | | MATRIX SPIKE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Measured Value | Acceptable Limits | | Recovery | Acceptable Limits | | Recovery | Acceptable Limits | |
| | | | Lower | Upper | | Lower | Upper | | Lower | Upper |
| Standard Water Analysis + Total Metals+Bromide | | | | | | | | | | |
| Total Silver | | 109% | 70% | 130% | 106% | 80% | 120% | 63% | 70% | 130% |

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.
More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dissolved Metals (Lab Filtered)+Calcium+Magnesium | | | | | | | | | | |
| Dissolved Zinc | | 103% | 70% | 130% | 124% | 80% | 120% | 97% | 70% | 130% |

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.
Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Standard Water Analysis + Total Metals (mg/L) + Bromide | | | | | | | | | | |
| Total Silver | | 109% | 70% | 130% | 106% | 80% | 120% | 63% | 70% | 130% |

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.



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# Method Summary

CLIENT NAME: CANADA FLUORSPAR (NL) INC.
AGAT WORK ORDER: 25K366638
PROJECT: South Ridge
ATTENTION TO: Gillian Kearney
SAMPLING SITE:
SAMPLED BY:

| PARAMETER | AGAT S.O.P | LITERATURE REFERENCE | ANALYTICAL TECHNIQUE |
|---|---|---|---|
| Water Analysis | | | |
| Total Phosphorus | INOR-93-6022 | modified from SM 4500-P B and SM 4500-P E | SPECTROPHOTOMETER |
| Dissolved Organic Carbon | INOR-121-6052 | SM 5310 B | TOC ANALYZER |
| Dissolved Mercury | MET-121-6100 & MET-121-6107 | SM 3112 B | CV/AA |
| Dissolved Aluminum | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Antimony | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Arsenic | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Barium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Beryllium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Bismuth | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Boron | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Cadmium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Chromium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Cobalt | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Copper | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Iron | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Lead | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Manganese | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Molybdenum | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Nickel | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Selenium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Silver | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Strontium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Thallium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Tin | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Titanium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Uranium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Vanadium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Zinc | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |


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# Method Summary

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

| PARAMETER | AGAT S.O.P | LITERATURE REFERENCE | ANALYTICAL TECHNIQUE |
|---|---|---|---|
| Dissolved Calcium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Dissolved Magnesium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| pH | INOR-121-6001 | SM 4500 H+B | PC TITRATE |
| Reactive Silica as SiO2 | INOR-121-6027 | SM 4500-SiO2 F | COLORIMETER |
| Chloride | INORG-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Fluoride | INORG-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Sulphate | INORG-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Alkalinity | INOR-121-6001 | SM 2320 B | |
| True Color | INOR-121-6008 | SM 2120 B | COLORIMETER |
| Turbidity | INOR-121-6001 | SM 2130 B | PC TITRATE |
| Electrical Conductivity | INOR-121-6001 | SM 2510 B | PC TITRATE |
| Nitrate + Nitrite as N | INORG-121-6005 | SM 4110 B | CALCULATION |
| Nitrate as N | INORG-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Nitrite as N | INORG-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Ammonia as N | INOR-121-6047 | SM 4500-NH3 H | COLORIMETER |
| Total Organic Carbon | INOR-121-6052 | SM 5310 B | TOC ANALYZER |
| Ortho-Phosphate as P | INOR-121-6012 | SM 4500-P G | COLORIMETER |
| Total Sodium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Potassium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Calcium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Magnesium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Bicarb. Alkalinity (as CaCO3) | INORG-121-6001 | SM 2320 B | PC TITRATE |
| Carb. Alkalinity (as CaCO3) | INORG-121-6001 | SM 2320 B | PC TITRATE |
| Hydroxide | INORG-121-6001 | SM 2320 B | PC-TITRATE |
| Calculated TDS | | SM 1030E | CALCULATION |
| Hardness | | SM 2340B | CALCULATION |
| Langelier Index (@20C) | | CALCULATION | CALCULATION |
| Langelier Index (@ 4C) | | CALCULATION | CALCULATION |
| Saturation pH (@ 20C) | | CALCULATION | CALCULATION |
| Saturation pH (@ 4C) | | CALCULATION | CALCULATION |
| Anion Sum | | SM 1030E | CALCULATION |
| Cation sum | | SM 1030E | CALCULATION |
| % Difference/ Ion Balance | | SM 1030E | CALCULATION |
| Total Aluminum | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Antimony | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Arsenic | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Barium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Beryllium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Bismuth | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Boron | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |



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# Method Summary

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

| PARAMETER | AGAT S.O.P | LITERATURE REFERENCE | ANALYTICAL TECHNIQUE |
|---|---|---|---|
| Total Cadmium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Chromium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Cobalt | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Copper | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Iron | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Lead | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Manganese | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Molybdenum | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Nickel | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Phosphorous | MET-121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Selenium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Silver | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Strontium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Thallium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Tin | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Titanium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Uranium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Vanadium | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Total Zinc | MET121-6104 & MET-121-6105 | modified from SM 3125/SM 3030 B/SM 3030 D | ICP-MS |
| Bromide | INORG-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Chloride | INOR-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Fluoride | INOR-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Sulphate | INOR-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Nitrate + Nitrite as N | INOR-121-6005 | SM 4110 B | CALCULATION |
| Nitrate as N | INOR-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Nitrite as N | INOR-121-6005 | SM 4110 B | ION CHROMATOGRAPH |
| Bicarb. Alkalinity (as CaCO3) | INOR-121-6001 | SM 2320 B | PC TITRATE |
| Carb. Alkalinity (as CaCO3) | INOR-121-6001 | SM 2320 B | PC TITRATE |
| Hydroxide | INOR-121-6001 | SM 2320 B | PC-TITRATE |
| Calculated TDS | CALCULATION | SM 1030E | CALCULATION |
| Hardness | CALCULATION | SM 2340B | CALCULATION |
| Langelier Index (@20C) | CALCULATION | CALCULATION | CALCULATION |
| Langelier Index (@ 4C) | CALCULATION | CALCULATION | CALCULATION |
| Saturation pH (@ 20C) | CALCULATION | CALCULATION | CALCULATION |
| Saturation pH (@ 4C) | CALCULATION | CALCULATION | CALCULATION |



Results relate only to the items tested. Results apply to samples as received.

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

# Method Summary

CLIENT NAME: CANADA FLUORSPAR (NL) INC.

AGAT WORK ORDER: 25K366638

PROJECT: South Ridge

ATTENTION TO: Gillian Kearney

SAMPLING SITE:

SAMPLED BY:

| PARAMETER | AGAT S.O.P | LITERATURE REFERENCE | ANALYTICAL TECHNIQUE |
|---|---|---|---|
| Anion Sum | CALCULATION | SM 1030E | CALCULATION |
| Cation sum | CALCULATION | SM 1030E | CALCULATION |
| % Difference/ Ion Balance | CALCULATION | SM 1030E | CALCULATION |
| Total Antimony | MET121-6104 & MET-121-6105 | SM 3125 | ICP-MS |



Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories
Unit 122 • 11 Morris Drive
Dartmouth, NS
B3B 1M2
webearth.agatlabs.com • www.agatlabs.com
P: 902.468.8718 • F: 902.468.8924

# Chain of Custody Record

**Laboratory Use Only** J.V Nov 7/25
Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature: -2.8, 6.5, 6.3.8
Hold Time:
AGAT Job Number: 25K366638
Notes: TAT not provided

## Report Information

Company: CANADA FLUORSPAR (NL) INC.
Contact: Gillian Kearney
Address: P.O. BOX 337
ST. LAWRENCE, NL, A0E2V0
Phone: 709-873-3331 Fax:
Client Project #: ~~WEEKLY~~ South Ridge
AGAT Quotation: 512854
Please Note: If quotation number is not provided client will be billed full price for analysis.

## Report Information (Please print):

1. Name: Gillian Kearney
   Email: gkearney@canadafluorspar.com
2. Name: James Churchill
   Email: jchurchill@canadafluorspar.com;

## Report Format

☐ Single Sample per page
☑ Multiple Samples per page
☑ Excel Format included
☑ Export XML

## Turnaround Time Required (TAT)

Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days
Date Required:

## Invoice To

Same Yes ☐ / No ☐
Company: CANADA FLUORSPAR (NL) INC.
Contact: gkearney@canadafluorspar.com
Address: ap@canadafluorspar.com
jchurchillcanadafluorspar.com:
Phone: Fax:
PO/Credit Card#: 21518

## Regulatory Requirements (Check):

☐ List Guidelines on Report ☐ Do not list Guidelines on Report
☐ PIRI
☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube

☑ CCME
☐ Industrial
☐ Commercial
☐ Res/Park
☐ Agricultural
☑ FWAL
☐ Sediment

☐ CDWQ
☐ NSEQS-Cont Sites
☐ HRM 101
☐ Storm Water
☐ Waste Water
☐ Other

Drinking Water Sample: ☐ Yes ☐ No Salt Water Sample ☐ Yes ☐ No
Reg. No.:

| Sample Identification | Date/Time Sampled | Sample Matrix | # Containers | Comments - Site/Sample Info. Sample Containment | Dissolved Mercury | DOC | Bromide | Total Phosphorus | SWF-Metals and Dissolved Metals | Dissolved Calcium & Magnesium |
|---|---|---|---|---|---|---|---|---|---|---|
| Director-Historic-01 | 06-Nov-25 | Water | 7 | Fluorspar Custom Package | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Director-Historic-02 | 06-Nov-25 | Water | 7 | Fluorspar Custom Package | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Director-Historic-03 | 06-Nov-25 | Water | 7 | Fluorspar Custom Package | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Director-Historic-04 | 06-Nov-25 | Water | 7 | Fluorspar Custom Package | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Director-Historic-05 | 06-Nov-25 | Water | 7 | Fluorspar Custom Package | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| AGS-Waste-01 | 06-Nov-25 | Water | 7 | Fluorspar Custom Package | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| AGS-Waste-02 | 06-Nov-25 | Water | 7 | Fluorspar Custom Package | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |

2025 NOV 7 11:58

| Samples Relinquished By (Print Name) | Date/Time | Samples Received By (Print Name) | Date/Time |
|---|---|---|---|
| James Churchill | 9:00am | Jen. V | |
| **Samples Relinquished By (Sign):** | **Date/Time** | **Samples Received By (Sign):** | **Date/Time** |
| | 06-Nov-25 | | |

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 1
N°:

Date Revised: May 29, 2015

# Appendix 6.5-5: Technical Memo Preliminary ML/ARD Assessment of Kinetic Tests

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378 Esplanade E, North Vancouver, BC
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# TECHNICAL MEMO

22 April 2026

| | |
|---|---|
| **To** | Isaac Sam, CFI, Mine Manager |
| **From** | Nikolay Sidenko, Jacob MacLaine |
| cc | Cortney Angelstad |
| **Subject** | **Preliminary ML/ARD Assessment of Kinetic Tests** |
| **Client** | Canadian Fluorspar Inc. (CFI) |
| **Project** | South Ridge EARD |
| **Project Code:** | CFI-25-01-02 EA-Registration Development |

## 1 INTRODUCTION

Canada Fluorspar Inc. (CFI) plans to develop the South Ridge Project (the Project) located approximately 4 kilometers south-southwest of the town of St. Lawrence, Newfoundland. CFI intends to mine the fluorspar (fluorite) ore from Director Vein, which is hosted in the granite and tuffisite and is overlain by till. The Project will consist of a single open pit operating over 18 months. Mining is expected to generate approximately 0.7 million tonnes of overburden, 3.7 million tonnes of mine rock, and 0.9 million tonnes of ore. Mine rock produced by the Project is expected to be of sufficiently high quality to be used as construction aggregate to support the development of Project infrastructure. Unused mine rock and overburden will be stockpiled to the northeast of the pit, while the ore will be processed off-site at the nearby AGS mill. Unused and stockpiled mine rock is expected to be sold for use as construction aggregate. After mining ceases, the site will be reclaimed, including covering any remaining mine rock with overburden and topsoil and natural flooding of the pit.

Phase I South Ridge Acid Rock Drainage (ARD)/Metal Leaching (ML) assessment report provided initial evaluation of ML/ARD risks associated with the exposure of mine rock, ore, overburden, and tailings using

static and short-term leaching tests (Falkirk 2026a). Based on results of acid base accounting (ABA) and Net Acid Generation (NAG) tests from Falkirk (2026a) we can conclude that:

- Ore, overburden, and tailings are classified as non-Potentially Acid Generating (NPAG) and do not require ARD mitigation.
- Low fraction (less than 4%) of mine rock samples conservatively classified as Potentially Acid Generating (PAG) indicate that risk of ARD is low. This low risk can be further reduced through mixing with NPAG rock, which has excess neutralization potential. This mixing will occur as part of normal mining activities during blasting, excavation, and stockpiling.
- Contact water monitoring data from several operating and historical fluorite mines in the St. Lawrence area show no indications of acid drainage supporting overall risk of ARD associated with the project.

Short-term leaching Shake Flask Extraction (SFE) tests indicate following:

- Concentrations of elements in all samples are below effluent limits listed in the Newfoundland and Labrador (NL) Environmental Control Water and Sewage Regulations Regulation 65/03 (NL 2003).
- Cadmium and zinc exceeded short-term (acute) Canadian Council of Ministers of the Environment guidelines (CCME 2024) in ore (24% of SFE tests), historical tailings (20% of water samples), granite (6% of tests), and in tuffisite (14% of tests), showing low probability of acute toxicity of Zn and Cd in water draining these materials.
- Potential parameters of interest (POI) which might affect receiving water bodies are listed below due to overall frequency exceeding long-term CCME 2025 guidelines:
  - Fluoride
  - Copper
  - Cadmium
  - Lead
  - Aluminum
  - Zinc

As part of the South Ridge Project Environmental Registration Document, water quality was predicted (i.e. source terms derived) for discharges from the site and in the receiving environment of the Project (Falkirk 2026b). For these predictions, source terms were developed using an analog approach, where water quality data from the nearby AGS Mine was used to estimate concentrations of POIs in contact waters for the Project including pit dewatering and seepage from stockpiles.

Phase II of ML/ARD program was initiated in December 2025 to:

- Investigate samples with uncertain ARD classification and estimate depletion rates for neutralization potential (NP) and acid generation potential (AP).
- Verify POI and determine long-term leaching behaviour for those.
- Support future updates of source terms if required.
- Characterize synthetic tailings.

The focus of Phase II was laboratory and field kinetic testing and detailed characterization of materials used in these tests. The objective of this memo is to outline methodology and preliminary results of kinetic tests conducted on ore and rock samples.

# 2 METHODOLOGY

Core samples of ore and mine rock were selected by Falkirk's Qualified Professional and collected by CFI personnel. All samples were shipped to Global ARD Laboratory (Global ARD) in Burnaby BC and crushed to 1 inch. Select samples were composited to represent scale of mine mixing occurring over bench or width of ore zone as detailed in the Phase I ML/ARD Report (Falkirk 2026a). Some of mine rock composite samples were further mixed into bulk composite to provide sufficient mass for field tests (Appendix A).

## 2.1 FIELD LEACH BIN

A bulk composite sample of mine rock with a weight of 257 kg was shipped to the site and placed in a bin resembling a rain barrel in the beginning of March 2026 (Figure 2-1). The rock in the barrel was rinsed with distilled water, and a leachate was collected from the bottom drain and sent for analysis. These results had not been received at time of writing. No more addition of distilled water is planned, and further leaching will occur with natural precipitation to reflect site conditions. The leachates will be sampled monthly during the frost-free season and tested for general water chemistry and trace elements.

**Figure 2-1: View of Field Leach Bin Test Setup**

## 2.2 HUMIDITY CELL TESTS

Three humidity cell (HC) tests containing composite samples of waste rock and ore were established by Global ARD under direction from Falkirk's Qualified Professional:

- HC-1: Ore "Composite-38 DS157_7-21" with Carbonate NP/AP ratio of 1.0, resulting in uncertain classification.
- HC-2: Weathered granite mine rock "Composite-37 DS157_6.41-7.0" with Carbonate NP/AP ratio of 0.3 classified as PAG but Sobek NP/AP ratio of 1.4 resulting uncertain classification if Sobek NP is used.
- HC -3: Mine rock "Bulk composite" test represents average mine rock.

Approximately one kilogram of minus ¼ inch crushed sample was placed into a standard cell and subjected to weekly "air and flood" cycles (ASTM 2010). The HCs are leached weekly with volumes of deionized water shown in Appendix A. Leachates from select weeks are filtered through a 0.45-µm membrane and tested for general water chemistry and trace elements. Additional details of HC testing and preliminary results are provided in Appendix A.

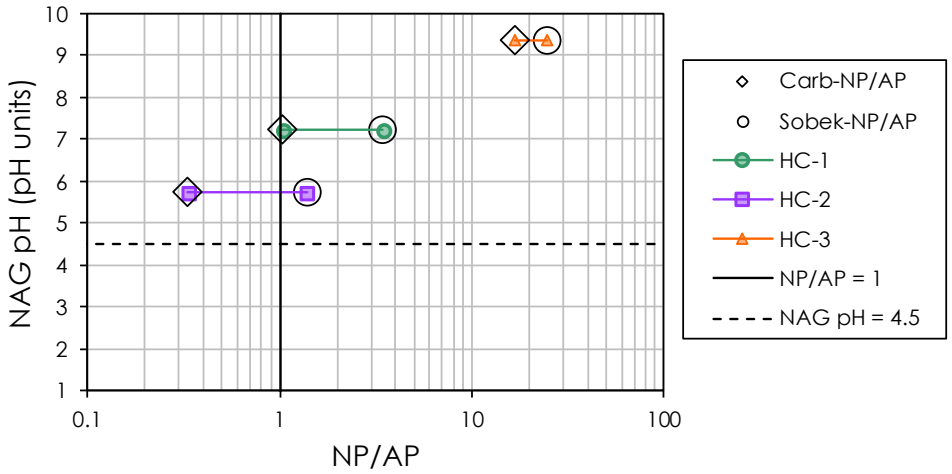
Leachate analysis results were screened against Newfoundland and Labrador (NFLD) Environmental Control Water and Sewage Regulations (ECWSR) 65/03 criteria (NFLD Criteria) and short- and long-term water quality guideline criteria to confirm POIs as described in Falkirk 2026b. It is important to note that these criteria do not apply to any leach tests and should generally not be interpreted within a regulatory context: the exercise is for screening purposes only. Element concentrations were also compared to mine seepage source terms (Falkirk 2026b).

# 3 RESULTS AND DISCUSSION

## 3.1 ACID ROCK DRAINAGE

Results from NAG testing suggested NPAG material (NAG pH > 4.5) but uncertainty due to low NP/AP values remained (Figure 3-1), particularly in material with either low sulphide and/or low NP (Table 3-1). Low sulphide content and consequently low AP generation could be balanced by non-carbonate neutralizing minerals, such as apatite (Falkirk 2026a). The response of HCs to continued rinsing will reduce the uncertainty of the ARD potential of these samples.

Preliminary leachates from three HCs provide early indication of trends and allow comment on ARD potential. All three cells show declining trends in pH and alkalinity, but it is too early in the tests to see stabilization (Figure 3-2). In HC-1 and HC-2, pH has remained below the long-term criteria of 6.5 since onset but above the NFLD ECWSR 65/03 criteria of 5.5. Early results from HC-3 are trending downwards with most recent measurement at pH 7. Despite the low pH in HC-1 and HC-2, deionized (DI) water pH is lower than the leachates and these samples are generating measurable amounts of alkalinity (Figure 3-2, middle). Acid production, as indicated by sulphate concentrations, is approaching or at the detection limit for all three cells (Figure 3-2, bottom), consistent with low sulphide content of mine rock. Combined, preliminary results indicate that the tests need to continue to confirm developing trends.



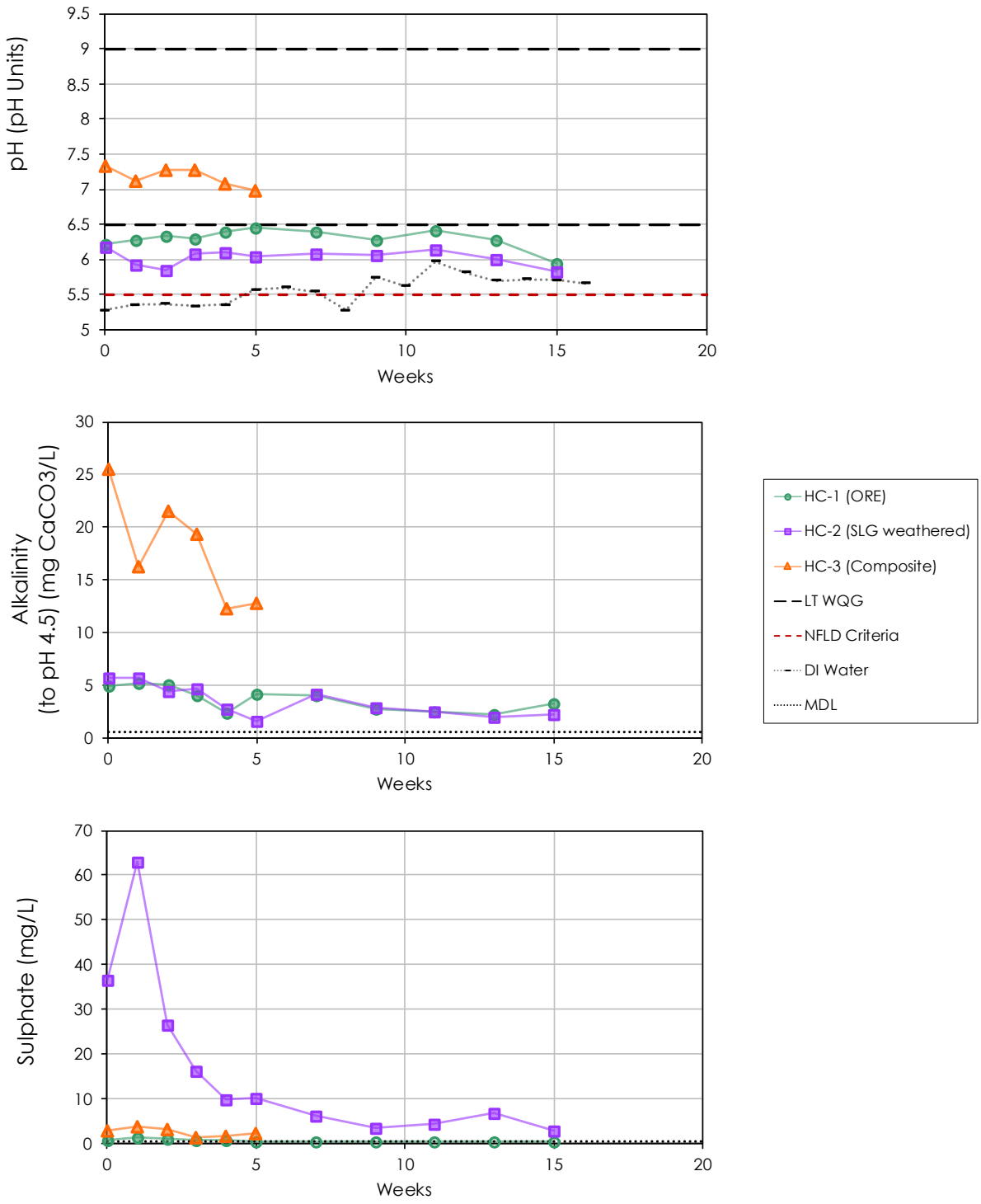

*NPR = neutralization potential ratio (NP/AP); Carb-NP/AP = carbonate NP to AP; Sobek-NP/AP = Sobek NP to AP*

**Figure 3-1: Neutralization Potential to Acid Potential Ratio (NP/AP) and NAG pH of Humidity Cell Material**

Preliminary estimates of long-term AP were evaluated using depletion calculations (Price 2009). Assuming pyrite oxidation as the only source of AP, carbonate minerals as the only source of NP, and an open system, depletion rates were calculated from the five most recent HC leachate analyses using equations from Table 18.1 of the MEND Manual (Price 2009). In cases with undetectable concentrations (e.g. sulphate in HC-1) half of method detection limit (MDL) was used. Acidity assumed aluminum, copper, iron, manganese, and zinc are primary sources. The initial amount of available AP and carbonate NP was obtained from ABA tests (Table 3-1). Preliminary depletion calculations indicate that carbonate NP will be exhausted in HC-1 and HC-2 before AP, with ARD onset at 27 and 16 years, respectively. In HC-3, which represents average mine rock, there is sufficient carbonate NP to provide alkalinity beyond AP depletion (Table 3-1). Depletion calculations did not consider non-pyritic sulphides or non-carbonate NP. Additionally, it should be noted that assumed initial amounts of NP and AP may not be fully available in kinetic tests because material placed in HC is coarser (- 6 mm) than pulverized sample ($P_{95}$ minus 75 µm) used for ABA tests. As a result, undetectable sulphate in HC-1 after five weeks may indicate exhaustion of AP, while NP is still available based on measurable alkalinity. Depletion calculations change classifications of HC-1 to NPAG, and continuation of HC-2 is recommended because similar results are expected.

**Table 3-1: Summary of Acid Potential and Carbonate Neutralization Potential Depletion Calculations**

| Humidity Cell | Lithology Code | Initial ABA Classification | Sample Mass, g | Acid Potential | | | Carbonate Neutralization Potential | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Depletion Rate | Time to Depletion | Initial | Depletion Rate | Time to Depletion |
| | | | | g $CaCO_3$/kg | mg $CaCO_3$/kg/wk | Years | g $CaCO_3$/kg | mg $CaCO_3$/kg/wk | Years |
| HC-1 | ORE | Uncertain | 950 | 1.6 | 0.12 | 261 | 1.7 | 1.2 | 27 |
| HC-2 | SLG weathered | Uncertain | 1,000 | 5.0 | 2.4 | 41 | 1.7 | 2.0 | 16 |
| HC-3 | Composite | NPAG | 1,000 | 0.54 | 1.1 | 9.2 | 9.2 | 7.8 | 22 |



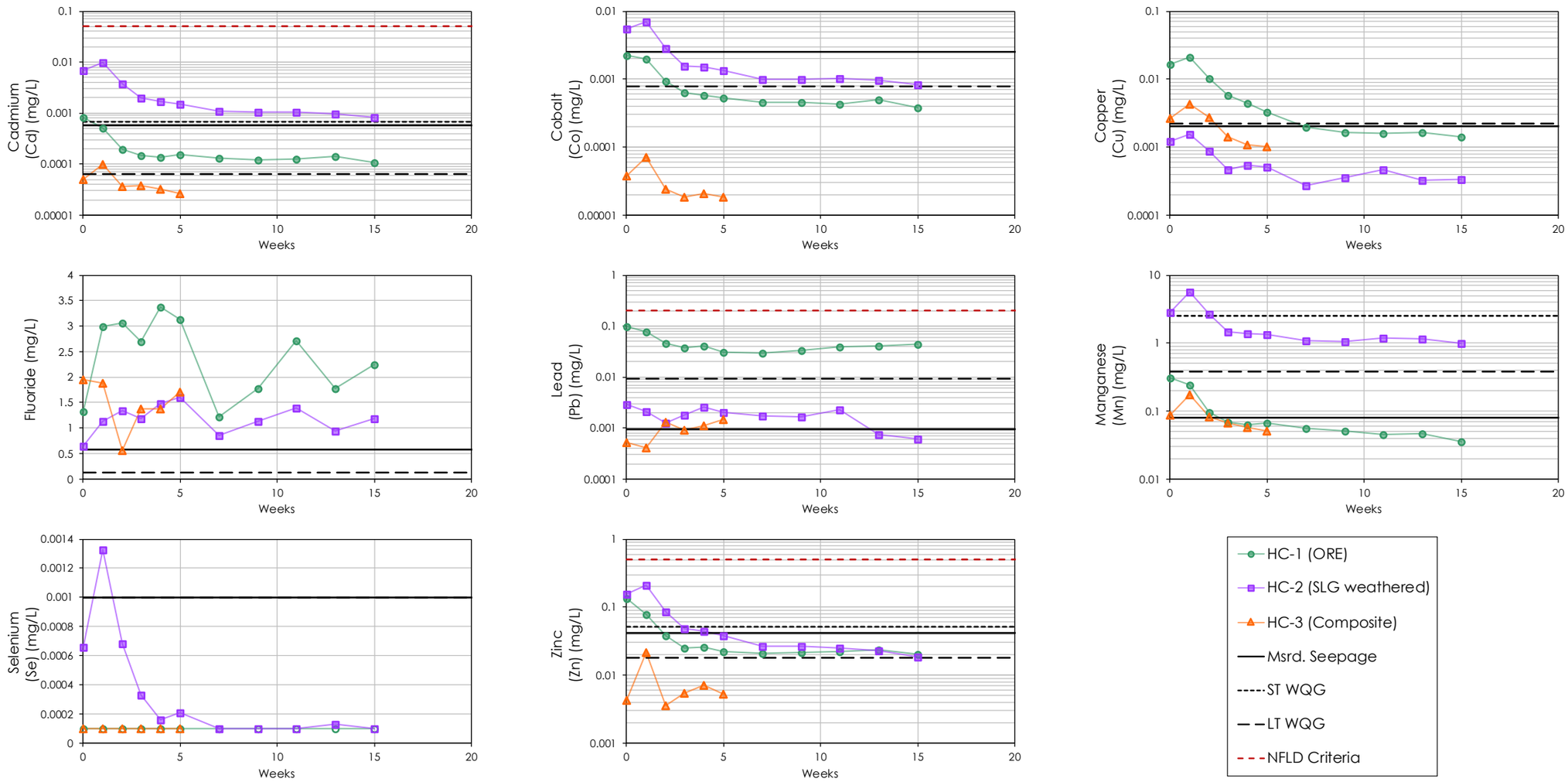

*LT WQG = long-term water quality guideline; DI water = deionized water; MDL = method detection limit.*
*Note, pH WQG is between 6.5 and 9.0.*

**Figure 3-2: Preliminary Humidity Cell pH (top), Alkalinity (middle), and Sulphate (bottom) Trends**

## 3.2 METAL LEACHING

No NFLD Criteria were exceeded indicating likely compliance of future mine rock drainage. POIs are listed below based exceedance frequency of short- and/or long -term water quality criteria (Figure 3-3):

- **Cadmium:** Both, short- and/or long-term water quality criteria were continually exceeded in HC-1 (ore) and HC-2 (weathered rock). In HC-3 (average mine rock), long-term criterion was exceeded once, in week one. All tests show declining trend. Concentrations of cadmium in leachate from average mine rock (HC-3) is below mine rock source terms (average seepage from AGS rock stockpile) indicating conservatism in predictions (Falkirk 2026b).
- **Zinc:** Both short- and/or long-term water quality criteria were continually exceeded in HC-1 (ore) and HC-2 (weathered rock). In HC-3 (average mine rock), long-term criterion was exceeded once in week one, similar to cadmium, and is below mine rock source terms (Falkirk 2026b). All tests show a declining trend with zinc concentrations in HC-1 (ore) and HC-2 (weathered rock) trending below the short-term criterion and mine rock source terms (Falkirk 2026b) within the first five flushing events. Zinc and cadmium trends may be similar because both metals are often associated with sphalerite.
- **Manganese:** Short-term water quality criterion was exceeded only in HC-2 (weathered rock) in the initial three weeks. Long-term criterion was also exceeded in HC-2, but not in other HCs. No criteria were exceeded in two other tests (HC-1 or HC-3). All three HCs show declining trend. Concentrations of manganese in leachate from average mine rock (HCT-3) are similar to the mine rock source term.
- **Floride:** Long-term water quality criterion was exceeded all HCs. Preliminary results do not show clear trends. Concentrations of fluoride in leachate from average mine rock (HC-3) were above the mine rock source term for fluoride indicating for potential update of this source term.
- **Copper:** Long-term water quality criterion was exceeded in HC-1 (ore) and HC-3 (average mine rock). All three HCs show declining trend with concentrations in HC-1 and HC-3 declining below the long-term criterion for copper. Concentrations of copper in leachate from average mine rock (HC-3) are similar to the respective mine rock source term.
- **Cobalt:** Long-term water quality criterion was exceeded in HC-1 (ore) and HC-2 (weathered rock) with trends declining below the criterion. Concentrations of cobalt in leachate from average mine rock (HC-3) is below the mine rock source term.
- **Lead:** Long-term water quality criteria were exceeded in HC-1 (ore). In the two other HC tests, the long-term criterion was exceeded more than once. Preliminary tests do not currently show clear trends, except for HC-1 (ore) exhibiting a notable decline during first five weeks. Concentrations of lead in leachate from average mine rock (HC-3) currently fluctuate around the mine rock source term.
- **Selenium:** Long-term water quality criterion for selenium was exceeded once, in week one in HC-2 (weathered rock). Selenium concentration in HC-2 then declined to the method detection limit; all HC-1 and HC-3 leachates are at the method detection limit. Concentrations of selenium in leachate from average mine rock (HCT-3) is below the mine rock source term.




*Msrd. = measured; ST and LT WQG = short- and long-term water quality guidelines, respectively; NFLD = Newfoundland and Labrador ECWSR 65/03 Criteria. Note, NFLD Criteria for selenium is not shown because concentrations are less than the criteria (0.01 mg/L)*

**Figure 3-3: Preliminary Humidity Cell Weekly Concentrations of Parameters of Interest (POI)**

# 4 CONCLUSIONS

The preliminary results from HC tests can be summarized as follows:

- ARD potential continues to be low based on preliminary results which suggests NP of sufficient amounts to neutralize slow sulphide oxidation in HC.
- Conclusions related to overall ARD risks and management remain the same as in Phase I South Ridge Acid Rock Drainage (ARD)/Metal Leaching (ML) assessment report (Falkirk 2026a).
- NFLD Criteria were not exceeded in any HC, indicating for likely compliance of mine rock drainage with the effluent limits.
- Leachate concentrations of cadmium, zinc, and manganese in one or more weekly analysis exceeded short-term water quality criteria.
- Leachate concentrations of cadmium, zinc, lead and manganese, fluoride, copper, cobalt, and selenium in one or more weekly analysis exceeded long-term water quality criteria.
- Leachate concentrations of POIs in average mine rock (HC-3) are below or similar to respective mine rock source terms, with the exception of fluoride. The fluoride source term may require revision pending results of final laboratory tests and verification in field bin leachates.

# 5 RECOMMENDATIONS

Falkirk provides the following recommendations:

- Continue to run HC tests until week 40 per recommendation from the MEND Manual (Price 2009) or until POI concentrations stabilize and reassess the results.
- Obtain and assess information from field leach bin.
- Initiate characterization and column testing of synthetic South Ridge tailings when these become available from metallurgical program.
- Scale-up kinetic test results to verify source terms and, if necessary, update water quality predictions.

# 6 STUDY LIMITATIONS

It is important to acknowledge certain limitations inherent in the process of preparing technical documents. This section aims to outline some limitations and provide transparency into the potential impact on the findings and conclusions presented herein. It is recommended that readers of this report consider these limitations while interpreting and applying the information presented. Future investigations or additional studies may be necessary to further explore and validate the findings and overcome these limitations.

**Scope and Generalizability**: Every effort has been made by Falkirk Environmental Consultants Ltd. (Falkirk) to conduct a thorough and accurate study. No warranty, express or implied, is made. Results presented in this document may not be applicable in all circumstances or settings and should be limited to the spatial and temporal scope presented alone. Variations in conditions, resources, and contextual factors could influence outcomes and conclusions.

**Data Limitations**: The findings and recommendations presented in this document are based on data provided to Falkirk, which may extend outside any data collected and analyzed within the defined scope

of work. The accuracy and reliability of the study rely on the quality and availability of data. While efforts are made to verify data integrity, certain limitations such as data accessibility, accuracy, or completeness may influence the analysis and subsequent findings.

**Assumptions, Estimations, and Methods**: In situations where specific data points or information are unavailable, certain assumptions and estimations are made. These assumptions are based on available knowledge and expertise at the time of analysis, recognizing that variations in these assumptions could potentially affect the accuracy of the results. The study was conducted using recognized standard practices, engineering, and scientific methods. However, limitations inherent to these methods, such as sample size, bias, or measurement errors, could impact the reliability and validity of the findings.

**Duty of Care and Professional Standards**: This study has been conducted in adherence to the code of practice outlined by professional engineering and scientific associations, by exercising a level of care and skill consistent with the members of the science and engineering professions practising under similar conditions in the jurisdiction where the services are provided. However, it is important to recognize that even with the application of standard practices, unforeseen circumstances or human error may introduce limitations to the findings and conclusions presented.

**Document Control**: This document has been prepared for the sole benefit of the client to whom it is addressed. Third parties using this document do so at their own risk. Furthermore, Falkirk is not responsible for any unauthorized use or modification of this document. Electronic media is susceptible to unauthorized modification, and no party can rely solely on such versions of this document.

**Contractual Agreements**: It is important to note that nothing in the Study Limitations section will supersede clauses in existing contractual agreements, including but not limited to Master Service Agreements, Work Authorizations, and Purchase Orders that govern the scope of work outlined in this report. Any conflicting terms and conditions defined in these agreements take precedence.

# 7 CLOSURE

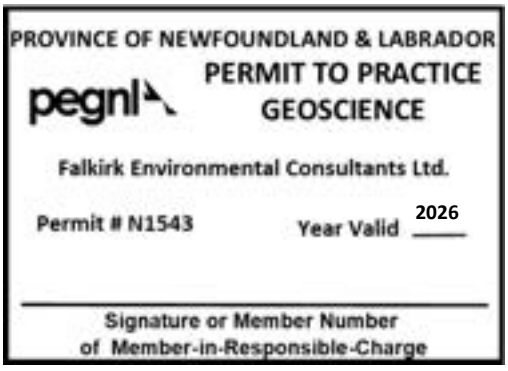
We trust this Technical Memorandum meets your present requirements. Please do not hesitate to contact the undersigned should you have any questions.

**Prepared by:**

**Jacob MacLaine**, P.Geo.
Sr. Geochemist and Water Quality Specialist

**Prepared by:**

**Nikolay Sidenko**, Ph.D., P.Geo.
Principal Geochemist



# 8 REFERENCES

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NL (Newfoundland and Labrador). 2003. Environmental Control Water and Sewage Regulations (ECWSR) 65/03.

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# APPENDIX A. CERTIFICATES OF ANALYSES

# CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

| CLIENT INFORMATION | |
|---|---|
| **Client:** | Canada Fluorspar (NL) Inc. |
| | |
| **Project Manager:** | Melissa Lambert |
| | |
| **Mailing Address** | 1 Clarke's Pond Road |
| | St. Lawrence, NL, CA A0E 2V0 |
| | |
| **Contact No:** | 1 (709) 702-5960 |
| | |

| COMPANY INFORMATION | |
|---|---|
| **Legal Name:** | Global ARD Testing Services Inc. |
| | |
| **Mailing Address:** | 6891 Antrim Avenue |
| | Burnaby, BC |
| | V5J 4M5 |
| **Contact No:** | |
| | Main: (604) 428-2730 |
| | Alternate: (604) 603-1359 |
| | |

| PROJECT INFORMATION | |
|---|---|
| **Project Name:** | South Ridge |
| **Project Number:** | 2025 Geochemical Sampling |

| REPORTING | |
|---|---|
| **Global Project No:** | 2577 (B4) Bulk Composite |
| **Report Version:** | 2 |
| **Pages (Including Cover):** | 9 |
| **Report Title:** | COA (B4) x 1 South Ridge Bulk Composites Sample (rec'd 27-Oct25) |
| | |
| **Analysis Reviewed By:** | Prab Bhatia (Pbhatia@globalARDtesting.com) |
| **Position:** | Project Manager |
| **Report Certified By:** | Prab Bhatia |
| **Signature:** | |

| RESULTS | | |
|---|---|---|
| **Reported To:** | **1** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **2** | Nikolay Sidenko (NIKOLAY@FALKIRK.CA) |
| | **3** | Inaara Hassan (ihassan@canadafluorspar.com) |
| | **4** | Brad Smith (bsmith@canadafluorspar.com) |
| **Date Reported:** | **Version-1:** | Tuesday, March 3, 2026 |
| | **Version-2:** | Tuesday, April 14, 2026 |
| | | |

| INVOICE | | |
|---|---|---|
| **Submitted To:** | **1** | Accounts Payable (ap@canadafluorspar.com) |
| | **2** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **3** | |
| | **4** | |
| | | |
| **Client PO No:** | | |
| **Global Invoice No:** | | ARD2577-0326A |
| **Date Submitted:** | | March 16, 2026 |

| NOTES |
|---|
| All samples and pulps are stored at no charge for 90 days past reporting date. |
| Please contact the lab if you would like to continue storage past 90 days. |
| Storage charges will apply. |
| |
| VERSIONS: |
| Version-1: Full Report |
| Version-2: Revised Sample ID., Add PSA Results |
| |

# CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.



**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| SAMPLE RECEIPT INFO | |
|---|---|
| Date Samples Received: | Monday, October 27, 2025 |
| No of Samples Received: | 1 |
| Samples Received By: | Said Zeinab |

| ANALYTICAL INSTRUCTIONS | |
|---|---|
| From: | |
| | as per email Confirmation |
| Date: | Tuesday, February 17, 2026 |

| S. No. | Sample ID | Global ARD Composite No. | Composite ID | Composite Sample Make-up | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | Global ARD Notes |
|---|---|---|---|---|---|---|---|---|
| 1 | Bulk Composite - 01 | Bulk Composite - 01 | Bulk Composite - 01 | See Bulk Composite Tab | CORE | Dry | 292.00 | 5.0 Kg left in the lab |

**Total wt of sample rec'd (kg): 292.00**

## Sample List

**Client:** Canada Fluorspar (NL) Inc. **Date Rec'd:** 10/27/2025
**Project Name:** South Ridge **No. of Samples:** 0
**Client Project No:** 2025 Geochemical Sampling
**Global Project No:** 2577 (B4) Bulk Composite


**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| S. No. | Global ARD Composite No. | Rock Type | Composite Weight Used for Bulk Composite | % of Bulk Composite | Global ARD Notes |
|---|---|---|---|---|---|
| **Bulk Composite - Sample Composition** | | | | | |
| | Composite-1 DS147_7.23-7.5 | SLG | 0.0 | 0.0% | |
| | Composite-2 DS147_7.5-18 | SLG | 10.0 | 3.5% | |
| | Composite-3 DS147_18-32 | SLG | 11.6 | 4.0% | |
| | Composite-4 DS147_31-33.4 | SLG | 0.0 | 0.0% | |
| | Composite-8 DS147_42-43 | SLG | 0.3 | 0.1% | |
| | Composite-8-DUP DS147_46-47 | TFS | 2.5 | 0.9% | |
| | Composite-9 DS148_7-7.5 | SLG | 0.6 | 0.2% | |
| | Composite-10 DS148_7.5-20 | SLG | 11.7 | 4.1% | |
| | Composite-11 DS148_21-35 | SLG | 10.9 | 3.8% | |
| | Composite-12 DS148_35-64 | SLG | 9.9 | 3.5% | |
| | Composite-13 DS148_66.6-67.54 | SLG | 0.0 | 0.0% | |
| | Composite-16 DS148_72.11-73.06 | TFS | 0.0 | 0.0% | |
| | Composite-16-DUP DS148_82-83 | TFS | 2.2 | 0.8% | |
| | Composite-17 DS150_4.4-5 | SLG | 1.2 | 0.4% | |
| | Composite-18 DS150_5-13 | SLG | 2.9 | 1.0% | |
| | Composite-21-DUP DS150_30.5-32 | TFS | 10.2 | 3.5% | |
| | Composite-22 DS150_30.07-33.96 | SLG | 0.7 | 0.2% | |
| | Composite-23 DS150_35.3-40 | SLG | 11.6 | 4.0% | |
| | Composite-24 DS155_4-4.5 | SLG | 0.9 | 0.3% | |
| | Composite-25 DS155_5-21 | SLG | 11.8 | 4.1% | |
| | Composite-26 DS155_21-25 | SLG | 7.6 | 2.6% | |
| | Composite-27 DS155_25-60 | SLG | 10.8 | 3.8% | |
| | Composite-31 DS155_78-79.7 | TFS | 0.0 | 0.0% | |
| | Composite-32 DS151_3.4-4 | SLG | 0.0 | 0.0% | |
| | Composite-33 DS151_3.4-4 | SLG | 1.4 | 0.5% | |
| | Composite-34 DS151_4-19.8 | SLG | 7.1 | 2.5% | |
| | Composite-36-DUP DS151_40-41 | TFS | 2.6 | 0.9% | |
| | Composite-37 DS157_6.41-7.0 | SLG | 1.2 | 0.4% | |
| | Composite-38 DS157_7-21 | SLG | 11.6 | 4.0% | |
| | Composite-39 DS157_21-36 | SLG | 5.8 | 2.0% | |
| | Composite-41-DUP DS157_60-61 | SLG | 2.4 | 0.8% | |
| | Composite-42 DS153_3-3.5 | SLG | 0.6 | 0.2% | |
| | Composite-43 DS153_3-20.9 | SLG | 8.2 | 2.9% | |
| | Composite-46 DS153_36_51 | SLG | 1.9 | 0.7% | |
| | Composite-47 DS154_5.4-6 | SLG | 1.1 | 0.4% | |
| | Composite-48 DS154_6-21 | SLG | 11.4 | 4.0% | |
| | Composite-49 DS154_21-41 | SLG | 1.4 | 0.5% | |
| | Composite-50 DS154_41-61 | SLG | 10.2 | 3.6% | |
| | Composite-53 DS154_72.6-75.62 | SLG | 0.0 | 0.0% | |
| | Composite-54 DS164_3.86-4.36 | SLG | 0.7 | 0.2% | |
| | Composite-55 DS164_5-21 | SLG | 7.6 | 2.6% | |
| | Composite-56 DS164_31-38 | TFS | 3.5 | 1.2% | |
| | Composite-58 DS164_41.08-43.0 | SLG | 2.0 | 0.7% | |
| | Composite-59 DS165_2.85-3.35 | SLG | 0.3 | 0.1% | |
| | Composite-60 DS165_3.35_17.0 | SLG | 12.0 | 4.2% | |
| | Composite-61 DS165_18_32.0 | SLG | 11.6 | 4.0% | |
| | Composite-62 DS165_32.0-48.0 | SLG | 9.7 | 3.4% | |
| | Composite-65 DS165_76.42-79.0 | SLG | 0.0 | 0.0% | Sent to SGS |
| | Composite-67 DS169_65-75 | TFS | 0.0 | 0.0% | Sent to SGS |
| | Composite-68 DS144_9.65_10.0 | SLG | 0.5 | 0.2% | |
| | Composite-69 DS144_10.0_24.0 | SLG | 9.5 | 3.3% | |
| | Composite-70 DS144_24.0-33.0 | SLG | 8.3 | 2.9% | |
| | Composite-72 DS144_37.0_38.0 | SLG | 0.0 | 0.0% | |
| | Composite-73 DS145_9.33_10.0 | SLG | 1.7 | 0.6% | |
| | Composite-74 DS145_10.0_24 | SLG | 11.5 | 4.0% | |
| | Composite-75 DS145_24.0-38.0 | SLG | 11.8 | 4.1% | |
| | Composite-76 DS145_38.0-52.0 | SLG | 12.0 | 4.2% | |
| | | | | | |
| | Bulk Composite Weight Ratio | | 285.95 | | |

| | |
|---|---|
| Total Weight of Bulk Composite (Kg) | 292 |
| Total Weight of Bulk Composite to go to the field (Kg | 257 |

Global
ARD Testing Services Inc.

# CERTIFICATE OF ANALYSIS ▪ ABA RESULTS


**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| S. No. | Sample ID | Paste pH | Fizz Rating | Total Carbon | Total Inorganic Carbon | $CaCO_3$ Equivalents*1 | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | AP*3 | Standard Sobek NP | NNP*4 | NPR*5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***Units:*** | **pH Units** | | **wt %** | **wt %** | **kg $CaCO_3$/tonne** | **wt %** | **wt %** | **wt %** | | **kg $CaCO_3$/tonne** | | |
| | ***Reported Detection Limit:*** | ***0.1*** | | ***0.01*** | ***0.02*** | ***1.7*** | ***0.01*** | ***0.01*** | ***0.01*** | **0.3** | | | |
| 1 | Bulk Composite - 01 | 7.9 | None | 0.08 | 0.06 | 5.0 | 0.02 | <0.01 | 0.02 | 0.6 | 11.3 | 10.7 | 17.9 |
| | **QUALITY ASSURANCE / QUALITY CONTROL** | | | | | | | | | | | | |
| | ***Pulp Replicates:*** | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | **%RPD** | | | | | | | | | | | | |
| | ***Reference Material Analysis:*** | | | | | | | | | | | | |
| | Reference Material | | | OREAS 20a | KZK-1 | | OREAS 20a | RTS-3a | | | 1) KZK-1 (Slight)<br>2) KZK-1 (Moderate) | | |
| | **Ref. Material Certified Value** | | | **0.05** | **0.92** | | **0.06** | **1.10** | | | **1) 59.0**<br>**2) 64.8** | | |
| | Reference Material Results | | | 0.06 | 0.84 | | 0.07 | 1.02 | | | 1) 61.2<br>2) N/A | | |
| | ***Acceptance Range:*** | | | ***90% - 110%*** | ***80% - 120%*** | | ***90% - 110%*** | ***90% - 110%*** | | | ***90% - 110%*** | | |
| | ***Method Blank Analysis:*** | | | | | | | | | | | | |
| | Method Blank Results | | | <0.01 | <0.02 | | <0.01 | <0.01 | | | | | |
| | ***GLOBAL SOP NO./METHOD:*** | *ARD-005* | *ARD-005* | *LECO* | *$HClO_4$ Leach $CO_2$ Coulometer* | *Calc.* | *LECO* | *ARD-010 (HCl Leach)* | *Calc.* | *Calc.* | *ARD-007* | *Calc.* | *Calc.* |

***NOTES:***
Job No: 20260219

**Date of Analysis (24 h):** February 24-25, 2026
pH of DI water used (pH units): 5.65
EC of DI water used (µS/cm): 1.29

***METHODS:***
Total Sulphur by LECO.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved $CO_2$ analysed by $CO_2$ Coulometer.

***ABBREVIATIONS:***
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

***CALCULATIONS:***
*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
*3 AP (Acid Potential): Sulphide-sulphur x 31.25
*4 NNP (Net Neutralization Potential): NP - AP
*5 NPR (Neutralization Potential Ratio): NP/AP

***REFERENCES:***
**Sample Preparation:** ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
**ABA:** Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
**Surface Rinse-pH**: MEND Report 1.20.1, Version 0 (2009).
**Modified ABA (Sobek) NP:** MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
**STD Sobek NP / Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Paste pH / Fizz Rating:** Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
**Sulphate Sulphur:** Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).
**Sulphur Speciation:** Sequential HCl and $HNO_3$ leach. The S extracted is determined by analysing the extract for $SO_4$ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Global
ARD Testing Services Inc.

## CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS


**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| S. No. | Sample ID | Method / Analyte / Unit / MDL / Sample Type | Silver (Ag) ppm 0.01 | Aluminum (Al) % 0.01 | Arsenic (As) ppm 0.1 | Gold (Au) ppm 0.0005 | Boron (B) ppm 10 | Barium (Ba) ppm 10 | Beryllium (Be) ppm 0.05 | Bismuth (Bi) ppm 0.01 | Calcium (Ca) % 0.01 | Cadmium (Cd) ppm 0.01 | Cerium (Ce) ppm 0.02 | Cobalt (Co) ppm 0.1 | Chromium (Cr) ppm 1 | Cesium (Cs) ppm 0.05 | Copper (Cu) ppm 0.2 | Iron (Fe) % 0.01 | Gallium (Ga) ppm 0.05 | Germanium (Ge) ppm 0.05 | Hafnium (Hf) ppm 0.02 | Mercury (Hg) ppm 0.005 | Indium (In) ppm 0.005 | Potassium (K) % 0.01 | Lanthanum (La) ppm 0.2 | Lithium (Li) ppm 0.1 | Magnesium (Mg) % 0.01 | Manganese (Mn) ppm 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bulk Composite - 01 | Pulp | 0.06 | 0.46 | 3.5 | 0.0043 | 23 | 45 | 1.50 | 0.31 | 0.89 | 0.11 | 136.35 | 0.3 | 58 | 1.34 | 3.9 | 0.95 | 2.90 | 0.09 | 3.48 | 0.01 | 0.089 | 0.33 | 61.2 | 11.7 | <0.01 | 169 |
| ***QUALITY ASSURANCE / QUALITY CONTROL*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | **%RPD** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 607 | | | 6.19 | 0.900 | 204.6 | 0.674 | <10 | 330 | 0.57 | 11.99 | 0.22 | 1.74 | 30.1 | 4.10 | 24.0 | 1.47 | 572.9 | 1.49 | 4.77 | 0.05 | 0.49 | 0.093 | 0.222 | 0.280 | 14.1 | 15.00 | 0.230 | 81 |
| **True Value STD OREAS 607** | | | **5.94** | **0.90** | **201.5** | | | **440.06** | **0.60** | **11.73** | **0.22** | **1.69** | **29.4** | **4.03** | **22.7** | **1.46** | **563.9** | **1.48** | **4.62** | **0.08** | **0.47** | **0.090** | **0.223** | **0.279** | **14.0** | **15.18** | **0.225** | **81** |
| % Difference | | | 4% | 0% | 2% | | | -25% | -4% | 2% | -1% | 3% | 2% | 2% | 6% | 1% | 2% | 1% | 3% | -38% | 5% | 4% | -1% | 0% | 1% | -1% | 2% | 1% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.01 | <0.01 | <0.1 | <0.0005 | <10 | <10 | <0.05 | <0.01 | <0.01 | <0.01 | <0.02 | <0.1 | <1 | <0.05 | <0.2 | <0.01 | <0.05 | <0.05 | <0.02 | <0.005 | <0.005 | <0.01 | <0.2 | <0.1 | <0.01 | <5 |

***Notes:***
Job No: YVR2610276

***Analytical Methods (IMS-130):***
A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

***Abbreviations:***
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

***On Cerfified Reference Material and Tolerance:***
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

Global
ARD Testing Services Inc.

## CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS


**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| S. No. | Sample ID | Method | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analyte | Molybdenum (Mo) | Sodium (Na) | Niobium (Nb) | Nickel (Ni) | Phosphorous (P) | Lead (Pb) | Rubidium (Rb) | Rhenium (Re) | Sulphur (S) | Antimony (Sb) | Scandium (Sc) | Selenium (Se) | Tin (Sn) | Strontium (Sr) | Tantalum (Ta) | Tellurium (Te) | Thorium (Th) | Titanium (Ti) | Thallium (Tl) | Uranium (U) | Vanadium (V) | Tungsten (W) | Yttrium (Y) | Zinc (Zn) | Zirconium (Zr) |
| | | Unit | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| | | MDL | 0.05 | 0.01 | 0.05 | 0.2 | 10 | 0.2 | 0.1 | 0.001 | 0.01 | 0.05 | 0.1 | 0.2 | 0.2 | 0.2 | 0.01 | 0.01 | 0.2 | 0.005 | 0.02 | 0.05 | 1 | 0.05 | 0.05 | 1 | 0.5 |
| | | Sample Typ | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Bulk Composite - 01 | Pulp | 1.62 | 0.12 | 42.04 | 1.1 | <10 | 20.6 | 21.2 | 0.001 | <0.01 | 0.93 | 0.4 | <0.2 | 7.7 | 3.9 | 0.02 | 0.03 | 22.1 | 0.023 | 0.12 | 4.48 | <1 | 2.38 | 76.59 | 109 | 122.5 |
| ***QUALITY ASSURANCE / QUALITY CONT*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pulp Replicates*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | %RPD | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Reference Material*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STD OREAS 607 | | | 3.68 | 0.07 | 0.12 | 13.9 | 481 | 172.9 | 16.8 | 0.001 | 0.51 | 23.47 | 1.00 | 3.3 | 0.80 | 22.4 | 0.02 | 2.51 | 5.9 | 0.013 | 0.49 | 1.97 | 9.00 | 0.69 | 5.90 | 259 | 12.6 |
| **True Value STD OREAS 607** | | | **3.67** | **0.07** | **NR** | **13.3** | **482** | **170.4** | **16.7** | **NR** | **0.51** | **23.85** | **1.01** | **3.4** | **0.791** | **22.5** | **NR** | **2.51** | **5.8** | **NR** | **0.49** | **2.02** | **8.51** | **0.69** | **5.79** | **254.1** | **12.3** |
| % Difference | | | 0% | 3% | | 4% | 0% | 1% | 0% | | 1% | -2% | -1% | -2% | 1% | 0% | | 0% | 2% | | 0% | -3% | 6% | 0% | 2% | 2% | 3% |
| ***Method Blank:*** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Method Blank | | | <0.05 | <0.01 | <0.05 | <0.2 | <10 | <0.2 | <0.1 | <0.001 | <0.01 | <0.05 | <0.1 | <0.2 | <0.2 | <0.2 | <0.01 | <0.01 | <0.2 | <0.005 | <0.02 | <0.05 | <1 | <0.05 | <0.05 | <1 | <0.5 |

## CERTIFICATE OF ANALYSIS ▪ SINGLE ADDITION NAG RESULTS (EGi Method)

Global ARD Testing Services Inc.



**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| S. No: | Sample ID | Pulp Sample Weight (g) | Vol. of 15% $H_2O_2$ (mL) | NAG pH (pH Units) | NaOH to pH 4.5 (mL) | NaOH to pH 7.0 (mL) | NaOH Conc. (N) | NAG Acidity pH 4.5 (kg $H_2SO_4$/tonne) | NAG Acidity pH 7.0 (kg $H_2SO_4$/tonne) | % RPD to pH 4.5 | % RPD to pH 7.0 | % RPD Acceptance Criteria |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| 1 | Bulk Composite - 01 | 2.5 | 250 | 9.36 | 0.00 | 0.00 | 0.1 | 0.0 | 0.0 | | | |
| **QUALITY ASSURANCE / QUALITY CONTROL** | | | | | | | | | | | | |
| ***Replicates:*** | | | | | | | | | | | | |
| | | | | | | | | | | | | 10% |
| | | | | | | | | | | | | |
| ***Method Blank Analysis:*** | | | | | | | | | | | | |
| Method Blank (15% $H_2O_2$ Solution) | | N/A | 250 | 5.07 | 0.00 | 10.66 | 0.1 | | | | | |
| ***GLOBAL SOP NO:*** | | ***ARD-017*** | | | | | | | | | | |

***NOTES:***
**Date of Analysis:** February 24-25, 2026

pH (pH Units) of 15% $H_2O_2$ (buffered with 0.5 N NaOH): 5.50
EC (µS/cm) of 15% $H_2O_2$ (buffered with 0.5 N NaOH): 23.20
pH (pH Units) of DI water used: 5.65
EC (µS/cm) of DI water used: 1.29

Solid:Liquid ratio used: 1:100; 2.5 g Pulp Sample: 250 mL 15% $H_2O_2$.
pH measurement of 15% $H_2O_2$ solution was conducted at room temperature & buffered with 0.5N NaOH solution to ensure a pH between 4 and 7.
NAG pH & method blank pH measurements were taken after digesting with peroxide solution and making up the solution to its original volume of 250 mL with DI water.
On client's request the NAG procedure is repeated using 1 g of pulp sample when the NAG value for pH 4.5 exceeds 25 kg $H_2SO_4$ per tonne.

***ABBREVIATIONS:***
R = Replicate (i.e. using a pulp sample from the same bag).
D = Duplicate (i.e. client sample is processed to produced a 2nd pulp bag & analyzed as a duplicate).
RPD = Relative Percent Difference.
EC = Electrical Conductivity
ORP = Oxidation Reduction Potential
RDL = Reportable Detection Limit.
EDL = Estimated Detection Limit
SIE = Selective Ion Electrode
IC = Ion Chromatography
Calc. = Calculation

***REFERENCE:***
Egi - Environmental Geochemistry International; Single Addition Net Acid Generation (NAG) Test Procedure; Miller et al; Revised Dec. 2006; Page 2 to 4.

## CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| Parameter | Method | Unit | RDL | 1<br>Bulk Composite - 01 | Method Blank |
|---|---|---|---|---|---|
| | | | | | |
| Weight of dry sample used | Weighing Scale | g | 0.01 | 250 | N/A |
| Volume of DI water used | Graduated Cylinder | mL | 0.50 | 750 | 750 |
| ***On filtered samples (using 0.45 µm filter paper):*** | | | | | |
| pH | Meter | pH units | 0.01 | 7.4 | 6.2 |
| EC | Meter | µS/cm | 1 | 110 | 1.81 |
| Acidity (to pH 8.3) | Titration | mg $CaCO_3$/L | 0.5 | 3.6 | 2.2 |
| Alkalinity (to pH 4.5) | Titration | mg $CaCO_3$/L | 0.5 | 22.4 | 2.6 |
| Sulphate | Turbidimetric | mg/L | 0.5 | 0.6 | |
| Chloride | IC | mg/L | 0.1 | 10.8 | |
| Fluoride | IC | mg/L | 0.1 | 2.85 | |
| Nitrate | IC | mg/L | 0.01 | 0.013 | |
| Nitrite | IC | mg/L | 0.01 | <0.010 | |
| Phosphorus, Total Dissolved | | mg/L | 0.005 | 0.0063 | |
| ***Dissolved Metals Analysis by ICP-MS:*** | | | | | |
| Dissolved Hardness (CaCO3) | ICP-MS | mg/L | 0.125 | 24.7 | <0.125 |
| Aluminum Dissolved | ICP-MS | mg/L | 0.001 | 0.126 | <0.0010 |
| Antimony Dissolved | ICP-MS | mg/L | 0.00005 | 0.000351 | <0.000050 |
| Arsenic Dissolved | ICP-MS | mg/L | 0.00005 | 0.00411 | <0.000050 |
| Barium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0526 | <0.00010 |
| Beryllium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000034 | <0.000010 |
| Bismuth Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 |
| Boron Dissolved | ICP-MS | mg/L | 0.002 | 0.0102 | <0.0020 |
| Cadmium Dissolved | ICP-MS | mg/L | 0.000002 | 0.0000263 | <0.0000020 |
| Calcium Dissolved | ICP-MS | mg/L | 0.05 | 9.3 | <0.050 |
| Chromium Dissolved | ICP-MS | mg/L | 0.001 | <0.00050 | <0.00050 |
| Cobalt Dissolved | ICP-MS | mg/L | 0.000005 | 0.0000204 | <0.0000050 |
| Copper Dissolved | ICP-MS | mg/L | 0.0001 | 0.00122 | <0.00010 |
| Iron Dissolved | ICP-MS | mg/L | 0.002 | 0.0123 | <0.0020 |
| Lead Dissolved | ICP-MS | mg/L | 0.00005 | 0.000233 | <0.000050 |
| Lithium Dissolved | ICP-MS | mg/L | 0.000 | 0.0256 | <0.000050 |
| Magnesium Dissolved | ICP-MS | mg/L | 0.005 | 0.38 | <0.0050 |
| Manganese Dissolved | ICP-MS | mg/L | 0.00005 | 0.0563 | <0.000050 |
| Mercury Dissolved | ICP-MS | mg/L | 0.00002 | <0.000020 | <0.000020 |
| Molybdenum Dissolved | ICP-MS | mg/L | 0.00001 | 0.0017 | <0.000010 |
| Nickel Dissolved | ICP-MS | mg/L | 0.00004 | 0.00006 | <0.000040 |
| Phosphorus Dissolved | ICP-MS | mg/L | 0.01 | <0.010 | <0.010 |
| Potassium Dissolved | ICP-MS | mg/L | 0.02 | 5.0 | <0.020 |
| Selenium Dissolved | ICP-MS | mg/L | 0.0001 | <0.00010 | <0.00010 |
| Silicon Dissolved | ICP-MS | mg/L | 0.1 | 1.96 | <0.10 |
| Silver Dissolved | ICP-MS | mg/L | 0.00001 | <0.000010 | <0.000010 |
| Sodium Dissolved | ICP-MS | mg/L | 0.02 | 6.19 | <0.020 |
| Strontium Dissolved | ICP-MS | mg/L | 0.0001 | 0.0253 | <0.00010 |
| Sulphur Dissolved | ICP-MS | mg/L | 1.00000 | <1.00 | <1.00 |
| Tellurium Dissolved | ICP-MS | mg/L | 0.00005 | <0.000050 | <0.000050 |
| Thallium Dissolved | ICP-MS | mg/L | 0.000004 | 0.0000684 | <0.0000040 |
| Thorium Dissolved | ICP-MS | mg/L | 0.00001 | 0.000129 | <0.000010 |
| Tin Dissolved | ICP-MS | mg/L | 0.0001 | <0.000100 | <0.000100 |
| Titanium Dissolved | ICP-MS | mg/L | 0.0002 | 0.00046 | <0.00020 |
| Tungsten Dissolved | ICP-MS | mg/L | 0.0002 | 0.00244 | <0.00020 |
| Uranium Dissolved | ICP-MS | mg/L | 0.000001 | 0.00158 | <0.0000010 |
| Vanadium Dissolved | ICP-MS | mg/L | 0.001 | <0.00100 | <0.00100 |
| Zinc Dissolved | ICP-MS | mg/L | 0.001 | 0.0010 | <0.0010 |
| Zirconium Dissolved | ICP-MS | mg/L | 0.00002 | 0.00056 | <0.000020 |
| ***Ion Balance:*** | | | | | |
| Major Anions | Calc. | meq/L | | 0.92 | |
| Major Cations | Calc. | meq/L | | 0.91 | |
| Difference | Calc. | meq/L | | 0.00 | |
| Balance (%) | Calc. | % | | -0.3% | |
| | | | *Shake Flask Extract ID:* | *26B2496-01* | *26B2572-13* |

***NOTES:***
Job No: 26B2496
**Date of Analysis (24 h):** February 19-20, 2026
pH of DI water used (pH Units): 5.36
EC of DI water used (µS/cm): 1.56

***ABBREVIATIONS:***
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

***REFERENCE:***
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
**Extraction Method used:** Using gyratory shaker for 24 h (± 2 h; gentle agitation).
**Liquid: Solid ratio used:** 3: 1; L: S; 750 mL DI $H_2O$: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| | | | | | |
| STD Mineral Water (34.78 mg/L) | 33.50 | 96.3% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 16.46 | | 83.9% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 26B2496_B6B3907-BLK1 | Chloride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '24 Feb 2026 | 0.1 | mg/L | | |
| 26B2496_B6B3907-BLK1 | Fluoride | <0.10 | mg/L | T | REG | SM 4110 B (2020) | '24 Feb 2026 | 0.1 | mg/L | | |
| 26B2496_B6B3907-BLK1 | Nitrate (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '24 Feb 2026 | 0.01 | mg/L | | |
| 26B2496_B6B3907-BLK1 | Nitrite (as N) | <0.010 | mg/L | T | REG | SM 4110 B (2020) | '24 Feb 2026 | 0.01 | mg/L | | |
| 26B2496_B6B3907-BS1 | Chloride | 105 | % | T | SC | SM 4110 B (2020) | '25 Feb 2026 | 1 | % | 115 | 85 |
| 26B2496_B6B3907-BS1 | Fluoride | 95 | % | T | SC | SM 4110 B (2020) | '25 Feb 2026 | 1 | % | 115 | 85 |
| 26B2496_B6B3907-BS1 | Nitrate (as N) | 105 | % | T | SC | SM 4110 B (2020) | '25 Feb 2026 | 1 | % | 115 | 85 |
| 26B2496_B6B3907-BS1 | Nitrite (as N) | 102 | % | T | SC | SM 4110 B (2020) | '25 Feb 2026 | 1 | % | 115 | 85 |
| | | | | | | | | | | | |
| 26B2496_B6B4025-BLK1 | Aluminum dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Antimony dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Arsenic dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Barium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Beryllium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Bismuth dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Boron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.002 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Cadmium dissolved | <0.0000020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.000002 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Calcium dissolved | <0.050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.05 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Chromium dissolved | <0.00050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Cobalt dissolved | <0.0000050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.000005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Copper dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Iron dissolved | <0.0020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.002 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Lead dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Lithium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Magnesium dissolved | <0.0050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Manganese dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Mercury dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00002 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Molybdenum dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Nickel dissolved | <0.000040 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00004 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Phosphorus dissolved | <0.010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.01 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Potassium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.02 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Selenium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Silicon dissolved | <0.10 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.1 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Silver dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Sodium dissolved | <0.020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.02 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Strontium dissolved | <0.00010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Sulfur dissolved | <1.00 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 1 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Tellurium dissolved | <0.000050 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00005 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Thallium dissolved | <0.0000040 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.000004 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Thorium dissolved | <0.000010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Tin dissolved | <0.000100 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Titanium dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0002 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Tungsten dissolved | <0.00020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.0002 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Uranium dissolved | <0.0000010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.000001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Vanadium dissolved | <0.00100 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Zinc dissolved | <0.0010 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.001 | mg/L | | |
| 26B2496_B6B4025-BLK1 | Zirconium dissolved | <0.000020 | mg/L | F | REG | EPA 6020B | '25 Feb 2026 | 0.00002 | mg/L | | |
| | | | | | | | | | | | |
| 26B2496_B6B4025-BS1 | Aluminum dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Antimony dissolved | 97 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Arsenic dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Barium dissolved | 103 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Beryllium dissolved | 102 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Bismuth dissolved | 104 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Boron dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Cadmium dissolved | 102 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Calcium dissolved | 100 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Chromium dissolved | 102 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Cobalt dissolved | 103 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Copper dissolved | 103 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Iron dissolved | 103 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Lead dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Lithium dissolved | 98 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Magnesium dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Manganese dissolved | 102 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Mercury dissolved | 100 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Molybdenum dissolved | 97 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Nickel dissolved | 102 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Phosphorus dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Potassium dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Selenium dissolved | 100 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Silicon dissolved | 96 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Silver dissolved | 100 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Sodium dissolved | 102 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Strontium dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Sulfur dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |

## CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.


**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

***Sulphate:***

| Certified Reference Material: | Parameter: Sulphate | % Recovery | Matrix Spike % | Units | QC Limits |
|---|---|---|---|---|---|
| STD Mineral Water (34.78 mg/L) | 33.50 | 96.3% | | % | 80 - 120 |
| Spiked Blank (19.61 mg/L) | 16.46 | | 83.9% | % | 80 - 120 |

***Dissolved Metals by ICP-MS:***

| Sample Code | Parameter | Result | Result Units | Total or Filtered | Method Type | Method Name | Date Analyzed | EQL | EQL Units | UCL | LCL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26B2496_B6B4025-BS1 | Tellurium dissolved | 95 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Thallium dissolved | 105 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Thorium dissolved | 102 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Tin dissolved | 98 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Titanium dissolved | 97 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Tungsten dissolved | 98 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Uranium dissolved | 101 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Vanadium dissolved | 103 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Zinc dissolved | 103 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4025-BS1 | Zirconium dissolved | 97 | % | F | SC | EPA 6020B | '25 Feb 2026 | 1 | % | 120 | 80 |
| 26B2496_B6B4109-BLK1 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '26 Feb 2026 | 0.005 | mg/L | | |
| 26B2496_B6B4109-BLK2 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '26 Feb 2026 | 0.005 | mg/L | | |
| 26B2496_B6B4109-BLK3 | Phosphorus Total Dissolved | <0.0050 | mg/L | F | REG | SM 4500-P F (2021) | '26 Feb 2026 | 0.005 | mg/L | | |
| 26B2496_B6B4109-BS1 | Phosphorus Total Dissolved | 112 | % | F | SC | SM 4500-P F (2021) | '26 Feb 2026 | 1 | % | 115 | 85 |
| 26B2496_B6B4109-BS2 | Phosphorus Total Dissolved | 112 | % | F | SC | SM 4500-P F (2021) | '26 Feb 2026 | 1 | % | 115 | 85 |
| 26B2496_B6B4109-BS3 | Phosphorus Total Dissolved | 112 | % | F | SC | SM 4500-P F (2021) | '26 Feb 2026 | 1 | % | 115 | 85 |

**NOTES:**
Job No: 26B2496

***Abbreviations & Descriptions:***
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate

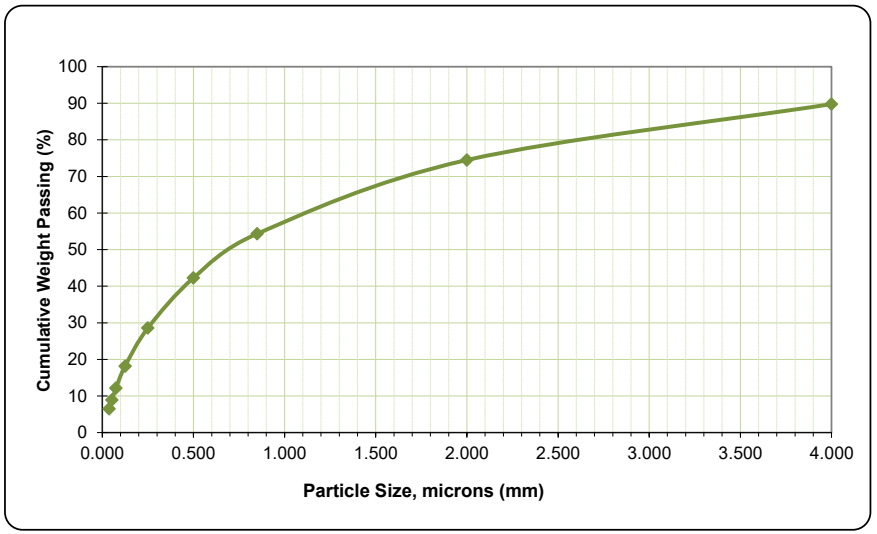
# CERTIFICATE OF ANALYSIS ▪ PARTICLE SIZE ANALYSIS RESULTS

Global ARD Testing Services Inc.



**GLOBAL PROJECT NO:** 2577 (B4) Bulk Composite
**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**PROJECT NO:** 2025 Geochemical Sampling
**REPORT VERSION:** 2

| Bulk Composite-01 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tyler Mesh | U.S Mesh | Opening (mm) | Screen (inches) | Mass (g) | % Retained | | % Passing |
| | | | | | Interval | Cumulative | |
| 5 | 5 | 4.000 | 0.157 | 15.20 | 10.2 | 10.2 | 89.8 |
| 9 | 10 | 2.000 | 0.079 | 22.70 | 15.3 | 25.5 | 74.5 |
| 20 | 20 | 0.850 | 0.0331 | 29.95 | 20.2 | 45.7 | 54.3 |
| 40 | 40 | 0.500 | 0.0197 | 17.95 | 12.1 | 57.7 | 42.3 |
| 60 | 60 | 0.250 | 0.0098 | 20.35 | 13.7 | 71.4 | 28.6 |
| 115 | 120 | 0.125 | 0.0049 | 15.50 | 10.4 | 81.9 | 18.1 |
| 200 | 200 | 0.075 | 0.0029 | 8.90 | 6.0 | 87.9 | 12.1 |
| 270 | 270 | 0.053 | 0.0021 | 4.80 | 3.2 | 91.1 | 8.9 |
| 400 | 400 | 0.038 | 0.0015 | 3.65 | 2.5 | 93.5 | 6.5 |
| <400 | <400 (Pan) | <0.037 | <0.0015 | 9.60 | 6.5 | 100.0 | 0.0 |
| **Wt. of sample used: g** | | | | **148.6** | 100.0 | | |



# CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

| CLIENT INFORMATION | |
|---|---|
| **Client:** | Canada Fluorspar (NL) Inc. |
| | |
| **Project Manager:** | Melissa Lambert |
| | |
| **Mailing Address** | 1 Clarke's Pond Road |
| | St. Lawrence, NL, CA A0E 2V0 |
| | |
| **Contact No:** | (709) 702 - 5960 |

| COMPANY INFORMATION | |
|---|---|
| **Legal Name:** | Global ARD Testing Services Inc. |
| | |
| **Mailing Address:** | 6891 Antrim Avenue |
| | Burnaby, BC |
| | V5J 4M5 |
| | |
| **Contact No:** | Main: (604) 428-2730 |
| | Alternate: (604) 603-1359 |

| PROJECT INFORMATION | |
|---|---|
| **Project Name:** | South Ridge |
| **Project No:** | 2025 Geochemical Sampling |

| REPORTING | |
|---|---|
| **Global Project No:** | 2577 (B1) |
| **Pages (Including Cover)** | 8 |
| **Report Title:** | 2577 (B1) x2 South Ridge HCTs COA Report |
| | |
| **Analysis Reviewed By:** | Said Zeinab (szeinab@GlobalARDTesting.com) |
| **Position:** | Acid Rock Drainage (ARD) Lab & Project Manager |
| **Report Certified By:** | Said Zeinab |
| | |
| **Signature:** | |

| RESULTS | | |
|---|---|---|
| **Reported To:** | **1** | Melissa Lambert (mlambert@canadafluorspar.com) |
| | **2** | Nikolay Sidenko (nikolay@falkirk.ca) |
| | **3** | Inaara Hassan (ihassan@canadafluorspar.com) |
| | **4** | Brad Smith (bsmith@canadafluorspar.com) |
| | **5** | Megan Lake (mlake@canadafluorspar.com) |
| **cc:** | | |
| **Date(s) Reported:** | | rd Update; 06-Mar26; 4th Update; 07-Apr26; 5th Update; 14-Apr26; |

| INVOICE | | |
|---|---|---|
| **Submitted To:** | **1** | Accounts Payable (ap@canadafluorspar.com) |
| | **2** | Melissa Lambert (mlambert@canadafluorspar.com) |
| **cc:** | | |
| **Mailing Address:** | | |
| | | |
| **TEL:** | | |
| **Global Invoice No:** | | ARD2577-0426H-05 |
| **Date Submitted:** | | April 14, 2026 |

HCT, Column, Custom Leach Columns (Lysimeters) & SAD column samples will be stored free of charge for 90 days past kinetic testing program or Closedown.

Please contact the lab if you require additional sample storage time. Storage charges will apply.

# CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.


**CLIENT:** Canada Fluorspar (NL) In
**PROJECT NAME:** South Ridge
**GLOBAL PROJECT NO:** 2577 (B1)

| Sample No. | Sample ID | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | HCT ID |
|---|---|---|---|---|---|
| ***Batch 1:*** | | | | | |
| 5 | Composite-5 (DS147_33.4-35.4) | CORE | Dry | 1.70 | HC-1 |
| 37 | Composite-37 (DS157_6.41-7.0) | CORE | Dry | 2.65 | HC-2 |
| ***Batch 4:*** | | | | | |
| 1 | Bulk Composite - 01 | CORE | Dry | 285.95 | HC-3 |
| | | | | | |

| S. No. | Global ARD Composite No. | Rock Type | Composite Weight Used for Bulk Composite (Kg) | % of Bulk Composite | Global ARD Notes |
|---|---|---|---|---|---|
| **Bulk Composite - Sample Composition** | | | | | |
| | Composite-1 DS147_7.23-7.5 | SLG | 0.0 | 0.0% | |
| | Composite-2 DS147_7.5-18 | SLG | 10.0 | 3.5% | |
| | Composite-3 DS147_18-32 | SLG | 11.6 | 4.0% | |
| | Composite-4 DS147_31-33.4 | SLG | 0.0 | 0.0% | |
| | Composite-8 DS147_42-43 | SLG | 0.3 | 0.1% | |
| | Composite-8-DUP DS147_46-47 | TFS | 2.5 | 0.9% | |
| | Composite-9 DS148_7-7.5 | SLG | 0.6 | 0.2% | |
| | Composite-10 DS148_7.5-20 | SLG | 11.7 | 4.1% | |
| | Composite-11 DS148_21-35 | SLG | 10.9 | 3.8% | |
| | Composite-12 DS148_35-64 | SLG | 9.9 | 3.5% | |
| | Composite-13 DS148_66.6-67.54 | SLG | 0.0 | 0.0% | |
| | Composite-16 DS148_72.11-73.06 | TFS | 0.0 | 0.0% | |
| | Composite-16-DUP DS148_82-83 | TFS | 2.2 | 0.8% | |
| | Composite-17 DS150_4.4-5 | SLG | 1.2 | 0.4% | |
| | Composite-18 DS150_5-13 | SLG | 2.9 | 1.0% | |
| | Composite-21-DUP DS150_30.5-32 | TFS | 10.2 | 3.5% | |
| | Composite-22 DS150_30.07-33.96 | SLG | 0.7 | 0.2% | |
| | Composite-23 DS150_35.3-40 | SLG | 11.6 | 4.0% | |
| | Composite-24 DS155_4-4.5 | SLG | 0.9 | 0.3% | |
| | Composite-25 DS155_5-21 | SLG | 11.8 | 4.1% | |
| | Composite-26 DS155_21-25 | SLG | 7.6 | 2.6% | |
| | Composite-27 DS155_25-60 | SLG | 10.8 | 3.8% | |
| | Composite-31 DS155_78-79.7 | TFS | 0.0 | 0.0% | |
| | Composite-32 DS151_3.4-4 | SLG | 0.0 | 0.0% | |
| | Composite-33 DS151_3.4-4 | SLG | 1.4 | 0.5% | |
| | Composite-34 DS151_4-19.8 | SLG | 7.1 | 2.5% | |
| | Composite-36-DUP DS151_40-41 | TFS | 2.6 | 0.9% | |
| | Composite-37 DS157_6.41-7.0 | SLG | 1.2 | 0.4% | |
| | Composite-38 DS157_7-21 | SLG | 11.6 | 4.0% | |
| | Composite-39 DS157_21-36 | SLG | 5.8 | 2.0% | |
| | Composite-41-DUP DS157_60-61 | SLG | 2.4 | 0.8% | |
| | Composite-42 DS153_3-3.5 | SLG | 0.6 | 0.2% | |
| | Composite-43 DS153_3-20.9 | SLG | 8.2 | 2.9% | |
| | Composite-46 DS153_36_51 | SLG | 1.9 | 0.7% | |
| | Composite-47 DS154_5.4-6 | SLG | 1.1 | 0.4% | |
| | Composite-48 DS154_6-21 | SLG | 11.4 | 4.0% | |
| | Composite-49 DS154_21-41 | SLG | 1.4 | 0.5% | |
| | Composite-50 DS154_41-61 | SLG | 10.2 | 3.6% | |
| | Composite-53 DS154_72.6-75.62 | SLG | 0.0 | 0.0% | |
| | Composite-54 DS164_3.86-4.36 | SLG | 0.7 | 0.2% | |
| | Composite-55 DS164_5-21 | SLG | 7.6 | 2.6% | |

# CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.



**CLIENT:** Canada Fluorspar (NL) In

**PROJECT NAME:** South Ridge

**GLOBAL PROJECT NO:** 2577 (B1)

| Sample No. | Sample ID | Sample Type | Condition | Wt. of Sample Rec'd (Kg) | HCT ID |
|---|---|---|---|---|---|
| ***Batch 1:*** | | | | | |
| 5 | Composite-5 (DS147_33.4-35.4) | CORE | Dry | 1.70 | HC-1 |
| 37 | Composite-37 (DS157_6.41-7.0) | CORE | Dry | 2.65 | HC-2 |
| ***Batch 4:*** | | | | | |
| 1 | Bulk Composite - 01 | CORE | Dry | 285.95 | HC-3 |
| | | | | | |

| S. No. | Global ARD Composite No. | Rock Type | Composite Weight Used for Bulk Composite (Kg) | % of Bulk Composite | Global ARD Notes |
|---|---|---|---|---|---|
| **Bulk Composite - Sample Composition** | | | | | |
| | Composite-56 DS164_31-38 | TFS | 3.5 | 1.2% | |
| | Composite-58 DS164_41.08-43.0 | SLG | 2.0 | 0.7% | |
| | Composite-59 DS165_2.85-3.35 | SLG | 0.3 | 0.1% | |
| | Composite-60 DS165_3.35_17.0 | SLG | 12.0 | 4.2% | |
| | Composite-61 DS165_18_32.0 | SLG | 11.6 | 4.0% | |
| | Composite-62 DS165_32.0-48.0 | SLG | 9.7 | 3.4% | |
| | Composite-65 DS165_76.42-79.0 | SLG | 0.0 | 0.0% | Mineralogy |
| | Composite-67 DS169_65-75 | TFS | 0.0 | 0.0% | Mineralogy |
| | Composite-68 DS144_9.65_10.0 | SLG | 0.5 | 0.2% | |
| | Composite-69 DS144_10.0_24.0 | SLG | 9.5 | 3.3% | |
| | Composite-70 DS144_24.0-33.0 | SLG | 8.3 | 2.9% | |
| | Composite-72 DS144_37.0_38.0 | SLG | 0.0 | 0.0% | |
| | Composite-73 DS145_9.33_10.0 | SLG | 1.7 | 0.6% | |
| | Composite-74 DS145_10.0_24 | SLG | 11.5 | 4.0% | |
| | Composite-75 DS145_24.0-38.0 | SLG | 11.8 | 4.1% | |
| | Composite-76 DS145_38.0-52.0 | SLG | 12.0 | 4.2% | |
| | | | | | |
| | Bulk Composite Weight Ratio | | **285.95** | | |

| | |
|---|---|
| Total Weight of Bulk Composite (Kg) | **292** |
| Total Weight of Bulk Composite to go to the field (Kg) | **257** |

# CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-1

Global ARD Testing Services Inc.



CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
GLOBAL PROJECT NO: 2577 (B1)
Sample ID: Composite-5 (DS147_33.4-35.4)
Sample Wt. used (g): 950.0

| | | | | General Parameters | | | Anions | | | Nutrients | | | | | Dissolved Metals by ICP-MS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Instrument/Method: | | | | pH Meter | EC Meter | Titration/Calc. | Turbidimetry | IC | | IC | | Colourimetry | Calc. | | | | | | | | | | | | | | | |
| Sampling Date | Week No. | Input Vol. (DI Water) | Output Vol. (Leachate) | pH | EC | Alkalinity (to pH 4.5) | Sulphate | Chloride | Fluoride | Nitrate ($NO_3$ as N) | Nitrite ($NO_2$ as N) | Total Dissolved Phosphorus | Hardness (as CaCO3) | Aluminum (Al) | Antimony (Sb) | Arsenic (As) | Barium (Ba) | Beryllium (Be) | Bismuth (Bi) | Boron (B) | Cadmium (Cd) | Calcium (Ca) | Chromium (Cr) | Cobalt (Co) | Copper (Cu) | Iron (Fe) | Lead (Pb) | Lithium (Li) |
| | Unit: | mL | mL | pH Units | µS/cm | mg CaCO3/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| | RDL: | 5 | 5 | 0.01 | 1 | 0.5 | 0.5 | 0.1 | 0.1 | 0.01 | 0.01 | 0.005 | 0.125 | 0.001 | 0.00005 | 0.00005 | 0.0001 | 0.00001 | 0.00001 | 0.002 | 0.000002 | 0.05 | 0.0005 | 0.000005 | 0.0001 | 0.002 | 0.00005 | 0.00005 |
| 5-Dec-25 | 0 | 715 | 651 | 6.21 | 155 | 4.88 | 0.74 | 35.7 | 1.32 | 0.058 | <0.010 | <0.0050 | 32.2 | 0.0153 | 0.000256 | 0.000186 | 0.179 | 0.00108 | <0.000010 | 0.0052 | 0.000822 | 11.0 | <0.00050 | 0.00222 | 0.0164 | 0.0060 | 0.0980 | 0.0218 |
| 12-Dec-25 | 1 | 475 | 415 | 6.28 | 138 | 5.19 | 1.20 | 29.7 | 3.00 | 0.118 | <0.010 | <0.0050 | 27.4 | 0.0457 | 0.000647 | 0.000423 | 0.125 | 0.00122 | 0.000018 | 0.0089 | 0.000511 | 9.25 | <0.00050 | 0.00199 | 0.0210 | 0.0171 | 0.0766 | 0.0203 |
| 19-Dec-25 | 2 | 475 | 451 | 6.33 | 58.2 | 5.05 | 0.95 | 6.05 | 3.07 | 0.093 | <0.010 | <0.0050 | 14.6 | 0.113 | 0.000436 | 0.000397 | 0.0803 | 0.000853 | 0.000026 | 0.0045 | 0.000199 | 5.19 | <0.00050 | 0.000928 | 0.0102 | 0.0381 | 0.0463 | 0.00700 |
| 26-Dec-25 | 3 | 475 | 445 | 6.30 | 43.4 | 4.00 | 0.62 | 1.52 | 2.69 | 0.047 | <0.010 | <0.0050 | 13.3 | 0.0591 | 0.000423 | 0.000380 | 0.0827 | 0.000673 | 0.000011 | 0.0028 | 0.000150 | 4.86 | <0.00050 | 0.000638 | 0.00573 | 0.0203 | 0.0375 | 0.00377 |
| 2-Jan-26 | 4 | 475 | 425 | 6.40 | 39.4 | 2.38 | 0.61 | 0.85 | 3.37 | 0.025 | <0.010 | <0.0050 | 13.6 | 0.131 | 0.000401 | 0.000405 | 0.0929 | 0.000711 | 0.000020 | <0.0020 | 0.000137 | 5.02 | <0.00050 | 0.000572 | 0.00442 | 0.0443 | 0.0406 | 0.00332 |
| 9-Jan-26 | 5 | 475 | 425 | 6.46 | 36.5 | 4.20 | <0.5 | 0.74 | 3.14 | 0.024 | <0.010 | <0.0050 | 12.6 | 0.0339 | 0.000434 | 0.000344 | 0.0967 | 0.000688 | <0.000010 | 0.0022 | 0.000151 | 4.58 | <0.00050 | 0.000529 | 0.00327 | 0.0107 | 0.0304 | 0.00296 |
| 16-Jan-26 | 6 | 475 | 417 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jan-26 | 7 | 475 | 429 | 6.40 | 44.7 | 4.01 | <0.5 | 0.35 | 1.22 | 0.021 | <0.010 | <0.0050 | 11.6 | 0.0288 | 0.000306 | 0.000240 | 0.105 | 0.000699 | <0.000010 | <0.0020 | 0.000131 | 4.31 | <0.00050 | 0.000453 | 0.00195 | 0.0095 | 0.0293 | 0.00164 |
| 30-Jan-26 | 8 | 475 | 429 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Feb-26 | 9 | 475 | 432 | 6.27 | 30.2 | 2.70 | <0.5 | 0.36 | 1.78 | 0.092 | <0.010 | <0.0050 | 10.9 | 0.0301 | 0.000278 | 0.000229 | 0.108 | 0.000769 | <0.000010 | <0.0020 | 0.000122 | 4.07 | <0.00050 | 0.000451 | 0.00163 | 0.0078 | 0.0340 | 0.00109 |
| 13-Feb-26 | 10 | 475 | 423 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Feb-26 | 11 | 475 | 424 | 6.41 | 29.0 | 2.44 | <0.5 | 0.19 | 2.72 | <0.010 | <0.010 | <0.0050 | 10.2 | 0.0279 | 0.000224 | 0.000211 | 0.109 | 0.000777 | <0.000010 | <0.0020 | 0.000125 | 3.83 | <0.00050 | 0.000432 | 0.0016 | 0.0068 | 0.0394 | 0.000916 |
| 27-Feb-26 | 12 | 475 | 425 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Mar-26 | 13 | 475 | 422 | 6.27 | 29.1 | 2.25 | <0.5 | 0.36 | 1.78 | 0.010 | <0.010 | <0.0050 | 11.3 | 0.0314 | 0.000199 | 0.000223 | 0.117 | 0.000815 | <0.000010 | <0.0020 | 0.000142 | 4.29 | 0.00186 | 0.000494 | 0.00166 | 0.0240 | 0.0414 | 0.000788 |
| 13-Mar-26 | 14 | 475 | 449 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Mar-26 | 15 | 475 | 432 | 5.94 | 24.3 | 3.20 | <0.5 | 0.13 | 2.25 | 0.016 | <0.010 | <0.0050 | 9.79 | 0.0389 | 0.00017 | 0.000131 | 0.0958 | 0.000639 | <0.000010 | <0.0020 | 0.000106 | 3.74 | <0.00050 | 0.000378 | 0.00141 | 0.0108 | 0.0439 | 0.000579 |
| 27-Mar-26 | 16 | 475 | 419 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Apr-26 | 17 | 475 | | 5.76 | 27.0 | 0.59 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Apr-26 | 18 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Apr-26 | 19 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Apr-26 | 20 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-May-26 | 21 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-May-26 | 22 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 23 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 24 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 25 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jun-26 | 26 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jun-26 | 27 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jun-26 | 28 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jun-26 | 29 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul-26 | 30 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul-26 | 31 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul-26 | 32 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul-26 | 33 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul-26 | 34 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Aug-26 | 35 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Aug-26 | 36 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Aug-26 | 37 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Aug-26 | 38 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep-26 | 39 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | |

***NOTES:***

RDL may be raised for some samples due to sample matrix interference.

***Abbreviations:***

RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry
Calc: Calculation

# CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-1

Global ARD Testing Services Inc.



**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**GLOBAL PROJECT NO:** 2577 (B1)
**Sample ID:** Composite-5 (DS147_33.4-35.4)
**Sample Wt. used (g):** 950

| Sampling Date | Week No. | Magnesium (Mg) | Manganese (Mn) | Mercury (Hg) | Molybdenum (Mo) | Nickel (Ni) | Phosphorus (P) | Potassium (K) | Selenium (Se) | Silicon (Si) | Silver (Ag) | Sodium (Na) | Strontium (Sr) | Sulphur (S) | Tellurium (Te) | Thallium (Tl) | Thorium (Th) | Tin (Sn) | Titanium (Ti) | Tungsten (W) | Uranium (U) | Vanadium (V) | Zinc (Zn) | Zirconium (Zr) | Ion Balance | | | Job No. & Leachate ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | | | Anions | Cations | % Difference | |
| | Unit: | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | | | | |
| | RDL: | 0.005 | 0.00005 | 0.00002 | 0.00001 | 0.00004 | 0.01 | 0.02 | 0.0001 | 0.1 | 0.00001 | 0.02 | 0.0001 | 1 | 0.00005 | 0.000004 | 0.00001 | 0.0001 | 0.0002 | 0.0002 | 0.000001 | 0.001 | 0.001 | 0.00002 | meq/L | meq/L | meq/L | |
| 5-Dec-25 | 0 | 1.10 | 0.310 | <0.000020 | 0.000163 | 0.000973 | <0.010 | 5.36 | <0.00010 | 0.24 | <0.000010 | 15.1 | 0.0753 | <1.00 | <0.000050 | 7.95E-05 | <0.000010 | <0.000100 | <0.00020 | 0.00317 | 0.00207 | <0.00100 | 0.135 | 0.000148 | 1.19 | 1.46 | -10.03 | 25L0949-01 |
| 12-Dec-25 | 1 | 1.05 | 0.243 | <0.000020 | 0.000384 | 0.00133 | <0.010 | 4.26 | <0.00010 | 0.58 | 0.000012 | 13.0 | 0.0502 | 1.19 | <0.000050 | 3.08E-05 | 0.000034 | 0.00109 | 0.00055 | 0.00720 | 0.00403 | <0.00100 | 0.0784 | 0.000674 | 1.13 | 1.25 | -4.88 | 25L1813-01 |
| 19-Dec-25 | 2 | 0.408 | 0.0968 | <0.000020 | 0.000331 | 0.000656 | <0.010 | 1.95 | <0.00010 | 0.55 | 0.000014 | 3.40 | 0.0195 | <1.00 | <0.000050 | 1.27E-05 | 0.000037 | 0.000933 | 0.00136 | 0.00521 | 0.00313 | <0.00100 | 0.0379 | 0.000600 | 0.46 | 0.51 | -5.61 | 25L2555-01 |
| 26-Dec-25 | 3 | 0.278 | 0.0683 | <0.000020 | 0.000262 | 0.000372 | <0.010 | 1.27 | <0.00010 | 0.47 | <0.000010 | 1.37 | 0.0148 | <1.00 | <0.000050 | 8.5E-06 | 0.000021 | 0.000867 | 0.00072 | 0.00416 | 0.00256 | <0.00100 | 0.0253 | 0.000306 | 0.28 | 0.37 | -13.95 | 25L3003-01 |
| 2-Jan-26 | 4 | 0.254 | 0.0633 | <0.000020 | 0.000234 | 0.000323 | <0.010 | 1.05 | <0.00010 | 0.64 | <0.000010 | 0.876 | 0.0135 | <1.00 | <0.000050 | 7.6E-06 | 0.000025 | 0.00102 | 0.00160 | 0.00357 | 0.00236 | <0.00100 | 0.0260 | 0.000446 | 0.26 | 0.36 | -15.23 | 26A0028-01 |
| 9-Jan-26 | 5 | 0.283 | 0.0661 | <0.000020 | 0.000245 | 0.000201 | <0.010 | 1.09 | <0.00010 | 0.55 | <0.000010 | 0.713 | 0.0142 | <1.00 | <0.000050 | 8.3E-06 | 0.000012 | 0.00102 | 0.00035 | 0.00413 | 0.00248 | <0.00100 | 0.0224 | 0.000216 | 0.27 | 0.32 | -8.29 | 26A0759-01 |
| 16-Jan-26 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jan-26 | 7 | 0.205 | 0.0552 | <0.000020 | 0.000146 | 0.000174 | <0.010 | 0.682 | <0.00010 | 0.44 | <0.000010 | 0.258 | 0.0116 | <1.00 | <0.000050 | 4.3E-06 | <0.000010 | 0.000896 | 0.00038 | 0.00263 | 0.00174 | <0.00100 | 0.0208 | 0.000128 | 0.16 | 0.27 | -26.72 | 26A2316-01 |
| 30-Jan-26 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Feb-26 | 9 | 0.167 | 0.0504 | <0.000020 | 0.000095 | 0.000154 | <0.010 | 0.555 | <0.00010 | 0.38 | <0.000010 | 0.151 | 0.0102 | <1.00 | <0.000050 | <0.000004( | <0.000010 | 0.000864 | 0.00030 | 0.00183 | 0.00172 | <0.00100 | 0.0218 | 0.000107 | 0.16 | 0.25 | -20.32 | 26B0821-01 |
| 13-Feb-26 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Feb-26 | 11 | 0.142 | 0.0456 | <0.000020 | 0.000079 | 0.000134 | <0.010 | 0.483 | <0.00010 | 0.39 | <0.000010 | 0.099 | 0.00864 | <1.00 | <0.000050 | <0.000004( | <0.000010 | 0.000956 | 0.00021 | 0.00159 | 0.00170 | <0.00100 | 0.0221 | 0.000078 | 0.20 | 0.23 | -7.00 | 26B2399-01 |
| 27-Feb-26 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Mar-26 | 13 | 0.139 | 0.0464 | <0.000020 | 0.000113 | 0.00185 | <0.010 | 0.448 | <0.00010 | 0.38 | <0.000010 | 0.099 | 0.00849 | <1.00 | <0.000050 | <0.000004( | <0.000010 | 0.000956 | 0.00030 | 0.00147 | 0.00161 | <0.00100 | 0.0234 | 0.000075 | 0.15 | 0.25 | -25.24 | 26C0862-01 |
| 13-Mar-26 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Mar-26 | 15 | 0.107 | 0.0353 | <0.000020 | 0.000050 | 0.000116 | <0.010 | 0.332 | <0.00010 | 0.30 | <0.000010 | 0.074 | 0.00652 | <1.00 | <0.000050 | <0.000004( | <0.000010 | 0.000702 | 0.00036 | 0.00095 | 0.00132 | <0.00100 | 0.0205 | 0.000091 | 0.19 | 0.22 | -7.07 | 26C2367-01 |
| 27-Mar-26 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Apr-26 | 17 | | | | | | | | | | | | | | | | | | | | | | | | 0.01 | 0.00 | 100.00 | |
| 10-Apr-26 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Apr-26 | 19 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 24-Apr-26 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-May-26 | 21 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 8-May-26 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 23 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| ######## | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 25 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 5-Jun-26 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jun-26 | 27 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 19-Jun-26 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jun-26 | 29 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 3-Jul-26 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul-26 | 31 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 17-Jul-26 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul-26 | 33 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 31-Jul-26 | 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Aug-26 | 35 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 14-Aug-26 | 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Aug-26 | 37 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 28-Aug-26 | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep-26 | 39 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |

# CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-2

Global ARD Testing Services Inc.



CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
GLOBAL PROJECT NO: 2577 (B1)
Sample ID: Composite-37 (DS157_6.41-7.0)
Sample Wt. used (g): 1000.0

| | | | | General Parameters | | | Anions | | | Nutrients | | | | | Dissolved Metals by ICP-MS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Instrument/Method: | | pH Meter | EC Meter | Titration/Calc. | Turbidimetry | IC | | IC | | Colourimetry | Calc. | | | | | | | | | | | | | | | | |
| Sampling Date | Week No. | Input Vol. (DI Water) | Output Vol. (Leachate) | pH | EC | Alkalinity (to pH 4.5) | Sulphate | Chloride | Fluoride | Nitrate ($NO_3$ as N) | Nitrite ($NO_2$ as N) | Total Dissolved Phosphorus | Hardness (as CaCO3) | Aluminum (Al) | Antimony (Sb) | Arsenic (As) | Barium (Ba) | Beryllium (Be) | Bismuth (Bi) | Boron (B) | Cadmium (Cd) | Calcium (Ca) | Chromium (Cr) | Cobalt (Co) | Copper (Cu) | Iron (Fe) | Lead (Pb) | Lithium (Li) | | |
| | Unit: | mL | mL | pH Units | µS/cm | mg CaCO3/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | | |
| | RDL: | 5 | 5 | 0.01 | 1 | 0.5 | 0.5 | 0.1 | 0.1 | 0.01 | 0.01 | 0.005 | 0.125 | 0.001 | 0.00005 | 0.00005 | 0.0001 | 0.00001 | 0.00001 | 0.002 | 0.000002 | 0.05 | 0.0005 | 0.000005 | 0.0001 | 0.002 | 0.00005 | 0.00005 | |
| 5-Dec-25 | 0 | 750 | 642 | 6.17 | 191 | 5.75 | 36.7 | 24.6 | 0.65 | 0.047 | <0.010 | <0.0050 | 47.3 | 0.350 | 0.00025 | <0.00105 | 0.0307 | 0.00115 | 0.000010 | 0.0132 | 0.00685 | 16.2 | <0.00050 | 0.00551 | 0.00121 | 0.0676 | 0.00295 | 0.0190 | |
| | | | | Replicate Analysis: | | | | | | | | | 45.9 | 0.347 | 0.000246 | <0.00105 | 0.0307 | 0.00116 | 0.000011 | 0.0128 | 0.00685 | 16.1 | <0.00050 | 0.00548 | 0.00123 | 0.0682 | 0.00297 | 0.0191 | |
| 12-Dec-25 | 1 | 500 | 445 | 5.92 | 308 | 5.76 | 63.1 | 35.6 | 1.14 | 0.185 | <0.010 | <0.0050 | 75.3 | 0.276 | 0.000267 | <0.00180 | 0.0283 | 0.00119 | <0.000020 | 0.0225 | 0.00969 | 25.6 | <0.00100 | 0.00689 | 0.00155 | 0.0165 | 0.00213 | 0.0269 | |
| 19-Dec-25 | 2 | 500 | 426 | 5.85 | 158 | 4.47 | 26.5 | 11.4 | 1.34 | 0.110 | <0.010 | <0.0050 | 32.3 | 0.233 | 0.000250 | <0.00105 | 0.0232 | 0.000744 | <0.000010 | 0.0124 | 0.00383 | 10.9 | <0.00050 | 0.00286 | 0.00088 | 0.0484 | 0.00124 | 0.0134 | |
| 26-Dec-25 | 3 | 500 | 453 | 6.09 | 86.9 | 4.66 | 16.3 | 3.53 | 1.19 | 0.061 | <0.010 | <0.0050 | 18.1 | 0.177 | 0.000215 | 0.000912 | 0.0187 | 0.000520 | <0.000010 | 0.0083 | 0.00197 | 6.24 | <0.00050 | 0.00155 | 0.00047 | 0.0359 | 0.00181 | 0.00798 | |
| 2-Jan-26 | 4 | 500 | 435 | 6.10 | 73.3 | 2.76 | 9.74 | 2.31 | 1.49 | 0.247 | <0.010 | <0.0050 | 16.1 | 0.348 | 0.000176 | 0.00106 | 0.0203 | 0.000624 | 0.000020 | 0.0051 | 0.00168 | 5.61 | <0.00050 | 0.00150 | 0.00054 | 0.138 | 0.00255 | 0.00622 | |
| 9-Jan-26 | 5 | 500 | 425 | 6.05 | 60.0 | 1.54 | 10.2 | 1.31 | 1.61 | 0.096 | <0.010 | <0.0050 | 13.8 | 0.390 | 0.000232 | 0.00107 | 0.0197 | 0.000597 | 0.000025 | 0.0051 | 0.00148 | 4.65 | <0.00050 | 0.00135 | 0.00051 | 0.215 | 0.00203 | 0.00559 | |
| 16-Jan-26 | 6 | 500 | 436 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jan-26 | 7 | 500 | 441 | 6.08 | 61.6 | 4.20 | 6.16 | 0.62 | 0.85 | 0.031 | <0.010 | <0.0050 | 10.7 | 0.167 | 0.000191 | 0.000884 | 0.0141 | 0.000410 | <0.000010 | 0.0032 | 0.00109 | 3.66 | <0.00050 | 0.000994 | 0.00027 | 0.0728 | 0.00173 | 0.00321 | |
| 30-Jan-26 | 8 | 500 | 437 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Feb-26 | 9 | 500 | 442 | 6.07 | 39.8 | 2.90 | 3.38 | 0.50 | 1.13 | 0.055 | <0.010 | <0.0050 | 9.63 | 0.196 | 0.000198 | 0.000978 | 0.0128 | 0.000389 | 0.000011 | 0.0028 | 0.00106 | 3.27 | <0.00050 | 0.00100 | 0.00036 | 0.0860 | 0.00169 | 0.00230 | |
| 13-Feb-26 | 10 | 500 | 438 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Feb-26 | 11 | 500 | 438 | 6.14 | 41.4 | 2.53 | 4.38 | 0.34 | 1.40 | 0.023 | <0.010 | <0.0050 | 9.37 | 0.229 | 0.000197 | 0.00101 | 0.0139 | 0.000367 | <0.000010 | 0.0028 | 0.00104 | 3.15 | <0.00050 | 0.00101 | 0.00046 | 0.134 | 0.00230 | 0.00224 | |
| 27-Feb-26 | 12 | 500 | 438 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Mar-26 | 13 | 500 | 438 | 6.00 | 36.0 | 2.00 | 6.77 | 0.52 | 0.95 | 0.022 | <0.010 | <0.0050 | 9.43 | 0.126 | 0.000174 | 0.000876 | 0.0118 | 0.000382 | <0.000010 | <0.0020 | 0.000973 | 3.24 | <0.00050 | 0.000962 | 0.00033 | 0.0525 | 0.00074 | 0.00168 | |
| 13-Mar-26 | 14 | 500 | 438 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Mar-26 | 15 | 500 | 442 | 5.83 | 30.8 | 2.20 | 2.88 | 0.29 | 1.19 | 0.022 | <0.010 | <0.0050 | 8.27 | 0.0971 | 0.000157 | 0.000809 | 0.00952 | 0.000278 | <0.000010 | <0.0020 | 0.000827 | 2.84 | <0.00050 | 0.000826 | 0.00034 | 0.0358 | 0.0006 | 0.00131 | |
| 27-Mar-26 | 16 | 500 | 438 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Apr-26 | 17 | 500 | | 5.76 | 32.6 | 0.70 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Apr-26 | 18 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Apr-26 | 19 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Apr-26 | 20 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-May-26 | 21 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-May-26 | 22 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 23 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 24 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 25 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jun-26 | 26 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jun-26 | 27 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jun-26 | 28 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jun-26 | 29 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul-26 | 30 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul-26 | 31 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul-26 | 32 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul-26 | 33 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul-26 | 34 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Aug-26 | 35 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Aug-26 | 36 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Aug-26 | 37 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Aug-26 | 38 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep-26 | 39 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

***NOTES:***

RDL may be raised for some samples due to sample matrix interference.

***Abbreviations:***

RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry
Calc: Calculation

# CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-2

Global ARD Testing Services Inc.



CLIENT: Canada Fluorspar (NL) Inc.
PROJECT NAME: South Ridge
GLOBAL PROJECT NO: 2577 (B1)
Sample ID: Composite-37 (DS157_6.41-7.0)
Sample Wt. used (g): 1000

| Sampling Date | Week No. | Magnesium (Mg) | Manganese (Mn) | Mercury (Hg) | Molybdenum (Mo) | Nickel (Ni) | Phosphorus (P) | Potassium (K) | Selenium (Se) | Silicon (Si) | Silver (Ag) | Sodium (Na) | Strontium (Sr) | Sulphur (S) | Tellurium (Te) | Thallium (Tl) | Thorium (Th) | Tin (Sn) | Titanium (Ti) | Tungsten (W) | Uranium (U) | Vanadium (V) | Zinc (Zn) | Zirconium (Zr) | Ion Balance | | | Job No. & Leachate ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit: | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | Anions | Cations | % Difference | |
| | RDL: | 0.005 | 0.00005 | 0.00002 | 0.00001 | 0.00004 | 0.01 | 0.02 | 0.0001 | 0.1 | 0.00001 | 0.02 | 0.0001 | 1 | 0.00005 | 0.000004 | 0.00001 | 0.0001 | 0.0002 | 0.0002 | 0.000001 | 0.001 | 0.001 | 0.00002 | meq/L | meq/L | meq/L | |
| 5-Dec-25 | 0 | 1.67 | 2.84 | <0.000020 | 0.000134 | 0.00459 | <0.010 | 10.0 | 0.00066 | 0.92 | 0.000011 | 12.2 | 0.0419 | 15.4 | <0.000050 | 0.000162 | 0.000496 | 0.000227 | 0.00242 | <0.00020 | 0.00403 | <0.00100 | 0.155 | 0.00314 | 1.61 | 1.89 | -7.94 | 25L0949-02 |
| | | 1.68 | 2.85 | <0.000020 | 0.000132 | 0.00462 | <0.010 | 10.1 | 0.00063 | 0.92 | <0.000010 | 12.1 | 0.0421 | 15.2 | <0.000050 | 0.000167 | 0.000524 | 0.000156 | 0.00230 | <0.00020 | 0.00406 | <0.00100 | 0.154 | 0.00326 | 1.61 | 1.88 | -7.78 | |
| 12-Dec-25 | 1 | 2.78 | 5.62 | <0.000040 | 0.000167 | 0.00698 | <0.020 | 11.7 | 0.00133 | 1.36 | <0.000020 | 15.8 | 0.0578 | 25.6 | <0.000100 | 0.000148 | 0.000332 | 0.000538 | <0.00040 | <0.00040 | 0.00425 | <0.00200 | 0.213 | 0.00137 | 2.50 | 2.74 | -4.59 | 25L1813-02 |
| 19-Dec-25 | 2 | 1.23 | 2.66 | <0.000020 | 0.000162 | 0.00275 | <0.010 | 6.62 | 0.00068 | 1.17 | 0.000016 | 6.57 | 0.0273 | 11.7 | <0.000050 | 9.34E-05 | 0.000464 | 0.000657 | 0.00164 | <0.00020 | 0.00298 | <0.00100 | 0.0859 | 0.00157 | 1.04 | 1.23 | -8.54 | 25L2555-02 |
| 26-Dec-25 | 3 | 0.618 | 1.49 | <0.000020 | 0.000156 | 0.00146 | <0.010 | 4.27 | 0.00033 | 1.26 | 0.000015 | 3.15 | 0.0144 | 6.79 | <0.000050 | 6.06E-05 | 0.000347 | 0.000660 | 0.00128 | <0.00020 | 0.00193 | <0.00100 | 0.0478 | 0.00150 | 0.60 | 0.69 | -7.00 | 25L3003-02 |
| 2-Jan-26 | 4 | 0.513 | 1.39 | <0.000020 | 0.000148 | 0.00122 | <0.010 | 3.93 | 0.00016 | 1.50 | 0.000016 | 1.97 | 0.0129 | 4.62 | <0.000050 | 5.61E-05 | 0.000640 | 0.00109 | 0.00463 | <0.00020 | 0.00205 | <0.00100 | 0.0443 | 0.00333 | 0.41 | 0.61 | -18.76 | 26A0028-02 |
| 9-Jan-26 | 5 | 0.533 | 1.35 | <0.000020 | 0.000157 | 0.00106 | <0.010 | 3.53 | 0.00021 | 1.69 | 0.000021 | 1.47 | 0.0115 | 4.06 | <0.000050 | 0.000057 | 0.00110 | 0.000933 | 0.00637 | <0.00020 | 0.00240 | <0.00100 | 0.0376 | 0.00782 | 0.37 | 0.53 | -18.10 | 26A0759-02 |
| 16-Jan-26 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jan-26 | 7 | 0.370 | 1.08 | <0.000020 | 0.000131 | 0.000745 | <0.010 | 2.18 | 0.00010 | 1.20 | <0.000010 | 0.653 | 0.00839 | 3.00 | <0.000050 | 3.84E-05 | 0.000432 | 0.000747 | 0.00239 | <0.00020 | 0.00126 | <0.00100 | 0.0266 | 0.00204 | 0.28 | 0.36 | -13.17 | 26A2316-02 |
| 30-Jan-26 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Feb-26 | 9 | 0.354 | 1.06 | <0.000020 | 0.000099 | 0.000740 | <0.010 | 1.86 | <0.00010 | 1.16 | <0.000010 | 0.455 | 0.00778 | 2.37 | <0.000050 | 3.58E-05 | 0.000410 | 0.00114 | 0.00265 | <0.00020 | 0.00122 | <0.00100 | 0.0266 | 0.00226 | 0.20 | 0.33 | -22.70 | 26B0821-02 |
| 13-Feb-26 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Feb-26 | 11 | 0.361 | 1.18 | <0.000020 | 0.000101 | 0.000702 | <0.010 | 1.91 | <0.00010 | 1.12 | 0.000014 | 0.361 | 0.00780 | 2.57 | <0.000050 | 3.76E-05 | 0.000584 | 0.000856 | 0.00422 | <0.00020 | 0.00139 | <0.00100 | 0.0248 | 0.00444 | 0.23 | 0.33 | -18.15 | 26B2399-02 |
| 27-Feb-26 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Mar-26 | 13 | 0.324 | 1.14 | <0.000020 | 0.000090 | 0.000644 | <0.010 | 1.58 | 0.00013 | 1.01 | <0.000010 | 0.284 | 0.00732 | 2.35 | <0.000050 | 2.98E-05 | 0.000240 | 0.000857 | 0.00174 | <0.00020 | 0.000925 | <0.00100 | 0.0226 | 0.00161 | 0.25 | 0.30 | -9.66 | 26C0862-02 |
| 13-Mar-26 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Mar-26 | 15 | 0.286 | 1.00 | <0.000020 | 0.000070 | 0.000541 | <0.010 | 1.28 | <0.00010 | 0.84 | <0.000010 | 0.223 | 0.00649 | 1.79 | <0.000050 | 2.31E-05 | 0.000162 | 0.000883 | 0.00108 | <0.00020 | 0.000699 | <0.00100 | 0.0187 | 0.00114 | 0.18 | 0.26 | -18.74 | 26C2367-02 |
| 27-Mar-26 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Apr-26 | 17 | | | | | | | | | | | | | | | | | | | | | | | | 0.01 | 0.00 | 100.00 | |
| 10-Apr-26 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Apr-26 | 19 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 24-Apr-26 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-May-26 | 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-May-26 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 23 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| ######## | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jun-26 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jun-26 | 27 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 19-Jun-26 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jun-26 | 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul-26 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul-26 | 31 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 17-Jul-26 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul-26 | 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul-26 | 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Aug-26 | 35 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 14-Aug-26 | 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Aug-26 | 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Aug-26 | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep-26 | 39 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |

# CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-3

Global ARD Testing Services Inc.



**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**GLOBAL PROJECT NO:** 2577 (B1)
**Sample ID:** #REF!
**Sample Wt. used (g):** 1000.0

| | | | | General Parameters | | | Anions | | | Nutrients | | | | | Dissolved Metals by ICP-MS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Instrument/Method: | | | pH Meter | EC Meter | Titration/Calc. | Turbidimetry | IC | | IC | | Colourimetry | Calc. | | | | | | | | | | | | | | | | |
| Sampling Date | Week No. | Input Vol. (DI Water) | Output Vol. (Leachate) | pH | EC | Alkalinity (to pH 4.5) | Sulphate | Chloride | Fluoride | Nitrate ($NO_3$ as N) | Nitrite ($NO_2$ as N) | Total Dissolved Phosphorus | Hardness (as CaCO3) | Aluminum (Al) | Antimony (Sb) | Arsenic (As) | Barium (Ba) | Beryllium (Be) | Bismuth (Bi) | Boron (B) | Cadmium (Cd) | Calcium (Ca) | Chromium (Cr) | Cobalt (Co) | Copper (Cu) | Iron (Fe) | Lead (Pb) | Lithium (Li) |
| | Unit: | mL | mL | pH Units | µS/cm | mg CaCO3/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| | RDL: | 5 | 5 | 0.01 | 1 | 0.5 | 0.5 | 0.1 | 0.1 | 0.01 | 0.01 | 0.005 | 0.125 | 0.001 | 0.00005 | 0.00005 | 0.0001 | 0.00001 | 0.00001 | 0.002 | 0.000002 | 0.05 | 0.0005 | 0.000005 | 0.0001 | 0.002 | 0.00005 | 0.00005 |
| 20-Feb-26 | 0 | 750 | 641 | 7.33 | 317 | 25.5 | 2.83 | 21.1 | 1.95 | 0.954 | <0.010 | <0.0050 | 26.4 | 0.172 | 0.000367 | 0.00269 | 0.0549 | 0.000061 | <0.000010 | 0.0128 | 5.04E-05 | 9.61 | <0.00050 | 3.75E-05 | 0.00266 | 0.0632 | 0.00053 | 0.0538 |
| | | | | *Replicate Analysis:* | | | | | | | | | 26.2 | 0.165 | 0.000353 | 0.00269 | 0.0534 | 0.000064 | <0.000010 | 0.0129 | 4.68E-05 | 9.57 | <0.00050 | 3.87E-05 | 0.00272 | 0.0646 | 0.00053 | 0.0550 |
| 27-Feb-26 | 1 | 500 | 470 | 7.11 | 198 | 16.2 | 3.90 | 27.8 | 1.89 | 2.69 | <0.010 | 0.0073 | 29.6 | 0.0753 | 0.000572 | 0.00285 | 0.0639 | 0.000127 | <0.000010 | 0.0191 | 9.81E-05 | 10.6 | <0.00050 | 7.21E-05 | 0.00431 | 0.0207 | 0.00042 | 0.0651 |
| 6-Mar-26 | 2 | 500 | 410 | 7.28 | 110 | 21.5 | 3.28 | 8.16 | 0.56 | 0.810 | <0.010 | <0.0050 | 20.5 | 0.210 | 0.000571 | 0.00248 | 0.0345 | 0.000079 | <0.000010 | 0.0143 | 3.64E-05 | 7.43 | <0.00050 | ######## | 0.00271 | 0.127 | 0.00130 | 0.0352 |
| 13-Mar-26 | 3 | 500 | 458 | 7.27 | 65.7 | 19.3 | 1.19 | 1.39 | 1.37 | 0.588 | <0.010 | <0.0050 | 16.1 | 0.188 | 0.000397 | 0.00163 | 0.0276 | 0.000065 | <0.000010 | 0.0091 | 3.78E-05 | 5.87 | <0.00050 | 1.85E-05 | 0.00141 | 0.108 | 0.0009 | 0.0191 |
| 20-Mar-26 | 4 | 500 | 458 | 7.08 | 54.7 | 12.3 | 1.64 | 0.84 | 1.38 | 0.535 | <0.010 | <0.0050 | 14.5 | 0.193 | 0.000350 | 0.00141 | 0.0266 | 0.000075 | <0.000010 | 0.0066 | 3.26E-05 | 5.28 | <0.00050 | ######## | 0.00108 | 0.122 | 0.00110 | 0.0145 |
| 27-Mar-26 | 5 | 500 | 449 | 6.99 | 54.0 | 12.8 | 2.19 | 0.43 | 1.71 | 0.334 | <0.010 | 0.0064 | 14.6 | 0.284 | 0.000306 | 0.00145 | 0.0276 | 0.000089 | 0.00001 | 0.0057 | 2.64E-05 | 5.29 | <0.00050 | 1.84E-05 | 0.00101 | 0.195 | 0.0015 | 0.0135 |
| 3-Apr-26 | 6 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Apr-26 | 7 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Apr-26 | 8 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Apr-26 | 9 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-May-26 | 10 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-May-26 | 11 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 12 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 13 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 14 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jun-26 | 15 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jun-26 | 16 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jun-26 | 17 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jun-26 | 18 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul-26 | 19 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul-26 | 20 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul-26 | 21 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul-26 | 22 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul-26 | 23 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Aug-26 | 24 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Aug-26 | 25 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Aug-26 | 26 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Aug-26 | 27 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep-26 | 28 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep-26 | 29 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep-26 | 30 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep-26 | 31 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Oct-26 | 32 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Oct-26 | 33 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Oct-26 | 34 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Oct-26 | 35 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Oct-26 | 36 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Nov-26 | 37 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Nov-26 | 38 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Nov-26 | 39 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | |

***NOTES:***

RDL may be raised for some samples due to sample matrix interference.

***Abbreviations:***

RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry
Calc: Calculation

## CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-3

Global ARD Testing Services Inc.



**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**GLOBAL PROJECT NO:** 2577 (B1)
**Sample ID:** #REF!
**Sample Wt. used (g):** #####

| Sampling Date | Week No. | Magnesium (Mg) | Manganese (Mn) | Mercury (Hg) | Molybdenum (Mo) | Nickel (Ni) | Phosphorus (P) | Potassium (K) | Selenium (Se) | Silicon (Si) | Silver (Ag) | Sodium (Na) | Strontium (Sr) | Sulphur (S) | Tellurium (Te) | Thallium (Tl) | Thorium (Th) | Tin (Sn) | Titanium (Ti) | Tungsten (W) | Uranium (U) | Vanadium (V) | Zinc (Zn) | Zirconium (Zr) | Ion Balance | | | Job No. & Leachate ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit: | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | Anions | Cations | % Difference | |
| | RDL: | 0.005 | 0.00005 | 0.00002 | 0.00001 | 0.00004 | 0.01 | 0.02 | 0.0001 | 0.1 | 0.00001 | 0.02 | 0.0001 | 1 | 0.00005 | 0.000004 | 0.00001 | 0.0001 | 0.0002 | 0.0002 | 0.000001 | 0.001 | 0.001 | 0.00002 | meq/L | meq/L | meq/L | |
| 20-Feb-26 | 0 | 0.587 | 0.0873 | <0.000020 | 0.00278 | 0.000115 | <0.010 | 8.73 | <0.00010 | 2.23 | 0.00001 | 12.8 | 0.0312 | <1.00 | <0.000050 | 0.000102 | 0.000288 | <0.000100 | 0.00182 | 0.00218 | 0.00210 | <0.00100 | 0.0043 | 0.00108 | 1.32 | 1.34 | -0.79 | 26B2399-03 |
| | | 0.567 | 0.0861 | <0.000020 | 0.00281 | 0.000092 | <0.010 | 8.76 | <0.00010 | 2.22 | <0.000010 | 12.8 | 0.0308 | <1.00 | <0.000050 | 9.92E-05 | 0.000289 | <0.000100 | 0.00200 | 0.00215 | 0.00205 | <0.00100 | 0.0044 | 0.00110 | 1.32 | 1.33 | -0.66 | |
| 27-Feb-26 | 1 | 0.779 | 0.176 | <0.000020 | 0.00758 | 0.000300 | <0.010 | 9.09 | <0.00010 | 2.14 | <0.000010 | 16.1 | 0.0318 | 1.14 | <0.000050 | 8.89E-05 | 0.000424 | <0.000100 | 0.00053 | 0.00285 | 0.00790 | <0.00100 | 0.0216 | 0.00141 | 1.43 | 1.55 | -4.02 | 26B3153-01 |
| 6-Mar-26 | 2 | 0.458 | 0.0831 | <0.000020 | 0.00692 | 0.000090 | <0.010 | 6.00 | <0.00010 | 2.27 | 0.000019 | 8.59 | 0.0182 | 1.04 | <0.000050 | 5.13E-05 | 0.000680 | 0.000154 | 0.00326 | 0.00364 | 0.00924 | <0.00100 | 0.0036 | 0.00274 | 0.80 | 0.97 | -9.61 | 26C0862-03 |
| 13-Mar-26 | 3 | 0.354 | 0.0664 | <0.000020 | 0.00381 | 0.000063 | <0.010 | 4.45 | <0.00010 | 1.87 | <0.000010 | 4.01 | 0.0142 | <1.00 | <0.000050 | 0.0000390 | 0.000376 | 0.000160 | 0.00302 | 0.00233 | 0.00921 | <0.00100 | 0.0054 | 0.00205 | 0.55 | 0.64 | -7.34 | 26C1590-01 |
| 20-Mar-26 | 4 | 0.321 | 0.0572 | <0.000020 | 0.00275 | <0.000040 | <0.010 | 3.61 | <0.00010 | 1.85 | <0.000010 | 2.65 | 0.0131 | <1.00 | <0.000050 | 0.000035 | 0.000418 | 0.000204 | 0.00336 | 0.00218 | 0.00697 | <0.00100 | 0.0072 | 0.00173 | 0.41 | 0.53 | -13.20 | 26C2367-03 |
| 27-Mar-26 | 5 | 0.333 | 0.0513 | <0.000020 | 0.00224 | <0.000040 | <0.010 | 3.52 | <0.00010 | 2.07 | <0.000010 | 2.17 | 0.0132 | <1.00 | <0.000050 | 3.38E-05 | 0.00056 | 0.00028 | 0.00467 | 0.00201 | 0.00637 | <0.00100 | 0.0053 | 0.00261 | 0.42 | 0.52 | -10.29 | 26C3190-01 |
| 3-Apr-26 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Apr-26 | 7 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 17-Apr-26 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Apr-26 | 9 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 1-May-26 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-May-26 | 11 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| ######## | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ######## | 13 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| ######## | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jun-26 | 15 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 12-Jun-26 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jun-26 | 17 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 26-Jun-26 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul-26 | 19 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 10-Jul-26 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul-26 | 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul-26 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul-26 | 23 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 7-Aug-26 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Aug-26 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Aug-26 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Aug-26 | 27 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 4-Sep-26 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep-26 | 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep-26 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep-26 | 31 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 2-Oct-26 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Oct-26 | 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Oct-26 | 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Oct-26 | 35 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |
| 30-Oct-26 | 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Nov-26 | 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Nov-26 | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Nov-26 | 39 | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | #DIV/0! | |

## CERTIFICATE OF ANALYSIS ▪ DI WATER pH & EC AND HCT ROOM TEMPERATURE

Global ARD Testing Services Inc.



**CLIENT:** Canada Fluorspar (NL) Inc.

**PROJECT NAME:** South Ridge

**GLOBAL PROJECT NO:** 2577 (B1)

| Sampling Date | Week No. | De-Ionized Water | | Temperature °C |
|---|---|---|---|---|
| | | pH (pH Units) RDL: 0.01 | EC (µS/cm) RDL: 0.01 | |
| | | | | |
| 5-Dec-25 | 0 | 5.28 | 1.35 | 19.8 |
| 12-Dec-25 | 1 | 5.35 | 1.29 | 19.8 |
| 19-Dec-25 | 2 | 5.36 | 1.16 | 19.4 |
| 26-Dec-25 | 3 | 5.33 | 1.43 | 20.1 |
| 2-Jan-26 | 4 | 5.35 | 1.76 | 19.8 |
| 9-Jan-26 | 5 | 5.57 | 1.54 | 20.5 |
| 16-Jan-26 | 6 | 5.60 | 1.47 | 19.6 |
| 23-Jan-26 | 7 | 5.54 | 1.73 | 21.3 |
| 30-Jan-26 | 8 | 5.28 | 1.70 | 19.4 |
| 6-Feb-26 | 9 | 5.74 | 1.16 | 21.1 |
| 13-Feb-26 | 10 | 5.62 | 1.49 | 20.2 |
| 20-Feb-26 | 11 | 5.97 | 1.64 | 20.1 |
| 27-Feb-26 | 12 | 5.81 | 1.71 | 20.4 |
| 6-Mar-26 | 13 | 5.70 | 1.24 | 20.4 |
| 13-Mar-26 | 14 | 5.72 | 1.58 | 20.2 |
| 20-Mar-26 | 15 | 5.71 | 1.36 | 20.2 |
| 27-Mar-26 | 16 | 5.66 | 1.63 | 20.3 |
| 3-Apr-26 | 17 | | | |
| 10-Apr-26 | 18 | | | |
| 17-Apr-26 | 19 | | | |
| 24-Apr-26 | 20 | | | |
| 1-May-26 | 21 | | | |
| 8-May-26 | 22 | | | |
| 15-May-26 | 23 | | | |
| 22-May-26 | 24 | | | |
| 29-May-26 | 25 | | | |
| 5-Jun-26 | 26 | | | |
| 12-Jun-26 | 27 | | | |
| 19-Jun-26 | 28 | | | |
| 26-Jun-26 | 29 | | | |
| 3-Jul-26 | 30 | | | |
| 10-Jul-26 | 31 | | | |
| 17-Jul-26 | 32 | | | |
| 24-Jul-26 | 33 | | | |
| 31-Jul-26 | 34 | | | |
| 7-Aug-26 | 35 | | | |
| 14-Aug-26 | 36 | | | |
| 21-Aug-26 | 37 | | | |
| 28-Aug-26 | 38 | | | |
| 4-Sep-26 | 39 | | | |
| 11-Sep-26 | 40 | | | |
| 18-Sep-26 | 41 | | | |
| 25-Sep-26 | 42 | | | |
| | | | | |

# CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL SET-UP DETAILS

Global ARD Testing Services Inc.


**CLIENT:** Canada Fluorspar (NL) Inc.
**PROJECT NAME:** South Ridge
**GLOBAL PROJECT NO:** 2577 (B1)

| HCT ID | Sample Type | Humidity Cell Dimensions (inches) | | | Dry Wt. of Sample (g) | Particle Size | Other Materials Used (1 Layer) | Column Material | Total Volume of Initial Flushings (Wk-0) (mL) | Weekly Flushing Volume (mL) | Sampling Frequency | Sampling Day | Water Addition to Drain Time (h) | Start-up Date | Proposed Termination Date | Total No. of Weeks Proposed | Operation Procedure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inner Diameter | Column Height | Cell Wall Thickness | | | | | | | | | | | | | |
| HC-1 | Composite-5 (DS147_33.4-35.4) | 4.0 | 8.0 | 1/4" | 950.0 | | 200 Nylon Mesh | Clear Cast Acrylic | 713 | 475 | Weekly | Friday | 2 | 5/Dec/25 | | 41 | Flood Leach |
| HC-2 | Composite-37 (DS157_6.41-7.0) | 4.0 | 8.0 | 1/4" | 1000.0 | | 200 Nylon Mesh | Clear Cast Acrylic | 750 | 500 | Weekly | Friday | 2 | 5/Dec/25 | | 41 | Flood Leach |
| HC-3 | Bulk Composite-01 | 4.0 | 8.0 | 1/4" | 1000.0 | | 200 Nylon Mesh | Clear Cast Acrylic | 750 | 500 | Weekly | Friday | 2 | 20/Feb/26 | | 41 | Flood Leach |

**Method Reference:** ASTM D 5744 - 07$^{\epsilon 1}$; Standard Test Method for Laboratory Weathering of Solid Materials Using a Humidity Cell[1], April 2010.

Global
ARD Testing Services Inc.

***HCT Schedule:***

| | | | | | Anions | | | Nutrients | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cycle** | **Sampling** | **pH** | **EC** | **Alkalinity** | **SO4** | **Cl** | **F** | **NO3** | **NO2** | **Low Level P** | **Dissolved Metals / ICP-MS** |
| Flush | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 | ✓ | | | | | | | | | | |
| 7 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 8 | ✓ | | | | | | | | | | |
| 9 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 10 | ✓ | | | | | | | | | | |
| 11 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 12 | ✓ | | | | | | | | | | |
| 13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 14 | ✓ | | | | | | | | | | |
| 15 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 16 | ✓ | | | | | | | | | | |
| 17 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 18 | ✓ | | | | | | | | | | |
| 19 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 20 | ✓ | | | | | | | | | | |
| 21 | ✓ | | | | | | | | | | |
| 22 | ✓ | | | | | | | | | | |
| 23 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24 | ✓ | | | | | | | | | | |
| 25 | ✓ | | | | | | | | | | |
| 26 | ✓ | | | | | | | | | | |
| 27 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 28 | ✓ | | | | | | | | | | |
| 29 | ✓ | | | | | | | | | | |
| 30 | ✓ | | | | | | | | | | |
| 31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 32 | ✓ | | | | | | | | | | |
| 33 | ✓ | | | | | | | | | | |
| 34 | ✓ | | | | | | | | | | |
| 35 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 36 | ✓ | | | | | | | | | | |
| 37 | ✓ | | | | | | | | | | |
| 38 | ✓ | | | | | | | | | | |
| 39 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| ***Total Units:*** | ***40*** | ***18*** | ***18*** | ***18*** | ***18*** | ***18*** | ***18*** | ***18*** | ***18*** | ***18*** | ***18*** |

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# Appendix 6.6-1: South Ridge Project Fish and Fish Habitat Report

# FISH AND FISH HABITAT REPORT

# South Ridge Project

## Canada Fluorspar Inc.

LGL File FA26014.31

January 2026

# FISH AND FISH HABITAT REPORT

## CFI Canada Fluorspar Inc.

### South Ridge Project

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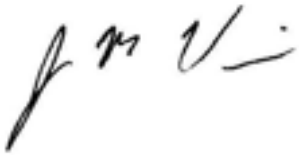

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| Date: | Version: |
|---|---|
| January 19, 2026 | Final |

**JANUARY 2026**
**LGL FA26014.31**

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## Acronyms and Abbreviations

| | |
|---|---|
| AD | Adult |
| AGS | St. Lawrence AGS Vein Fluorspar Mine |
| BS | Beach Seine |
| CFI | Canada Fluorspar Inc. |
| CPUE | Catch per unit effort |
| DFO | Department of Fisheries and Oceans Canada |
| EA | Environmental Assessment |
| GN | Gill net |
| HEU | Habitat Equivalents Units |
| HN | Hoop net |
| HSI | Habitat Suitability Units |
| JUV | Juvenile |
| LGL | LGL Limited |
| MT | Minnow trap |
| NFC | No fish caught |
| YOY | Young-of-the-year |

# 1 Introduction

Canada Fluorspar (NL) Inc. (CFI) is in the planning phase of the South Ridge Project (the Project), an expansion of the existing St. Lawrence AGS Vein Fluorspar Mine (AGS). The Project has a short lifespan (expected duration of 18 months) and will consist of the extraction of fluorspar ore from an open pit, the creation of stockpiles of overburden, rock, and topsoil, and the construction of a network of upgraded access roads. The Project will use the existing AGS processing pits and tailings facilities.

## 1.1 Background

LGL Limited (LGL) was retained by CFI to conduct a fish and fish habitat field assessment within the drainage systems and potential receiving watercourses/waterbodies in the vicinity of the Project. The field assessment summarised in this report was completed to support the submission of an Environmental Assessment (EA) Registration Document for the Project and to help develop effective mitigation measures for potential project effects. Throughout the planning process for this field assessment, the project team discussed the Project and study area with the Department of Fisheries and Oceans Canada (DFO) to ensure the methodology would facilitate potential future permitting.

The field assessment findings summarized in this report were intended to supplement the results from historic studies completed on behalf of the Project as part of the 2015 Environmental Assessment Registration (CFI 2015).

# 2 Study Area

The study area for the 2025 fish and fish habitat field assessment for the South Ridge Project is comprised of a 100 m radius buffer centered on the proposed physical disturbance footprint of the Project (i.e., the South Ridge pit and stockpiles) and extends to surrounding waterbodies identified by DFO (Figure 1). The focal locations of the field assessment were:

- Shoal Cove Pond
    - Associated drainages (Shoal Cove Brook) and sources (Clarkes Pond Brook)
    - Adjacent wetlands
- Hares Ears Pond
    - Associated drainages (Salt Cove Brook) and sources (no one source)
    - Adjacent wetlands

The Project footprint is located within the Eastern Hyper-Oceanic Barrens Ecoregion, which is characterized by 200 m or less elevation, close proximity to the ocean, high wind exposure, cold summer and mild winter temperatures, and frequent fog. The vegetation is composed predominantly of tuckamore (balsam fir [*Abies balsamea*] krummholz) and open barrens of heath moss (*Rhacomitrium languinosum*) with blanket and plateau bogs (LaFosse 2004).

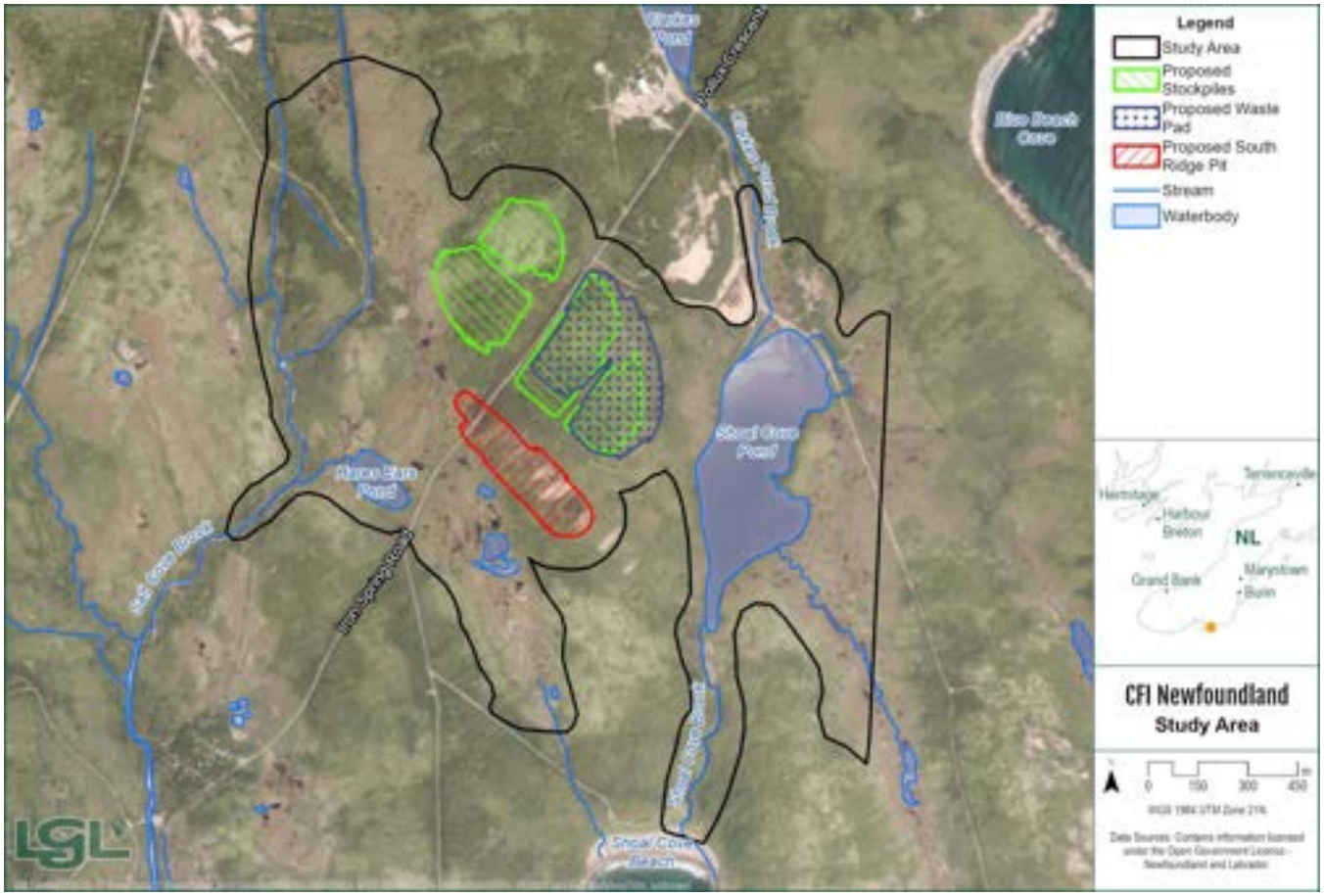


Figure 1. Study area for the fish and fish habitat field assessment conducted for the CFI South Ridge Project (November 2025).

## 3 Methods

The fish and fish habitat assessment for this Project was completed in accordance with *the Standard Methods Guide for the Classification/Quantification of Lacustrine Habitat in Newfoundland and Labrador* (Bradbury and Power 2001). Fieldwork was conducted by two teams of two people from November 8 to November 10, 2025 and included both a fish community component and a fish habitat assessment using multiple methods (Table 1). Incidental observations of wildlife and associated habitat were also recorded during field program (see Table A-1 in Appendix A).

Table 1. Summary of fish and fish habitat field assessment techniques and equipment.

| Site | Techniques | Equipment Used |
|---|---|---|
| Shoal Cove Pond | Bathymetric survey | Garmin Echomap Plus 73sv fish finder |
| | Sediment sampling | Petite Ponar, visual assessment |
| | Aquatic vegetation and shoreline survey | Visual assessment |
| | Fish capture | Gill net |
| | | Hoop net |
| | | Minnow trap |
| | | Beach seine |
| Hares Ears Pond | Substrate survey | Visual and tactile assessment |

| Site | Techniques | Equipment Used |
|---|---|---|
| | Aquatic vegetation and shoreline survey | Visual assessment |
| | Fish Capture | Hoop net |
| | | Minnow trap |
| | | Beach seine |
| Salt Cove Brook | Habitat characterization (substrate, flow, vegetation) | Visual assessment, historical hydrology data |
| Adjacent Wetlands | Connectivity and flow path assessment | Visual assessment |
| | Fish capture | Minnow trap |

## 3.1 Habitat Assessment

The habitat assessment consisted of collecting data on the following: bathymetry, substrate, surface water flow paths (direct or indirect fish habitat), important habitat features (spawning grounds or juvenile rearing habitat), areas of erosion/disturbance, littoral and non-littoral zones, and aquatic vegetation (species and areal coverage). Direct fish habitat is defined as aquatic environments that provide permanent conditions capable of supporting one or more fish life stages. Indirect fish habitat includes features that support direct fish habitat, often contributing to underground flow and nutrients, but do not support fish.

Aquatic vegetation and shoreline conditions were visually assessed during field surveys. Vegetation surveys documented dominant species, vegetation type (submerged or emerged), and approximate spatial extent within the pond and along the shoreline. Observations were recorded throughout the pond and perimeter to characterize overall habitat conditions.

### 3.1.1 Shoal Cove Pond

Bathymetric data in Shoal Cove Pond were collected using a Garmin Echomap Plus 73sv fish finder along 27 transects (Figure 2). Water depth measurements were recorded continuously along each transect. Transects were designed to provide full spatial coverage of the pond, and bathymetric contours presented in the Results section were interpolated from depth measurements collected along these transects.

Substrate conditions were assessed using sediment samples collected from the deepest area (~1.8 m) of the pond, using a Petite Ponar grab sampler (Figure 3). Grab sampling was conducted at two locations to characterize dominant substrate types. Substrate composition was visually examined and classified based on sediment texture and the presence of underlying coarse material.

A habitat assessment was also conducted in Shoal Cove Brook and Clarkes Pond Brook. Surveys extended upstream from Shoal Cove Pond to the Clarkes Pond Brook fish-passage barrier and downstream from the pond outlet, through Shoal Cove Brook and to the mouth at Shoal Cove Beach. Survey methods included walking the channel and visually assessing connectivity, flow conditions, substrate composition, and documenting the presence of barriers to fish movement.

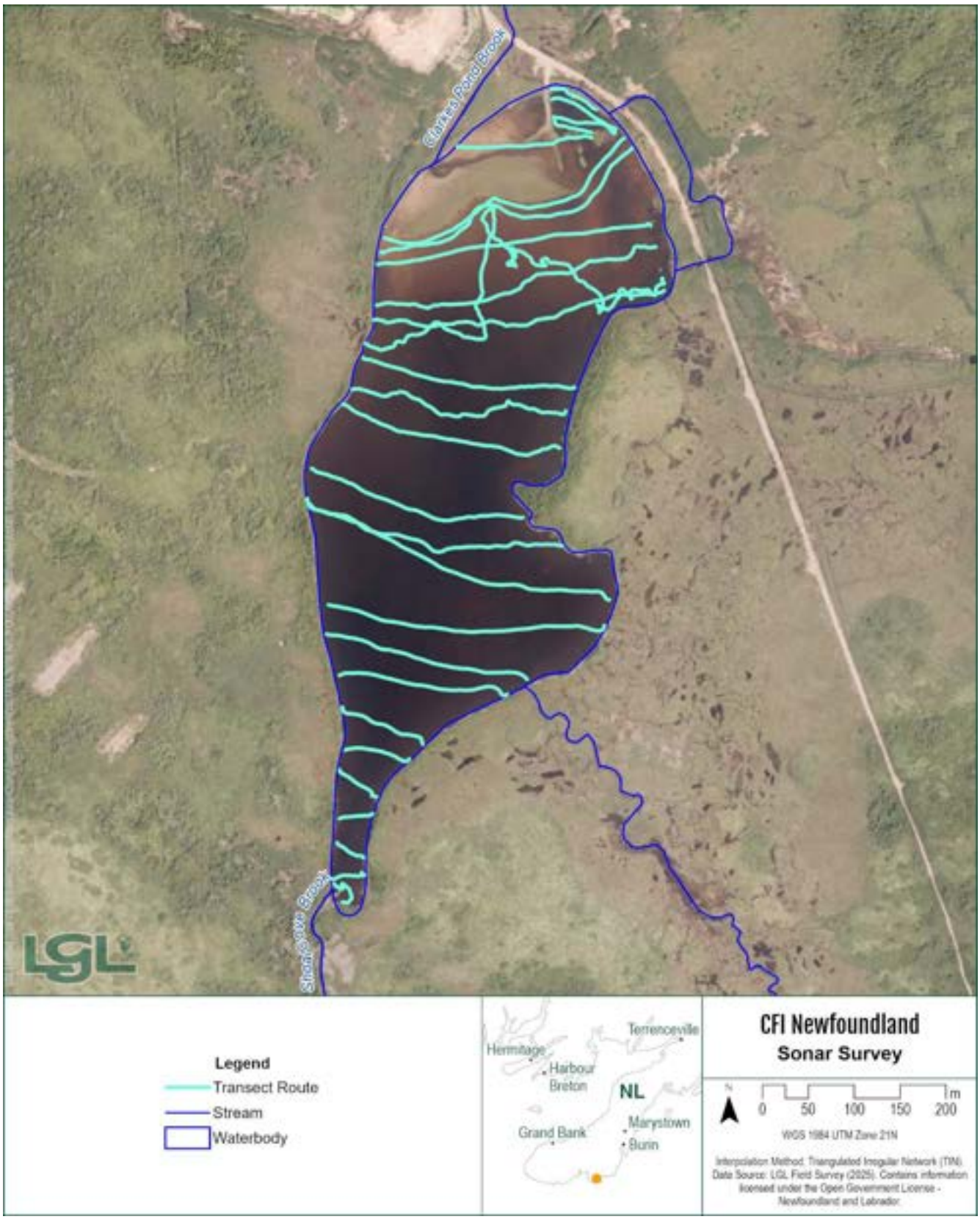


Figure 2. Bathymetric transects designed to provide full spatial coverage of Shoal Cove Pond.

### 3.1.2 Hares Ears Pond

Bathymetric surveying was not necessary for Hares Ears Pond as water depths were consistently shallow (≤1.0 m) throughout the pond, instead, water depth was assessed by wading. Sediment sampling was also not required, as surveyors were able to directly assess substrate composition by visual and tactile observation.

Surface water flow paths entering Hares Ears Pond and along its outflow to Salt Cove Brook were defined based on thorough field observations (see Table 1). Habitat connectivity between the pond, upstream wetlands, and adjacent watercourses was assessed by documenting physical connections and potential fish-passage structures, including culverts beneath Iron Springs Road.

### 3.1.3 Salt Cove Brook

Given the scope of work for this project, the entirety of Salt Cove Brook was not assessed, only a small section at the convergence of Hares Ears Pond and Salt Cove Brook within the study area was surveyed (see Figure 1). Substrate conditions, aquatic vegetation, and general habitat characteristics were assessed through field observations (see Table 1). Hydrologic conditions, including water velocity and depth, were characterized using available hydrology measurements collected in 2024 (WSP 2025). Connectivity to adjacent waterbodies and potential barriers to fish passage were documented based on field observations and existing information.

### 3.1.4 Adjacent Wetlands

Wetland connectivity and surface water flow paths between Hares Ears Pond and adjacent wetlands, and Shoal Cove Pond and adjacent wetlands, were assessed through visual field observations. Observations focused on identifying permanent and temporary ponds, surface water connections, potential subsurface flow paths, and features influencing fish passage.

## 3.2 Fish Community Assessment

All fish sampling for the Project was conducted according to the conditions under the DFO Section 52 experimental license NL-9275-25 (Appendix B). Fish collection methods included gill nets, hoop nets, minnow traps, and beach seines (Table 2). Electrofishing was not conducted because the field assessment occurred outside of the acceptable timing window to conduct electrofishing as per DFO regulations (Scruton and Gibson 1995).

**Table 2. Summary of fish and fish habitat assessment sampling completed for the 2025 South Ridge Project.**

| Study Area Waterbody and Wetland | Gill Net | Beach Seine | Hoop Net | Minnow Trap | Sediment Sampled | Bathymetry | Habitat Assessment |
|---|---|---|---|---|---|---|---|
| Shoal Cove Pond | 3 | 3 | 2 | 4 | 2 | Y | Y |
| Adjacent Wetlands | N | N | N | 9 | N | N | Y |
| Hares Ears Pond | N | 3 | 1 | 2 | N | N | Y |
| Adjacent Wetlands | N | N | N | 5 | N | N | Y |
| Salt Cove Brook | N | N | N | N | N | N | Y |

Note: Numbers represent the number of deployments conducted
N=No, Y=Yes

Fish surveys were completed between November 8 and 10, 2025, to meet the following objectives:

- confirm the presence/absence of fish in each of the waterbodies;
- capture the maximum number of species possible; and,
- capture as many fish life stages (spawning, young-of-the-year (YOY), juvenile, and adult) as possible.

Brook Trout (*Salvelinus fontinalis*) life stages were determined by examining external morphology, colour, length, and season. Spawned-out adults were identified by the presence of a red underside and the absence of a swollen abdomen.

All handling of fish followed ethical practices that aimed to reduce stress and risk of fish mortality, which included minimizing handling time, wetting hands prior to handling, and releasing fish gently in the same waters from which they were captured.

### 3.2.1 Shoal Cove Pond

Sampling occurred in Shoal Cove Pond and adjacent wetlands using multiple types of gear. Three gill nets were deployed in Shoal Cove Pond, each with an approximate soak time of one hour (Figure 3). Two hoop nets were set for a minimum duration of eight hours each. Minnow traps were deployed four times in Shoal Cove Pond and nine times in adjacent wetlands and streams, with an average soak time of approximately 24 hours. In addition, three beach seines were completed in Shoal Cove Pond with an average pull length of approximately 25 m.

### 3.2.2 Hares Ears Pond

Fish sampling in Hares Ears Pond was conducted using minnow traps, a hoop net, and beach seines. Two minnow traps were deployed throughout the pond for approximately 24 hours (Figure 4). One hoop net was set for roughly eight hours, and three beach seines were completed.

### 3.2.3 Salt Cove Brook

Fish sampling was not conducted in Salt Cove Brook by LGL. Fish presence and composition were assessed using existing information from available historical sources (CFI 2015; WSP 2025).

### 3.2.4 Adjacent Wetlands

Minnow trapping was conducted in wetlands adjacent to Hares Ears Pond and Shoal Cove Pond. Five minnow traps were deployed in wetlands adjacent to Hares Ears Pond, and nine minnow traps were deployed in wetlands adjacent to Shoal Cove Pond. Trap locations were selected to sample standing water and connected wetland features. Catch data from each trap were recorded.

Fish presence and potential species use of wetland habitats were evaluated using existing information on species occurrence in Salt Cove Brook (WSP 2025) and professional judgement based on observed habitat characteristics.

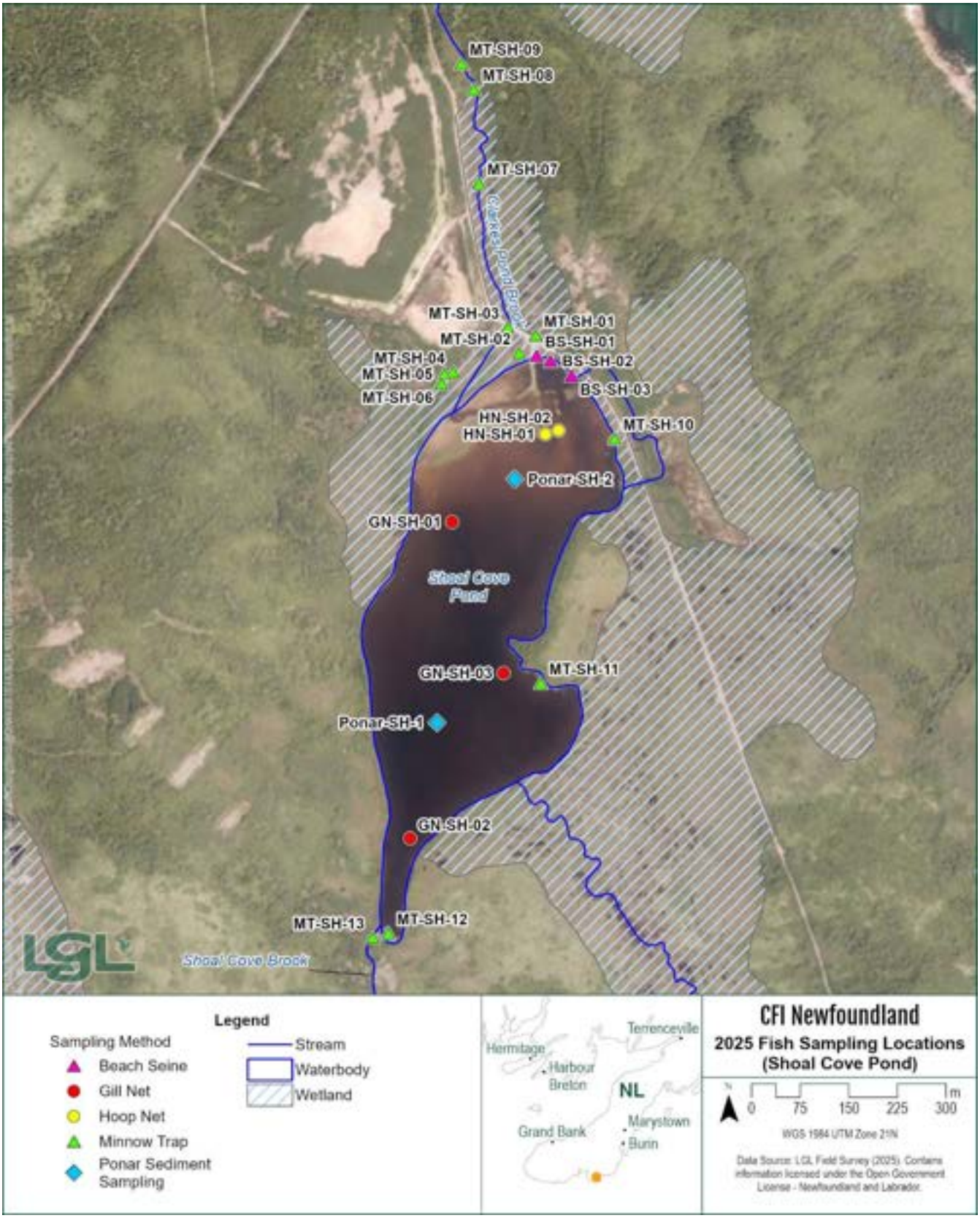


Figure 3. Locations of fish sampling conducted at Shoal Cove Pond, surrounding wetlands and streams in November 2025.

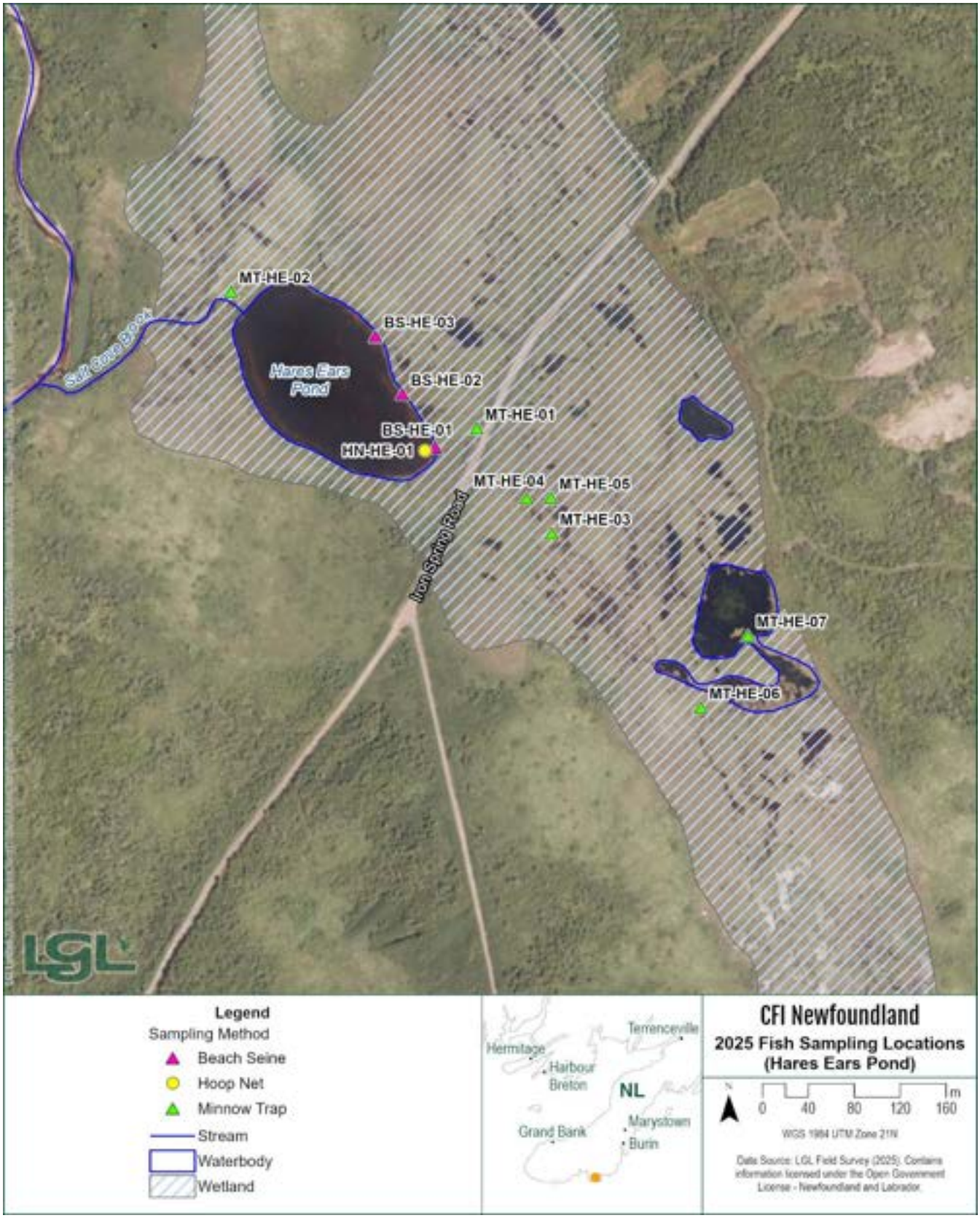


Figure 4. Locations of fish sampling conducted at Hares Ears Pond, surrounding wetlands and streams in November 2025.

## 3.3 Habitat Suitability Indices and Habitat Equivalents Units

Habitat Suitability Indices (HSI) and Habitat Equivalents Units (HEU) for each fish species potentially present in the ponds within the study area were calculated using methods provided by DFO (Bradbury et al. 1999; Bradbury and Power 2001). These calculations were completed using a series of standardized tables that generate an estimate of the total area of suitable habitat for each species by substrate type within each pond (Shoal Cove Pond and Hares Ears Pond).

The following workflow was implemented:

- Identify the fish species and specific life stages that are present within the study area;
- Map and calculate the area of each substrate type (bedrock, boulder, rubble, cobble, gravel, sand, silt, muck, clay, and pelagic) and cover (vegetation or non-vegetation);
- Calculate HSI using species-specific *Lacustrine habitat requirements* tables from Bradbury and Power (2001). Complete calculations only for fish species and habitat types present within the study area. Evaluate HSI values by life stage (spawning, YOY, juvenile, and adult), water depth (0-1 m and 1-2 m), substrate, and cover (none, submerged, emergent, overhead, *in situ*, or other). Rate categories by high, medium, low or nil, corresponding to numerical values of 1.0, 0.67, 0.33, and 0.0.
- Calculate HSI values for each fish species and life stage for all water depth and substrate combinations. For each combination, average the numerical ratings for water depth, substrate, and cover to produce a single HSI value. If a substrate type is assigned a nil rating, assign an HSI value of zero;
    - Develop composite HSI summaries for each fish species and life stage by combining HSI values across water depths and substrates. Group values by habitat (littoral and non-littoral) and substrate type (coarse, medium, and fine).
- Calculate HEU to measure available suitable habitat for each fish species. Apply the highest composite HSI value across life stages for each habitat group. Finally, calculate HEU by multiplying the composite HSI value by the surface area of the corresponding habitat group.

# 4 Results

Prior to the field program, the study area experienced heavy rainfall (i.e., during the week of 3 November 2025, St. Lawrence received 105.7 mm of rainfall (WeatherStats 2025)) with very dry conditions during the summer and early fall. Submerged ATV and moose (*Alces alces*) tracks near the shoreline of Shoal Cove Pond indicated recently elevated water levels prior to the field study. Generally, weather conditions during the field surveys was moderately windy and overcast, with air temperatures between 1-10°C and no precipitation. However, a heavy rainfall event occurred overnight on November 9 with precipitation totaling approximately 50 mm, which further increased the already elevated water levels observed during the field program.

Fish sampling focused on Shoal Cove Pond and Hares Ears Pond with additional surveys being completed in the surrounding wetlands and watercourses. No fish mortalities occurred during the sampling period.

## 4.1 Shoal Cove Pond

### 4.1.1 Habitat Assessment

Shoal Cove Pond is predominantly shallow, with most water depths less than 1.5 m and a maximum recorded depth of 1.8 m (Figure 5). Submerged aquatic macrophytes, primarily pondweed (*Potamogeton* sp.), and emergent vegetation including water bulrush (*Schoenoplectus* sp.), were observed throughout the pond (Figure 6, Table 3).

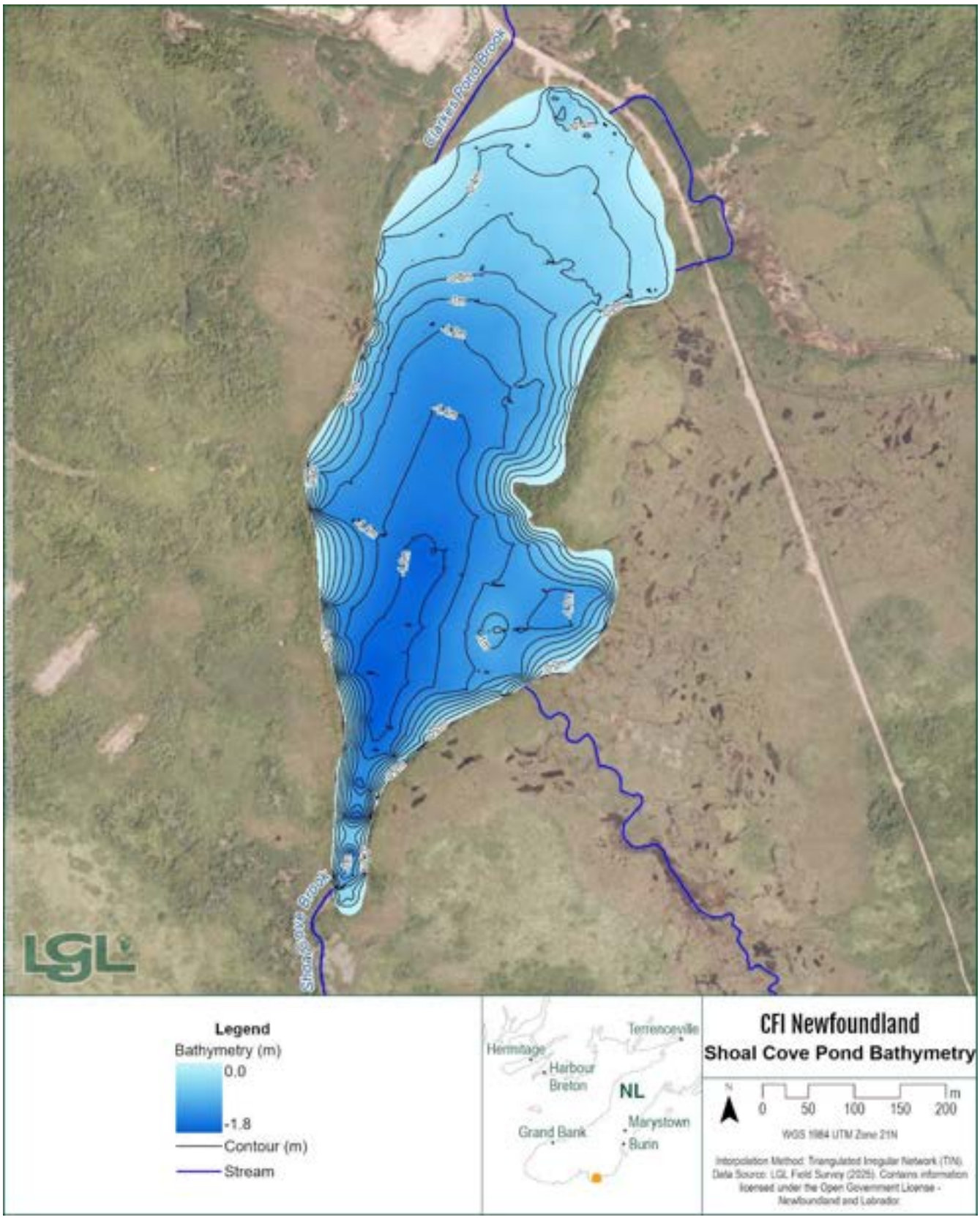


Figure 5. Bathymetry of Shoal Cove Pond based on data collected on 8-9 November 2025.

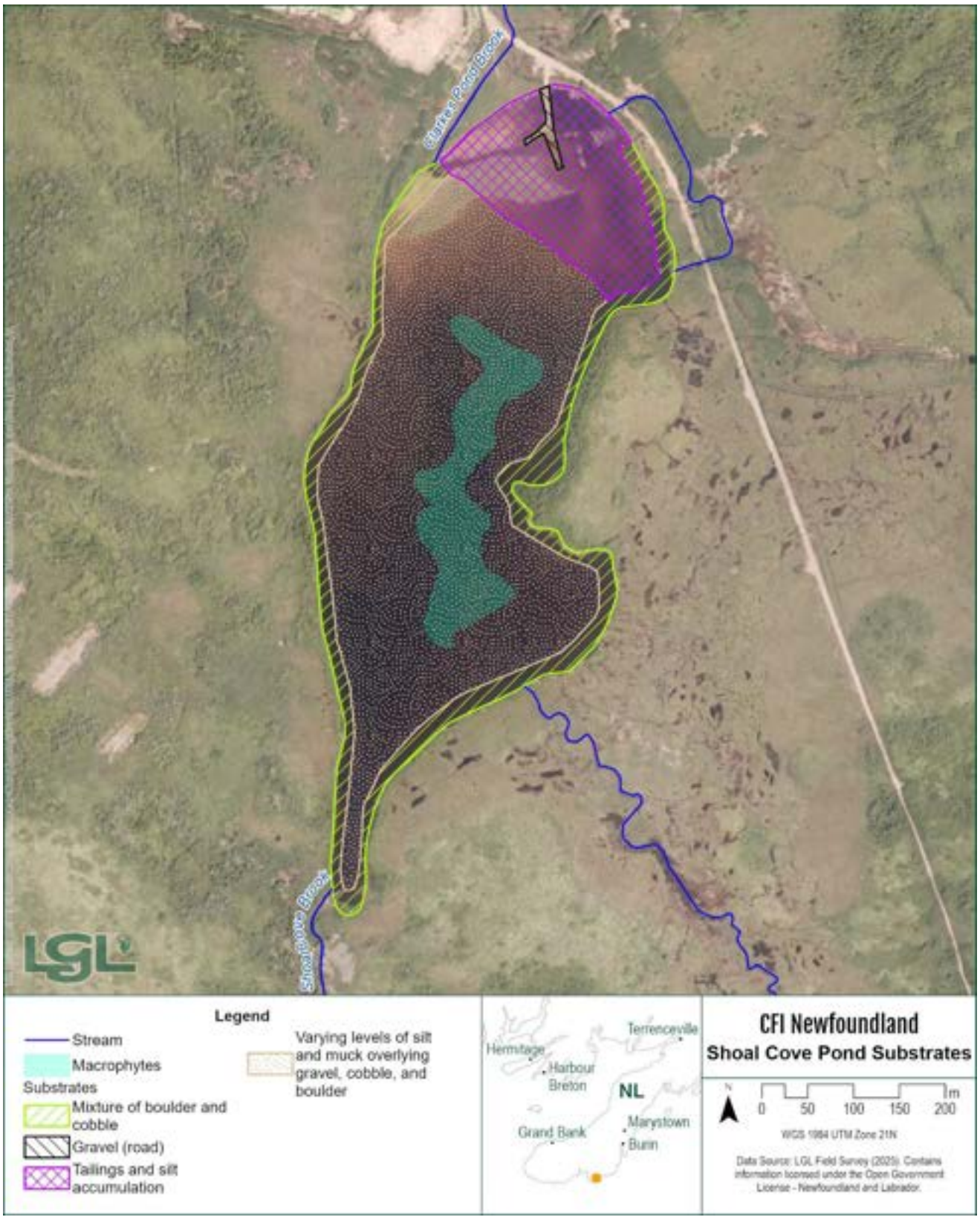


Figure 6. Substrate and cover type map of Shoal Cove Pond based on the habitat assessment conducted in November 2025.

Table 3. Surface area estimates of substrate in Shoal Cove Pond, based on the habitat assessment conducted in November 2025.

| Substrate | Coarse | Medium | Fine |
|---|---|---|---|
| No-Vegetation | Bedrock – 0 m²<br>Boulder – 26,030 m² | Rubble- 0 m²<br>Cobble – 2892 m²<br>Gravel- 957 m² | Sand – 8,970 m²<br>Silt – 90,519 m²<br>Muck – 29,824 m²<br>Clay- 0 m² |
| Totals | 26,030 m² | 3,849 m² | 129,313 m² |
| Vegetation | Bedrock – 0 m²<br>Boulder – 1,370 m² | Rubble- 0 m²<br>Cobble – 152 m²<br>Gravel- 0 m² | Sand- 0 m²<br>Silt – 19,786 m²<br>Muck – 8,480 m²<br>Clay- 0 m² |
| Totals | 1,370 m² | 152 m ² | 28,267 m² |

Note: Mill tailings were historically discharged into Shoal Cove Pond from an upstream facility, resulting in deposition of fine sediments at the north end of the pond (CFI 2015). Therefore, substrate proportions shown here reflect tailings impact.

Two sediment samples (see Figure 3) indicate that silt and muck overlying large cobbles and small boulders is the dominant substrate across approximately half of the pond (see Figure 6). Exposed cobbles and boulders characterize much of the shoreline and the southern region of the pond, with additional large boulders scattered throughout the pond.

Shoal Cove Pond has received tailings since the mid 1930's. Tailings were released into the pond via Clarkes Pond Brook up until 1957 when the discharge location was changed (CFI 2015). As a result, minimal tailings were deposited until 1987, when a tailings management facility began discharging effluent into the pond once again (CFI 2015). This effluent frequently exceeded discharge limits until 1990 (CFI 2015). The primary cause of the predominance of silt and fine materials at the pond's northern end is likely due to this historical tailings deposition.

Permanent fish habitat was observed from approximately 500 m upstream of the pond (Clarkes Pond Brook), through the pond, and downstream (Shoal Cove Brook) to the mouth of Shoal Cove Beach. Several small drainage channels enter Shoal Cove Pond from surrounding wetlands, but these channels are small and unlikely to support direct fish habitat (Figure 7). A fish-passage barrier composed of approximately 20 m of large riprap with four small diameter pipe culverts was identified in Clarkes Pond Brook, ~500 m upstream of Shoal Cove Pond (Figure 8). It is currently unknown whether direct fish habitat exists upstream of this barrier or within Clarkes Pond. A damaged weir is also present at the outlet of Shoal Cove Pond into Shoal Cove Brook; however, missing vertical metal poles mean it no longer restricts fish passage.

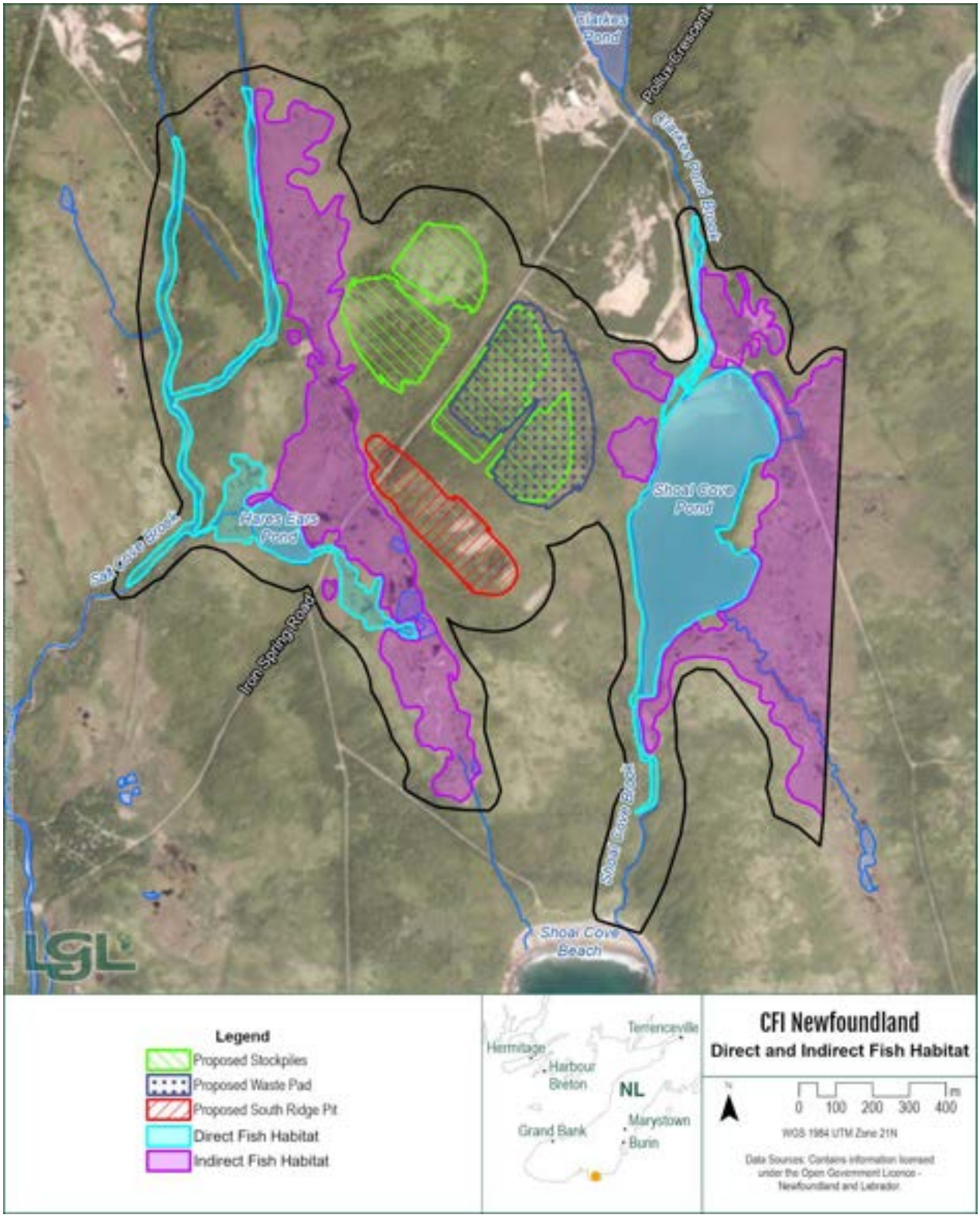


Figure 7. Direct and indirect fish habitat identified in and near the waterbodies of the CFI South Ridge Project Area (November 2025).

Figure 8. Shoal Cove Pond georeferenced photographic summary. Top left: south end of Shoal Cove Pond facing north, middle left: damaged weir at the south end of Shoal Cove Pond (Shoal Cove Brook), bottom left: confluence of Shoal Cove Brook and Shoal Cove Bay, top right: culvert fish barrier between Clarkes Pond and Shoal Cove Pond (Clarkes Pond Brook), middle right: north end of Shoal Cove Pond facing south, bottom right: spawned-out Brook Trout captured in Shoal Cove Pond.

### 4.1.2 Fish Community

Gill netting resulted in the capture of two spawned-out adult Brook Trout in GN-SH-1, one spawned-out adult Brook trout in GN-SH-3, and no fish caught in GN-SH-2. No fish were captured in either hoop net during the sampling period. Across 13 minnow trap locations, a single YOY Brook Trout was captured (Table 44). Beach seining captured three Brook Trout in total: one juvenile and one spawned-out adult in the first seine (BS-SH-01), one juvenile in the second seine (BS-SH-02), and no fish in the third seine (BS-SH-03).

Table 4. Summary of fish sampling conducted at Shoal Cove Pond, surrounding wetlands and streams in 2025.

| ID | Latitude °N | Longitude °W | Effort (minutes) | Species[2] | Count | Stage[3] | CPUE[4] (fish/min) |
|---|---|---|---|---|---|---|---|
| MT-SH-01 | 46.897298 | -55.39491 | 1357 | NFC | - | | 0 |
| MT-SH-02 | 46.89706 | -55.39525 | 1355 | NFC | - | | 0 |
| MT-SH-03 | 46.897419 | -55.39547 | 1353 | NFC | - | | 0 |

| ID | Latitude °N | Longitude °W | Effort (minutes) | Species[2] | Count | Stage[3] | CPUE[4] (fish/min) |
|---|---|---|---|---|---|---|---|
| MT-SH-04 | 46.896815 | -55.39659 | 1351 | BT | 1 | YOY | 0.0007 |
| MT-SH-05 | 46.896786 | -55.39677 | 1330 | NFC | - | | 0 |
| MT-SH-06 | 46.896654 | -55.39684 | 1329 | NFC | - | | 0 |
| MT-SH-07 | 46.899424 | -55.395996 | 1273 | NFC | - | | 0 |
| MT-SH-08 | 46.90073 | -55.39606 | 1254 | NFC | - | | 0 |
| MT-SH-09 | 46.90109 | -55.3963 | 1262 | NFC | - | | 0 |
| MT-SH-10 | 46.895845 | -55.393354 | 1286 | NFC | - | | 0 |
| MT-SH-11 | 46.892474 | -55.394952 | 1465 | NFC | - | | 0 |
| MT-SH-12 | 46.889047 | -55.398138 | 1433 | NFC | - | | 0 |
| MT-SH-13 | 46.888992 | -55.398458 | 1433 | NFC | - | | 0 |
| HN-SH-01 | 46.895924 | -55.39475 | 253 | NFC | - | | 0 |
| HN-SH-02 | 46.895967 | -55.394489 | 965 | NFC | - | | 0 |
| GN-SH-01 | 46.894732 | -55.39668 | 55 | BT | 2 | AD | 0.036 |
| GN-SH-02 | 46.890354 | -55.397662 | 70 | NFC | - | | 0 |
| GN-SH-03 | 46.892619 | -55.395704 | 52 | BT | 1 | AD | 0.019 |
| BS-SH-01 | 46.897016 | -55.3949 | NA | BT | 2 | 1 JUV, 1 AD | NA |
| BS-SH-02 | 46.896937 | -55.394623 | NA | BT | 1 | JUV | NA |
| BS-SH-03 | 46.89673 | -55.3942 | NA | NFC | - | | NA |

[1]MT= minnow trap; GN=gill net; BS=beach seine; HN=hoop net.
[2]BT=Brook Trout; NFC=no fish caught.
[3]YOY=young of the year; JUV=juvenile; AD=adult; NA = not applicable.
[4]CPUE=Catch Per Unit Effort.

## 4.2 Hares Ears Pond

### 4.2.1 Habitat Assessment

Water depths in Hares Ears Pond were consistently shallow (≤1.0 m) across the pond. Submerged aquatic macrophytes (pondweed) and emergent vegetation (water bulrush) were abundant, occurring continuously throughout the pond and along its perimeter. Substrates consisted primarily of silt overlying cobble and boulder, with larger boulders scattered throughout the pond (Table 5, Figure 9).

**Table 5. Surface area estimates of substrates in Hares Ears Pond, based on the habitat assessment conducted in November 2025.**

| Substrate | Coarse | Medium | Fine |
|---|---|---|---|
| No-Vegetation | Bedrock – 0 m²<br>Boulder – 831 m² | Rubble- 0 m²<br>Cobble – 356 m²<br>Gravel- 75 m² | Sand – 0 m²<br>Silt – 0 m²<br>Muck –0 m²<br>Clay- 0 m² |
| Totals | 831 m² | 431 m² | 0 m² |
| Vegetation | Bedrock – 0 m²<br>Boulder –0 m² | Rubble- 0 m²<br>Cobble – 173 m²<br>Gravel- 0 m² | Sand- 0 m²<br>Silt –11,929 m²<br>Muck – 5,187m²<br>Clay- 0 m² |
| Totals | 0 m² | 173 m ² | 17,116 m² |

Figure 9. Substrate and cover type map of Hares Ears Pond based on the habitat assessment conducted in November 2025.

Hares Ears Pond, its outlet (Salt Cove Brook), and the upstream wetlands were observed to be directly connected and provide continuous direct fish habitat (see Figure 7, Figure 10). Two pipe culverts beneath Iron Springs Road allow for fish passage between Hares Ears Pond and the upstream wetlands and small ponds to the southeast. These ponds and the watercourse that drains them are permanent features as indicated by aquatic macrophyte growth throughout the open channels and pond features. The upstream watercourse is narrow but relatively deep (40-50 cm), with rock substrates and deeply undercut vertical banks. The combined wetland and channel flow path is approximately 400 m long (see Figure 7).

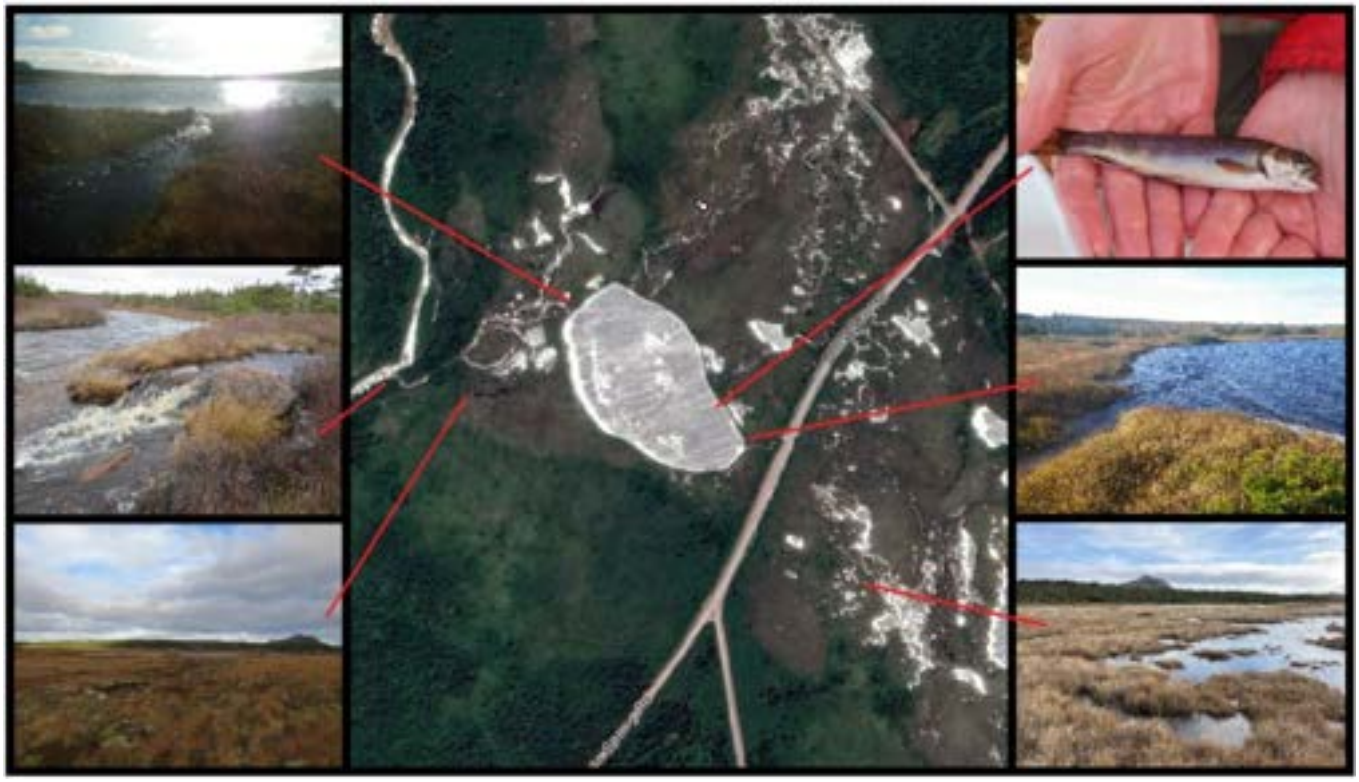

Figure 10. Hares Ears Pond georeferenced photographic summary. Top left: outlet at the northwestern end of Hares Ears Pond flowing into Salt Cove Brook; middle left: confluence of Salt Cove Brook and Hares Ears outlet stream; bottom left: overview of Hares Ear and surrounding wetlands; top right: juvenile Brook Trout captured in Hares Ears Pond; middle right: stream flowing into Hares Ears Pond from southern wetlands and ditches; bottom right: overview of wetlands.

### 4.2.2 Fish Community

One hoop net was set within Hares Ears Pond, resulting in the capture of two juvenile Brook Trout (Table 6). Three beach seines were performed with seine BS-HE-01 capturing two adult Brook Trout and one juvenile. Seine BS-HE-02 produced no catch. BS-HE-03 captured four Brook Trout, three YOY and one juvenile. While conducting habitat assessments, surveyors noted the presence of a deceased adult green frog in Hares Ears Pond.

Table 6. Summary of fish sampling conducted at Hares Ears Pond, surrounding wetlands and streams in 2025.

| ID | Latitude °N | Longitude °W | Effort (min) | Species[2] | Count | Stage | CPUE[3] (fish/min) |
|---|---|---|---|---|---|---|---|
| MT-HE-01 | 46.892778 | -55.4094444 | 1395 | NFC | | | 0 |
| MT-HE-02 | 46.893889 | -55.4122222 | 1626 | NFC | | | 0 |
| MT-HE-03 | 46.891944 | -55.4086111 | 1365 | NFC | | | 0 |
| MT-HE-04 | 46.892222 | -55.4088889 | 1409 | NFC | | | 0 |
| MT-HE-05 | 46.892222 | -55.4086111 | 1374 | BT | 1 | AD | 0.00073 |
| MT-HE-06 | 46.890556 | -55.4069444 | 1386 | NFC | | | 0 |
| MT-HE-07 | 46.891111 | -55.4063889 | 1371 | NFC | | | 0 |
| HN-HE-01 | 46.895924 | -55.39475 | 1432 | BT | 2 | JUV | 0.0014 |
| BS-HE-01 | 46.892635 | -55.409923 | NA | BT | 3 | 1 JUV, 2 AD | |
| BS-HE-02 | 46.893058 | -55.410286 | NA | NFC | | | |
| BS-HE-03 | 46.893515 | -55.410581 | NA | BT | 4 | 3 YOY, 1 JUV | |

[1]MT= minnow trap; GN=gill net; BS=beach seine; HN=hoop net.
[2]BT=Brook Trout; NFC=no fish caught.
[3]YOY=young of the year; JUV=juvenile; AD=adult.
[4]CPUE=Catch Per Unit Effort.

## 4.3 Salt Cove Brook

### 4.3.1 Habitat Assessment

The substrate observed within the study area of Salt Cove Brook consisted primarily of a gravel-cobble-boulder mix. Following a significant rainfall event, surveyors noted higher than usual flow conditions. Hydrology measurements collected in 2024 recorded velocities ranging from 0.11 m/s to 0.79 m/s and mean depths between 0.09 m to 0.25 m (WSP 2025). Aquatic vegetation was not observed during LGL's survey within the Salt Cove Brook study area, likely due to flow conditions being too high to support its establishment and the dominance of coarse substrates.

Salt Cove Brook provides potential fish habitat for multiple fish species, including Atlantic Salmon. It has an outflow into the Atlantic Ocean at Salt Cove and a direct connection to Hares Ears Pond and upstream wetlands. The mouth of Salt Cove Brook may be impassable to Atlantic Salmon at times (WSP 2025) but typically, there are no barriers to fish passage. Given these connections and habitat characteristics (gravel-cobble substrate, riffles) there is a possibility that Salt Cove Brook supports Atlantic Salmon spawning.

### 4.3.2 Fish Community

No fish surveys were conducted in Salt Cove Brook by LGL during this assessment, though species composition has been well documented since 2018 by CFI's habitat compensation program (WSP 2025). Historical data collected on behalf of CFI's AGS mine indicate that Salt Cove Brook supports Atlantic Salmon, American Eel, and Brook Trout (CFI 2015, WSP 2025).

## 4.4 Adjacent Wetlands

### 4.4.1 Habitat Assessment

Multiple ponds along the eastern edge of the wetlands between Hares Ears Pond and the Project area appear to be permanent features; however, most of these do not seem to be directly connected to the primary surface-water flow path associated with the main inflowing watercourse entering the pond from the southeast (see Figure 7, Figure 10). It is possible (and likely) that water flow is moving underground or beneath floating vegetation, but these pathways are unlikely to provide conditions that would allow for fish passage. This "unconnected" portion of the

wetland also contains several ponds that dry out as evidenced by cracked mud substrates and a lack of aquatic vegetation.

In contrast, a portion of the wetland complex and its connected upstream areas provide continuous fish habitat (shown in blue on Figure 7). Culverts beneath Iron Springs Road allow for fish passage between Hares Ears Pond and these wetland areas which includes a permanent watercourse and several small ponds to the southeast. The combined wetland and channel flow path extends for approximately 400 m.

At Shoal Cove Pond, there are multiple small drainage channels that enter the pond from surrounding wetlands; however, these channels are small and unlikely to support fish habitat. No evidence of permanency was observed.

### 4.4.2 Fish Community

A total of five minnow traps were set in the wetlands adjacent to Hares Ears Pond. Within these traps, LGL personnel captured one adult Brook Trout (MT-HE-05), ten Green Frog tadpoles and two predaceous diving beetles (MT-HE-06), and a single tadpole (MT-HE-07) (see Table 6, Figure 10). The remaining traps yielded no catch. One passing motorist indicated that the largest of three ponds (located in the pink indirect fish habitat on Figure 7) was "stocked" with Brook Trout by a local resident, though no fish were captured or observed in this pond during the field program.

Historical data shows that Salt Cove Brook supports both Atlantic Salmon and American Eel (WSP 2025). Given its direct connection to Hares Ears Pond and surrounding wetlands, these areas could theoretically be used by these species. However, based on the specific characteristics of the wetland habitat and the shallow, weedy nature of the pond, this scenario is considered highly unlikely, at least for Atlantic Salmon. American Eel could potentially use the pond and upstream wetlands for foraging.

Within Shoal Cove Pond wetlands nine minnow traps were set, MT-SH-04 captured a single YOY Brook Trout while the others yielded no catch (see Table 4). The small pond in which the fish was captured is directly connected to Shoal Cove Brook upstream of Shoal Cove Pond.

## 4.5 Habitat Suitability Indices and Habitat Equivalents Units

Habitat Evaluation Units (HEU) were calculated for Brook Trout, American Eel, and Atlantic Salmon (Appendix C). American Eel and Atlantic Salmon were included despite not being observed during the field program, as present conditions do not restrict fish passage to Shoal Cove Pond or Hares Ears Pond, and both species have historical records in each system.

The HEU analysis identifies Brook Trout as having the most preferred habitat present, with 141,708 $m^2$ out of 188,982 $m^2$ available in Shoal Cove Pond and 12,903 $m^2$ out of 18,551 $m^2$ available in Hares Ears Pond (Table 7 and Table 8). American Eel and Atlantic Salmon also have suitable habitat in both ponds, though less than Brook Trout overall. Across all species and both ponds, coarse substrate habitats accounted for the highest HEU values, indicating this habitat type provides the most preferred conditions within Shoal Cove Pond and Hares Ears Pond.

Table 7. Habitat Equivalent Units for each fish species present within Shoal Cove Pond.

| | Littoral Zone | | | | | | |
|---|---|---|---|---|---|---|---|
| Species[1] | Coarse/No Veg (available habitat 26,030 m²) | Medium/No veg (available habitat 3,849 m²) | Fine/No veg (available habitat 129,313 m²) | Coarse/Veg (available habitat 1,370 m²) | Medium/Veg (available habitat 152 m²) | Fine/Veg (available habitat 28,267 m²) | Total available habitat (188,982 m² |
| Brook Trout | 26,030 | 3,849 | 90,519 | 1,370 | 152 | 19,787 | **141,708** |
| American Eel | 26,030 | 0 | 51.725 | 1,370 | 0 | 8,763 | **87,888** |
| Atlantic Salmon | 26,030 | 3.657 | 51,725 | 1,370 | 113 | 11,307 | **94,202** |

[1] Only brook trout were caught during the 2025 studies at Shoal Cove Pond
Note: Non-littoral zone was not present within Shoal Cove Pond, therefore it was not included in this table

Table 8. Habitat Equivalent Units for each fish species present within Hares Ears Pond.

| | Littoral Zone | | | | | | |
|---|---|---|---|---|---|---|---|
| Species[1] | Coarse/No Veg (available habitat 831 m²) | Medium/No veg (available habitat 431 m²) | Fine/No veg (available habitat 0 m²) | Coarse/Veg (available habitat 0 m²) | Medium/Veg (available habitat 173 m²) | Fine/Veg (available habitat 17,116 m²) | Total available habitat (available habitat 18,551m² |
| Brook Trout | 831 | 431 | NA | NA | 173 | 11,468 | **12,903** |
| American Eel | 831 | 0 | NA | NA | 0 | 6,647 | **7,478** |
| Atlantic Salmon | 831 | 395 | NA | NA | 173 | 5,691 | **7,091** |

[1] Only brook trout were caught during the 2025 studies at Hares Ears Pond
Note: Non-littoral zone was not present within Hares Ears Pond, therefore it was not included in this table

# 5 Discussion

Habitat conditions in the study area ranged from shallow ponds with abundant aquatic vegetation to fast-flowing stream segments. Water levels were elevated during fieldwork due to recent heavy rainfall, which influenced flow conditions, water depths, and shoreline inundation in several locations, particularly Shoal Cove Pond. Hares Ears Pond and a portion of the adjacent wetlands exhibited characteristics consistent with functional fish habitat, including continuous flow paths and generally unobstructed connectivity throughout most of the system. Shoal Cove Pond is also considered fish habitat, despite having some localized barriers to fish passage.

Key lacustrine habitat features observed included exclusively littoral zones in both Shoal Cove Pond and Hares Ears Pond with extensive patches of submerged macrophytes, and substrates dominated by silt and muck over cobble and boulder. Shoal Cove Brook and Salt Cove Brook provided lotic habitat characterized by gravel-cobble substrates, riffle sections, and moderate flow velocities (WSP 2025). Wetland complexes associated with Hares Ears Pond support permanent surface water channels, undercut banks, and macrophyte growth, indicating consistent aquatic habitat.

Brook Trout were the primary species confirmed during sampling, with adult, juvenile, and YOY life stages captured within Shoal Cove Pond and Hares Ears Pond. Spawned-out adults were captured only in Shoal Cove Pond, with no evidence collected to support spawning adults in Hares Ears Pond, though a single (non-spawning) adult was captured in the Hares Ears Pond adjacent wetlands. The presence of various life stages indicates that these areas provide a combination of spawning, rearing, and foraging habitat for Brook Trout. Historical data also confirm the presence of Atlantic Salmon within Salt Cove Brook and American Eel within its headwaters of Haypook Pond. Given the connectivity of these areas and habitat conditions, it is possible that Hares Ears Pond is used at least periodically by American Eel. Habitat conditions in Hares Ears Pond, including shallow depths, soft substrates and abundant vegetation, are more suitable for American eel than for Atlantic Salmon, though limited spawning habitat may exist for salmon within Salt Cove Brook.

Habitat characteristics observed during the assessment align with expectations for the Eastern Hyper-Oceanic Barrens Ecoregion, where shallow ponds, heath-moss wetlands, and narrow rocky streams are typical. Substrate compositions, vegetation patterns, and flow characteristics were consistent with previously documented conditions in the surrounding area, and the presence of Brook Trout aligns with historical data for these waterbodies (CFI 2015, WSP 2025). Natural factors influencing habitat include seasonal changes, water quality (temperature, dissolved oxygen, salinity) and physical conditions (water flow, depth, turbidity, substrate). Anthropogenic influences are predominantly historical, including the previous deposition of tailings, installation of culverts, rock placement, and a damaged weir at the outlet of Shoal Cove Pond. The culvert and rock barrier between Shoal Cove Pond and Clarkes Pond currently restrict upstream fish passage, while other infrastructure such as the Iron Springs Road culverts allow movement between Hares Ears Pond and upstream wetlands.

The combination of shallow pond environments, well-connected flow paths, diverse substrates, and variable vegetation cover supports a range of habitat functions including rearing, foraging and overwintering for Brook Trout. Riffle-run habitats in Salt Cove Brook provide potential spawning habitat for Atlantic Salmon, while soft substrates and dense vegetation in Hares Ears Pond create favourable conditions for American Eel (although neither species were captured during this project). Restricted connectivity between Shoal Cove Pond and Clarkes Pond limits habitat access in the area, but otherwise the system provides continuous aquatic habitat across most pathways. Wetland channels linked to Hares Ears Pond also function as fish passage and seasonal habitat.

HEU is used by DFO to quantify the potential for harm, alteration, disturbance and destruction (HADD) of fish habitat and can be used by CFI to inform the development of a fish habitat compensation plan that ensures there is no net loss of productive fish habitat as a result of the Project activities.

HEU calculations identified a substantial proportion of available preferred littoral habitat for Brook Trout, American Eel and Atlantic Salmon, in both Shoal Cove Pond and Hares Ears Pond. In Shoal Cove Pond, preferred habitat ranged from approximately 87,888 to 141,708 m² (46%-75% of 188,982 m² total available habitat). In Hares Ears Pond preferred habitat ranged from approximately 7,091 to 12,903 m² (38%-70% of 18,551 m² total available habitat), depending on species.

Results interpretation is influenced by the timing of the survey, which occurred outside the allowable electrofishing window and shortly after significant rainfall, potentially affecting detectability and fish movement patterns. Elevated water levels may have obscured shoreline habitat features. Only portions of Salt Cove Brook were assessed, leaving some uncertainty regarding the full extent of habitat condition upstream and downstream of the study area.

# 6 Conclusion

The study area contains a well-connected network of pond, stream, and wetland habitats that collectively support multiple life stages of Brook Trout and provide potential habitat for other fish species such as American Eel and Atlantic Salmon. Permanent fish habitat was confirmed, with key features such as shallow vegetated ponds, cobble-dominated streams, and continuous wetland channels, that support ecological processes such as spawning, rearing, and foraging.

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# Appendix A – Incidental Observations

Table A-1. Incidental Observations of birds and wildlife made during the Fish and Fish habitat assessments conducted within the Project area of the CFI South Ridge Project 2025.

| Date | Time | Observer | Location | Air Temp (°C) | Species | Count | Age/ Sex | Behaviour | Habitat | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 Nov 25 | 8:37 | JV/SP | 46.89694° N 55.39444° W | 5 | Greater Yellowlegs | 1 | | Calling, flying | Shoal Cove Pond, nearby mixed forest, Marsh | |
| 8 Nov 25 | 8:37 | JV/SP | 46.89694° N 55.39444° W | 5 | Dark-eared Junco | 2 | | Calling | Shoal Cove Pond: Nearby mixed forest, Marsh | |
| 8 Nov 25 | 9:07 | JV/SP | 46.89611° N 55.39639° W | 5 | Blue Jay | 1 | | Call | Barrens, Marsh, Wetland, Pond Nearby mixed forest | |
| 8 Nov 25 | 9:53 | JV/SP | 46.89472° N 55.39750° W | 5 | Herring Gull | 2 | 1 Adult 1 Juvenile | Flying | Barrens, Marsh, Wetland, Pond, Nearby mixed forest | |
| 8 Nov 25 | 11:50 | SM | 46.897083° N 55.39475° W | 6 | Red-breasted Merganser | 3 | | Flyover | Shoal Cove Pond | |
| 9 Nov 25 | 7:45 | SM | 46.90078° N 55.39649° W | 5 | Pine Sisken | 2 | | Flyover | Stunted coniferous forest along stream between Shoal | |

| Date | Time | Observer | Location | Air Temp (°C) | Species | Count | Age/ Sex | Behaviour | Habitat | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Cove and Clarkes Pond | |
| 9 Nov 25 | 9:45 | SM | 46.892835° N 55.395063° W | 7 | Merlin | 1 | | Flyover | Coastal Barren, flyover Shoal Cove Pond | |
| 9 Nov 25 | 11:20 | JV/SP | 46.89167° N 55.40806° W | 7 | American Pipit | 1 | | Call | Barrens/ Marsh/ Wetland/ Pond/ Nearby mixed forest | Windy |
| 9 Nov 25 | 12:03 | JV/SP | 46.88389° N 55.40222° W | 7 | Sanderling | 4 | Adult | On beach, feeding | Sandy beach | Windy |
| 9 Nov 25 | 12:03 | JV/SP | 46.88389° N 55.40222° W | 7 | Semi-palmated Plover | 2 | Adult | On beach, feeding | Sandy Beach | Windy |
| 10 Nov 25 | 8:38 | JV/SP | 46.89250° N 55.40944° W | 1 | American Goldfinch | 2 | / | Flying, call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |
| 10 Nov 25 | 9:59 | JV/SP | 46.89111° N 55.40639° W | 4 | Blue Jay | 2 | / | Call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |

| Date | Time | Observer | Location | Air Temp (°C) | Species | Count | Age/ Sex | Behaviour | Habitat | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 Nov 25 | 9:44 | JV/SP | 46.89238° N 55.40860° W | 4 | American Goldfinch | 1 | / | Call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |
| 10 Nov 25 | 10:15 | JV/SP | 46.89056° N 55.40528° W | 4 | Blac-capped Chickadee | 2 | / | Call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |
| 10 Nov 25 | 10:15 | JV/SP | 46.89056° N 55.40528° W | 4 | Dark-eyed Junco | 2 | / | Call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |
| 10 Nov 25 | 10:15 | JV/SP | 46.89056° N 55.40528° W | 4 | Boreal Chickadee | 2 | / | Call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |
| 10 Nov 25 | 10:15 | JV/SP | 46.89056° N 55.40528° W | 4 | Golden-crowned Kinglet | 2 | / | Call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |
| 10 Nov 25 | 11:15 | JV/SP | 46.89278° N 55.40944° W | 4 | Pine Grosbeak | 2 | / | Call | Barrens/ Marsh/ Wetland/ Nearby mixed forest | Calm |
| 10 Nov 25 | 13:00 | JV/SP/SM/AO | 46.89222° N 55.40972° W | 6 | Moose | 3 | 2 Adult 1 Juvenile | Feeding, Standing, walking | Hares ear pond/ Marsh/ Mixed fir spruce forest | Hanging out for a while |

| Date | Time | Observer | Location | Air Temp (°C) | Species | Count | Age/ Sex | Behaviour | Habitat | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 Nov 25 | 14:02 | JV/SP | 46.89278° N 55.40333° W | 7 | Boreal Chickadee | 2 | / | Calling | Wetlands/ Mixed fir spruce forest | |
| 10 Nov 25 | 14:02 | JV/SP | 46.89278° N 55.40333° W | 7 | Pine Grosbeak | 2 | / | Call | Wetlands/ Mixed fir spruce forest | |
| 10 Nov 25 | 14:02 | JV/SP | 46.89278° N 55.40333° W | 7 | Red squirrel | 1 | / | Call | Wetlands/ Mixed fir spruce forest | |
| 10 Nov 25 | 13:20 | SM | 46.892932° N 55.407071° W | 7 | Green-winged Teal | 4 | | Flying pond to pond, foraging | Wetlands SE of Hares Ears Pond | |

[1]JV=Judson Venier, SP=Sydnie Power, SM=Sean Munro, AO=Adam O'Meara

# Appendix B – Department of Fisheries and Oceans Section 52 License

Unclassified - Non-Classifié

Fisheries and Oceans Canada / Pêches et Océans Canada

**2025**

**SECTION 52 LICENCE** **LICENCE #: NL-9275-25**

LGL Limited
1655 Topsail Road
Paradise, NL
A1L 1V1

**Contact Information:** Sean Munro – (709) 754-1992 ; jcavallo@lgl.com

Subject to Section 52 of the *Fishery (General) Regulations*, permission is hereby granted to the designate(s) of **LGL Limited** to conduct fishing activity, subject to the following conditions:

**1. PURPOSE:**

A. To conduct a study to identify the current state of fish and fish habitat prior to the application for project approval for the South Ridge Project on behalf of Canada Fluorspar Inc. (CFI).

B. The South Ridge Project is a planned expansion of the St. Lawrence Fluorspar Project which would be located along the Iron Spring Road (46.896771, -55.403216), approximately ~4 km to the SSW of the town St. Lawrence, Newfoundland.

**2. FISHING SEASON:**

A. This licence is valid from October 27, 2025 to November 30, 2025.

B. If for proper management and control of fisheries, it is required that fishing in this area is required to stop within the above validity period, you must cease fishing when notified by one of the following methods:
   a. Broadcasting the notice over a commercial or marine radio station, a radio station operated by the Department of Fisheries and Oceans ("Department") or a radio station located on a vessel under contract to the Department that broadcasts in the area or vicinity of the area affected by the closure notice; or
   b. Transmitting the notice by electronic means to the licence holder; or
   c. Having a fishery officer or fishery guardian give oral notice thereof.

**3. SPECIES AND QUANTITY - (number of fish caught is unknown):**

A. Brook trout
B. American eel
C. Atlantic salmon

D. No retention

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Fisheries and Oceans Canada / Pêches et Océans Canada

**2025**

**SECTION 52 LICENCE** **LICENCE #: NL-9275-25**

LGL Limited
1655 Topsail Road
Paradise, NL
A1L 1V1

**Contact Information:** Sean Munro – (709) 754-1992 ; jcavallo@lgl.com

**4. BIOLOGICAL SAMPLING:**

A. Fish will be removed from nets in a manner to avoid injury and will be placed in bins or buckets with fresh water. Handling time of fish out of water will be kept to a minimum.

B. Fish will be identified and enumerated, but will not be weighted or measured, which will reduce time out of water.

C. Listed species (i.e. American Eel) will be given priority during processing.

D. Fish will be returned to the waterbody in which they were captured in a healthy state or held in water until recovery is complete.

E. Any mortalities will be recorded and reported to DFO.

**5. FISHING AREA:**

A. A 100m setback for fisheries investigations has been identified at Hares Ear Pond, Shoal Cove Pond and surrounding waterbodies (wetlands). See attached Appendix 1.

**6. FISHING GEAR:**

A. Minnow traps – max of 10.

B. Gill nets – short duration – max of 3 – 100 ft length various sized mesh. You **must** notify the Area Chief, Conservation and Protection, Melissa Abbott (Melissa.Abbott@dfo-mpo.gc.ca ) **each** time you use gillnets.

C. Hoop nets – max of 2.

D. Seine nets – max of 2. 100 ft length and ¼ mesh size.

E. Fishing gear must be set in a manner that it does not impede the upstream migration of fish.

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**2025**

**SECTION 52 LICENCE** **LICENCE #: NL-9275-25**

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F. Fishing activity must cease when water temperatures exceed 20 degrees and gear must be removed from the water.

G. All gear used must be marked/tagged with licence number **NL-9275-25**. Unless other wise stated above, you must not leave fishing gear unattended in water for more than 24 consecutive hours.

## 7. AUTHORIZED DESIGNATE(S):

| | |
|---|---|
| Joe Cavallo | Adam O'Meara |
| Judson Venier | Sydnie Power |

## 8. BY-CATCH:

A. All by-catch of other species must be returned to the water in the area from which they are caught in a manner that causes them the least harm.

## 9. REPORTING REQUIREMENTS:

A. **Prior** to any activities authorized under this licence taking place, and each time gill nets are used or fyke nets set in rivers, you **must** notify the Area Chief, Conservation and Protection, Fisheries and Oceans Canada for the area of activity in writing to:
- Eastern Newfoundland and Labrador (Melissa Abbott), Melissa.Abbott@dfo-mpo.gc.ca.
- Information provided must include designate(s), species sought, fishing location, dates and times, type of gear to be used and limits to the usage of gear.

B. An electronic report containing records of the dates fished, numbers of fish of each species counted, and any biological characteristics data collected must be submitted within 90 days of the licence end date and identified as **NL-9275-25** to:
- Chantelle Burke, Salmonids Section, Fisheries and Oceans Canada: Chantelle.Burke@dfo-mpo.gc.ca.

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Fisheries and Oceans Canada | Pêches et Océans Canada

**2025**

**SECTION 52 LICENCE** **LICENCE #: NL-9275-25**

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**Contact Information:** Sean Munro – (709) 754-1992 ; jcavallo@lgl.com

C. If there are any unusual mortalities or diseases identified, notify the nearest Department of Fisheries and Oceans office and the Chair of the Introductions and Transfers Committee at DFO.NLITC-CITTNL.MPO@dfo-mpo.gc.ca.

**10. DISCARDING WASTE:**

A. (for Non-vessel based fishery):
   I. The licence holder, when fishing under these conditions of licence, is prohibited from discarding in waters under the authority of this licence any item that may be harmful to fish or fish habitat including but not limited to plastics, ropes, fishing gear, garbage bags, fuel, oil, rags, glass, bottles, metal, extruded polystyrene foam (e.g. Styrofoam) and tires.

**11. LOST GEAR REPORTING:**

A. For the purpose of this section, lost gear is defined as fishing gear over which the licence holder/operator has accidentally lost control and that cannot be located and/or retrieved by the licence holder/operator.

B. The licence holder/operator must report any of their lost fishing gear within 24 hours of returning to port at the end of the fishing trip. Reports of lost gear must be submitted to Fisheries and Oceans Canada (DFO) through the Fishing Gear Reporting System available online at https://qq-ef.dfo-mpo.gc.ca/en or by completing the Lost Fishing Gear Form available online at https://www.dfo-mpo.gc.ca/fisheries-peches/reports-rapports/lost-gear-perte-engin/index-eng.html and attached to these licence conditions and it must be submitted as per the instructions provided on the form.

**12. RETRIEVED GEAR REPORTING:**

A. For the purpose of this section, retrieved fishing gear is defined as any previously reported lost fishing gear by the licence holder and fishing vessel operator, that has been subsequently found.

B. The licence holder/operator must report the retrieval of any of their own previously reported lost gear within 24 hours of returning to port at the end of the fishing trip. Reports of retrieved gear must be submitted to DFO through the Fishing Gear Reporting System available online at https://qq-ef.dfo-

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Fisheries and Oceans Canada | Pêches et Océans Canada

**2025**

**SECTION 52 LICENCE** **LICENCE #: NL-9275-25**

LGL Limited
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Paradise, NL
A1L 1V1

**Contact Information:** Sean Munro – (709) 754-1992 ; jcavallo@lgl.com

mpo.gc.ca/en or by completing and submitting the Retrieval of Previously Reported Lost Fishing Gear Form available online at https://www.dfo-mpo.gc.ca/fisheries-peches/reports-rapports/retrieved-gear-recuperation-engin/index-eng.html and attached to these licence conditions and it must be submitted as per the instructions provided on the form. Retrieval can only occur during the validity period of these licence conditions and only in relation to the specific type of gear authorized to be used by these licence conditions.

**13. GENERAL REQUIREMENTS:**

A. Requests for amendments to this license must be made in writing via e-mail to: DFO.ExperimentalLicensing-Experimental.MPO@DFO-MPO.GC.CA.

B. This license must be carried at all times and must be produced for inspection upon request of a Fishery Officer and/or Fishery Guardian.

C. Fish caught under the authority of this license cannot be sold, traded, or bartered.

D. No recreational or commercial fishing activity is permitted while engaged in activities authorized under this licence, **and no recreationally caught fish can be transported where this licence is in use.**

# Appendix C – Habitat Suitability Indices and Habitat Equivalent Units Calculation Tables

Table C-1. Lacustrine habitat requirement ratings for brook trout at different life stages for the depth and substrate combinations at Shoal Cove Pond 2025 (adapted from Table 17 of Bradley et al. (1999)).

| Brook trout -Spawning | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobble | 0.84 | 0.84 | 0.84 | 0.84 |
| Gravel | 1.00 | - | 1.00 | - |
| Sand | 0.84 | - | 0.84 | - |
| Silt | 0.67 | 0.67 | 0.67 | 0.67 |
| Muck | 0.67 | 0.67 | 0.67 | 0.67 |

| Brook trout -YOY | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 1.00 | 1.00 | 1.00 | 1.00 |
| Cobble | 1.00 | 1.00 | 1.00 | 1.00 |
| Gravel | 1.00 | - | 1.00 | - |
| Sand | 0.00 | - | 0.00 | - |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| Brook trout -Juvenile | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 1.00 | 1.00 | 1.00 | 1.00 |
| Cobble | 1.00 | 1.00 | 1.00 | 1.00 |
| Gravel | 1.00 | - | 1.00 | - |
| Sand | 0.00 | - | 0.00 | - |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| Brook trout -Adult | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobble | 1.00 | 1.00 | 1.00 | 1.00 |
| Gravel | 1.00 | - | 1.00 | - |
| Sand | 0.67 | - | 0.78 | - |
| Silt | 0.67 | 0.67 | 0.78 | 0.78 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

Table C-2. Lacustrine habitat requirement ratings for Atlantic Salmon at different life stages for the depth and substrate combinations at Shoal Cove Pond 2025 (adapted from Table 15 of Bradley et al. (1999)).

| Atlantic salmon -Spawning | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobble | 0.00 | 0.00 | 0.00 | 0.00 |
| Gravel | 0.00 | NA | 0.00 | NA |
| Sand | 0.00 | NA | 0.00 | NA |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| Atlantic salmon -YOY | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 1.00 | 1.00 | 1.00 | 1.00 |
| Cobble | 1.00 | 1.00 | 1.00 | 1.00 |
| Gravel | 0.67 | NA | 0.00 | NA |
| Sand | 0.67 | NA | 0.67 | NA |
| Silt | 0.67 | 0.67 | 0.67 | 0.67 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| Atlantic salmon -Juvenile | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobble | 0.00 | 0.00 | 0.00 | 0.00 |
| Gravel | 0.00 | NA | 0.00 | NA |
| Sand | 0.00 | NA | 0.00 | NA |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| Atlantic salmon -Adult | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobble | 0.00 | 0.00 | 0.00 | 0.00 |
| Gravel | 0.00 | NA | 0.00 | NA |
| Sand | 0.00 | NA | 0.00 | NA |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

Table C-3. Lacustrine habitat requirement ratings for American Eel at different life stages for the depth and substrate combinations at Shoal Cove Pond 2025 (adapted from Table 3 of Bradley et al. (1999)).

| American eel -Spawning | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobble | 0.00 | 0.00 | 0.00 | 0.00 |
| Gravel | 0.00 | NA | 0.00 | NA |
| Sand | 0.00 | NA | 0.00 | NA |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| American eel -YOY | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobble | 0.00 | 0.00 | 0.00 | 0.00 |
| Gravel | 0.00 | NA | 0.00 | NA |
| Sand | 0.00 | NA | 0.00 | NA |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| American eel -Juvenile | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 1.00 | 1.00 | 1.00 | 1.00 |
| Cobble | 0.00 | 0.00 | 0.00 | 0.00 |
| Gravel | 0.00 | NA | 0.00 | NA |
| Sand | 0.00 | NA | 0.00 | NA |
| Silt | 1.00 | 1.00 | 0.78 | 0.78 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

| American eel -Adult | | | | |
|---|---|---|---|---|
| Substrate | Non-Vegetated | | Vegetated | |
| | Depth (m) | | | |
| | 0-1 | 1-2 | 0-1 | 1-2 |
| Boulder | 1.00 | 1.00 | 1.00 | 1.00 |
| Cobble | 0.00 | 0.00 | 0.00 | 0.00 |
| Gravel | 0.00 | NA | 0.00 | NA |
| Sand | 1.00 | NA | 1.00 | NA |
| Silt | 0.00 | 0.00 | 0.00 | 0.00 |
| Muck | 0.00 | 0.00 | 0.00 | 0.00 |

Table C-4. Habitat Suitability Indices for all potential fish species and their respective life stages.

| Species | Life Stage | Coarse/No Veg (boulder) | Medium/No Veg (cobble & gravel) | Fine/No veg (sand, silt, muck) | Coarse/Veg (boulder) | Medium/Veg (cobble & gravel) | Fine/Veg (sand, silt, muck) |
|---|---|---|---|---|---|---|---|
| Brook Trout | Spawning | 0.00 | 0.89 | 0.70 | 0.00 | 0.89 | 0.70 |
| | YOY | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 |
| | Juvenile | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 |
| | Adult | 0.00 | 1.00 | 0.40 | 0.00 | 1.00 | 0.47 |
| American Eel | Spawning | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | YOY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Juvenile | 1.00 | 0.00 | 0.40 | 1.00 | 0.00 | 0.31 |
| | Adult | 1.00 | 0.00 | 0.2 | 1.00 | 0.00 | 0.20 |
| Atlantic Salmon | Spawning | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | YOY | 1.00 | 0.89 | 0.40 | 1.00 | 0.67 | 0.40 |
| | Juvenile | 1.00 | 0.95 | 0.13 | 0.78 | 0.74 | 0.11 |
| | Adult | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Table C-5. Surface area estimates of each substrate within Shoal Cove Pond.

| Substrate | Coarse | Medium | Fine |
|---|---|---|---|
| No-Vegetation | Bedrock – 0 m²<br>Boulder – 26,030 m² | Rubble- 0 m²<br>Cobble – 2892 m²<br>Gravel- 957 m² | Sand – 8,970 m²<br>Silt – 90,519 m²<br>Muck – 29,824 m²<br>Clay- 0 m² |
| Totals | 26,030 m² | 3,849.28 m² | 129,313 m² |
| Vegetation | Bedrock – 0 m²<br>Boulder – 1,370 m² | Rubble- 0 m²<br>Cobble – 152 m²<br>Gravel- 0 m² | Sand- 0 m²<br>Silt – 19,786.90 m²<br>Muck – 8,480.10 m²<br>Clay- 0 m² |
| Totals | 1,370 m² | 152 m ² | 28,267 m² |

Table C-6. Lacustrine habitat requirement ratings for Brook Trout at different life stages for the depth and substrate combinations at Hares Ears Pond 2025 (adapted from Table 3 of Bradley et al. (1999)).

| Brook Trout -Spawning | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 0.00 | NA |
| Cobble | 0.84 | 0.84 |
| Gravel | 1.00 | NA |
| Silt | NA | 0.67 |
| Muck | NA | 0.67 |

| Brook Trout -YOY | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 1.00 | NA |
| Cobble | 1.00 | 1.00 |
| Gravel | 1.00 | NA |
| Silt | NA | 0.00 |
| Muck | NA | 0.00 |

| Brook Trout -Juvenile | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 1.00 | NA |
| Cobble | 1.00 | 1.00 |
| Gravel | 1.00 | NA |
| Silt | NA | 0.00 |
| Muck | NA | 0.00 |

| Brook Trout -Adult | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 0.00 | NA |
| Cobble | 1.00 | 1.00 |
| Gravel | 1.00 | NA |
| Silt | NA | 0.78 |
| Muck | NA | 0.00 |

Table C-7. Lacustrine habitat requirement ratings for American eel at different life stages for the depth and substrate combinations at Hares Ears Pond 2025 (adapted from Table 3 of Bradley et al. (1999)).

| American eel -Spawning | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 0.00 | NA |
| Cobble | 0.00 | 0.00 |
| Gravel | 0.00 | NA |
| Silt | NA | 0.00 |
| muck | NA | 0.00 |

| American eel -YOY | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 0.00 | NA |
| Cobble | 0.00 | 0.00 |
| Gravel | 0.00 | NA |
| Silt | NA | 0.00 |
| muck | NA | 0.00 |

| American eel -Juvenile | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 1.00 | NA |
| Cobble | 0.00 | 0.00 |
| Gravel | 0.00 | NA |
| Silt | NA | 0.78 |
| Muck | NA | 0.00 |

| American eel -Adult | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 1.00 | NA |
| Cobble | 0.00 | 0.00 |
| Gravel | 0.00 | NA |
| Silt | NA | 0.00 |
| Muck | NA | 0.00 |

Table C-8. Lacustrine habitat requirement ratings for Atlantic Salmon at different life stages for the depth and substrate combinations at Hares Ears Pond 2025 (adapted from Table 3 of Bradley et al. (1999)).

| Atlantic Salmon -Spawning | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 0.00 | NA |
| Cobble | 0.00 | 0.00 |
| Gravel | 0.00 | NA |
| Silt | NA | 0.00 |
| Muck | NA | 0.00 |

| Atlantic Salmon -YOY | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 1.00 | NA |
| Cobble | 1.00 | 1.00 |
| Gravel | 0.67 | NA |
| Silt | NA | 0.67 |
| muck | NA | 0.00 |

| Atlantic Salmon -Juvenile | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 1.00 | NA |
| Cobble | 1.00 | 0.78 |
| Gravel | 0.84 | NA |
| Silt | NA | 0.00 |
| Muck | NA | 0.00 |

| Atlantic Salmon-Adult | | |
|---|---|---|
| Substrate | Non-Vegetated | Vegetated |
| | Depth (m) | |
| | 0-1 | 0-1 |
| Boulder | 0.00 | NA |
| Cobble | 0.00 | 0.00 |
| Gravel | 0.00 | NA |
| Silt | NA | 0.00 |
| Muck | NA | 0.00 |

Table C-9. Habitat Suitability Indices for all potential fish species and their respective life stages.

| Species | Life Stage | Coarse/No Veg (boulder) | Medium/No Veg (cobble & gravel) | Fine/No veg (silt, muck) | Coarse/Veg (boulder) | Medium/Veg (cobble & gravel) | Fine/Veg (silt, muck) |
|---|---|---|---|---|---|---|---|
| Brook Trout | Spawning | 0.00 | 0.92 | NA | NA | 0.84 | 0.67 |
| | YOY | 1.00 | 1.00 | NA | NA | 1.00 | 0.00 |
| | Juvenile | 1.00 | 1.00 | NA | NA | 1.00 | 0.00 |
| | Adult | 0.00 | 1.00 | NA | NA | 1.00 | 0.39 |
| American Eel | Spawning | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 |
| | YOY | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 |
| | Juvenile | 1.00 | 0.00 | NA | NA | 0.00 | 0.39 |
| | Adult | 1.00 | 0.00 | NA | NA | 0.00 | 0.00 |
| Atlantic Salmon | Spawning | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 |
| | YOY | 1.00 | 0.83 | NA | NA | 1.00 | 0.33 |
| | Juvenile | 1.00 | 0.92 | NA | NA | 0.78 | 0.00 |
| | Adult | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 |

# Appendix 6.6-2: Fisheries Act Authorization and Agreement

# FISH HABITAT COMPENSATION AGREEMENT
# SHOAL COVE POND TAILINGS PROJECT

THIS AGREEMENT made the 10th day of January, 1997

BETWEEN:

HER MAJESTY IN RIGHT OF CANADA
as represented by the Minister of Fisheries and Oceans ("DFO")

AND:

BURIN MINERALS LIMITED, incorporated under the laws of the Province of Newfoundland and Labrador and having its head office in St. Lawrence, Newfoundland ("Burin Minerals").

WHEREAS:

A. As part of the reactivation of the St. Lawrence fluorspar mines, Burin Minerals intends to utilize Shoal Cove Pond (46° 53.6' N, 55° 23.8' W) as a tailings impoundment. Two dams will be constructed, one at the outlet from Shoal Cove Pond and one 366 m (1200 ft) upstream of the outlet, to establish a tailings settling pond and a polishing pond.

B. An assessment of the potential impacts of the Shoal Cove Pond tailings impoundment on fish habitat in Shoal Cove Pond, Shoal Cove Brook and Clarke's Pond Brook was documented in a report dated November, 1995; namely:

"Shoal Cove Pond Tailings Disposal Site Environmental Preview Report", prepared for Burin Minerals Limited by ADI Nolan Davis.

Compensation measures were documented in a report dated July 12, 1996; namely:

"Proposed No-Net Loss Compensation, Shoal Cove Pond Tailings Project", prepared by Burin Minerals Limited.

C. To ensure no net loss of fish habitat productive capacity of Shoal Cove Pond, Shoal Cove Brook and Clarke's Pond Brook, Burin Minerals is committed to a Fish Habitat Compensation Program, and in particular, to ensure suitable replacement of fish habitat productive capacity losses at the site of the proposed project so that the extent of habitat destroyed is replaced with equal or greater newly created and restored habitat, as well as, access to presently inaccessible habitat.

D. This Fish Habitat Compensation Agreement forms part of the conditions of the Fisheries Act Section 35(2) authorization issued to Burin Minerals Limited for works or undertakings affecting fish habitat in Shoal Cove Pond, Shoal Cove Brook and Clarke's Pond Brook.

E. The destruction of fish habitat associated with the Shoal Cove Tailings Project would otherwise constitute a violation of Section 35(1) of the Fisheries Act and is only permissible with strict adherence to the conditions authorized in this agreement. Failure to strictly adhere to these conditions may result in charges being laid under Section 35(1) of the Fisheries Act.

The Parties agree as follows:

1. ALTERED FISH HABITAT

Burin Minerals agrees that in compensation for alteration and destruction of fish habitat in Shoal Cove Pond, Shoal Cove Brook and Clarke's Pond Brook, it shall carry out or cause to be carried out with due diligence and in a good and workmanlike manner and at its own cost and expense and to the satisfaction of DFO, a Fish Habitat Compensation Program consistent with the "Proposed No-Net Loss Compensation, Shoal Cove Pond Tailings Project" referred to in B above, and more particularly, will create new fish rearing habitat in the diversion channel between the Haypook Pond Canal and Salt Cove Brook, revegetate streambanks of new diversion channel, restore stream flow to a 1.25 km dewatered section of Salt Cove Brook, break a concrete barrier in Haypook Pond Canal to provide fish passage during low flows, and contain old tailings which is presently eroding into the dewatered section of Salt Cove Brook, as more particularly shown in heavy outline on the sketch annexed hereto as Schedule "A".

2. FISH HABITAT COMPENSATION PROGRAM

Without restricting the generality of the foregoing, Burin Minerals agrees to perform the following works (the "Compensation Program"):

a) Stream flow will be restored to the original streambed of Salt Cove Brook by diverting water flow from the canal below Haypook Pond.

b) The new diversion channel will be constructed to contain four (4) pools approximately 2 m deep. Boulders and rock material will also be placed in the channel to provide instream cover and habitat diversity.

c) Vegetation will be placed along the streambanks of the new channel to prevent erosion, as well as, to provide cover, shade and a potential food source for fish.

d) A concrete barrier in the canal above the new diversion is presently a barrier to fish migration during low flows. This barrier will be altered to allow for fish passage, thus improving access to approximately 8 km of stream and 5 ponds.

e) There will be an earth barricade constructed adjacent to Salt Cove Brook approximately 50 m downstream from the outlet of the new diversion channel to repair a breach in an old tailings dam from previous operations. This barricade will prevent drainage from the old tailings area from entering the stream, thus reducing siltation problems downstream.

3. SCHEDULE OF WORKS

The Compensation Program shall be commenced during the period of tailings dam construction and shall be completed before the utilization of Shoal Cove Pond for tailings impoundment.

4. MODIFICATIONS

In the event that the Compensation Program is not completed within the time referred to above, a re-evaluation of the Compensation Program may be undertaken by DFO and any modifications deemed by DFO to be necessary as a result of the failure to complete the Compensation Program within the time set out in this Agreement, shall be carried out or caused to be carried out by Burin Minerals with due diligence and in a good and workmanlike manner, at its own expense and to the satisfaction of DFO.

5. MONITORING PROGRAM

Burin Minerals shall set up a monitoring program satisfactory to DFO in order to assess the effectiveness of the Compensation Program, and more particularly, one and three years subsequent to the commencement of the Agreement will perform the following:

a) assess the stability of the created habitat by using ground surveys

b) conduct biological evaluations (eg. electrofishing) to determine if fish are utilizing created and restored habitat

c) conduct evaluations to determine the success of re-vegetation and erosion control at the new diversion channel

d) assess the effectiveness of erosion control at the old tailings area adjacent to Salt Cove Brook and the improvement to fish migration past the concrete barrier in Haypook Pond Canal by ground surveys and observation

e) provide DFO with a comprehensive written report, including all relevant documents, data and photographs within one month of each assessment or evaluation.

Annual timing of surveys shall be determined in consultation with DFO.

6. FURTHER WORK

Burin Minerals is responsible to ensure that the habitat created and restored pursuant to the Compensation Program is functioning properly for a period of thirty-six (36) months following the finalization of the compensation works. If the monitoring program indicates to DFO that the created and restored habitat is not functioning as designed, Bu n Minerals will carry out or cause to be carried out at its own cost and expense, with due di gence and in a good and workmanlike manner and to the satisfaction of DFO, any modifica ons deemed by DFO to be necessary to enable the created and restored habitat to function a designed.

7. RESPONSIBILITIES UNDER OTHER LEGISLATION

Nothing contained herein shall in any manner relieve Burin Minerals of any c its oth r responsibilities for environmental protection, and it is Burin Minerals' respor ibility to ensure that the other interested federal and/or territorial environmental departments nd ministries are satisfied that the compensation measures are acceptable from their points of view.

8. DEFAULT

In the event that Burin Minerals is, in the opinion of DFO, in default or breach of any terms of this Agreement, which default or breach has not been remedied by Burin Minerals to the satisfaction of DFO after 90 days written notice to remedy given by DFO to Burin Minerals, DFO may, but shall not be obliged to, take such steps as may be necessary to remedy such default or breach and, without limiting any of DFO remedies at law or in equity, all costs so incurred by DFO shall be charged to and paid by Burin Minerals and shall be deemed a debt due to DFO.

9. COMPLIANCE WITH LAW

Burin Minerals shall comply with all applicable federal, provincial and municipal laws, by-laws, and orders which relate to the Habitat Compensation Agreement.

10. INDEMNITIES

Burin Minerals agrees at all times to indemnify and save harmless DFO and its Ministers, officers and employees from and against all claims and demands, loss, costs, actions, suits or other proceedings by whomsoever made, brought or prosecuted, whether arising by reason

of personal injury or death or property damage or loss or otherwise occasioned by any negligent act or omission of Burin Minerals, its officers, servants, agents, contractors, employees or any other person for whom it is at law responsible, in any manner based upon, occasioned by, arising out of or attributable to this Agreement.

## 11. NOTICES

11.1 All notices and communications to DFO in connection with this Agreement shall be addressed to:

Division Manager
Marine Environment and Habitat Management Division
Department of Fisheries and Oceans
P.O. Box 5667
St. John's NF A1C 5X1

11.2 All notices and communications to Burin Minerals in connection with this Agreement shall be addressed to:

General Manager
Burin Minerals Limited
P.O. Box 337
St. Lawrence NF A0E 2V0

11.3 Any notices or other communications required or permitted to be given or made under this Agreement shall be in writing, and shall be well and sufficiently given or made if:

a) delivered in person during normal business hours and left with the addressee or any other responsible employee at the relevant address set out herein, or

b) telecopied, faxed or sent by other means of recorded electronic communication provided receipt thereof is confirmed by the recipient.

## 12. INTERPRETATION

Wherever the singular is used in this Agreement, it shall be construed as including the plural or feminine or masculine or body corporate wherever the context or parties hereto so require. All headings in this Agreement are for ease of reference only and do not form part of this Agreement, nor shall they be used to interpret this Agreement.

13. ENUREMENT

This Agreement is binding upon and enures to the benefit of Burin Minerals, s executors, administrators, heirs, successors and assigns and DFO, its successors and assigns.

14. INVALIDITY

If any provision of this Agreement is found to be invalid, illegal or unenforceable, it will be severable from this Agreement and the remaining provisions will not be affected thereby and will be valid, legal and enforceable.

15. ASSIGNMENT

This Agreement shall not be assigned in whole or in part, by Burin Minerals, without the prior written consent of DFO.

16. ENTIRE AGREEMENT

This Agreement is comprised of this document, the Compensation Proposal, and any valid amendments to them.

17. AMENDMENTS

This Agreement may be amended at any time with the written consent of the Parties involved.

IN WITNESS WHEREOF the parties have hereunto set their hands and seals the day and year first written above.

Signed, sealed and delivered by a representative of the Minister of Fisheries and Oceans, on behalf of Her Majesty the Queen in right of Canada )

Witness

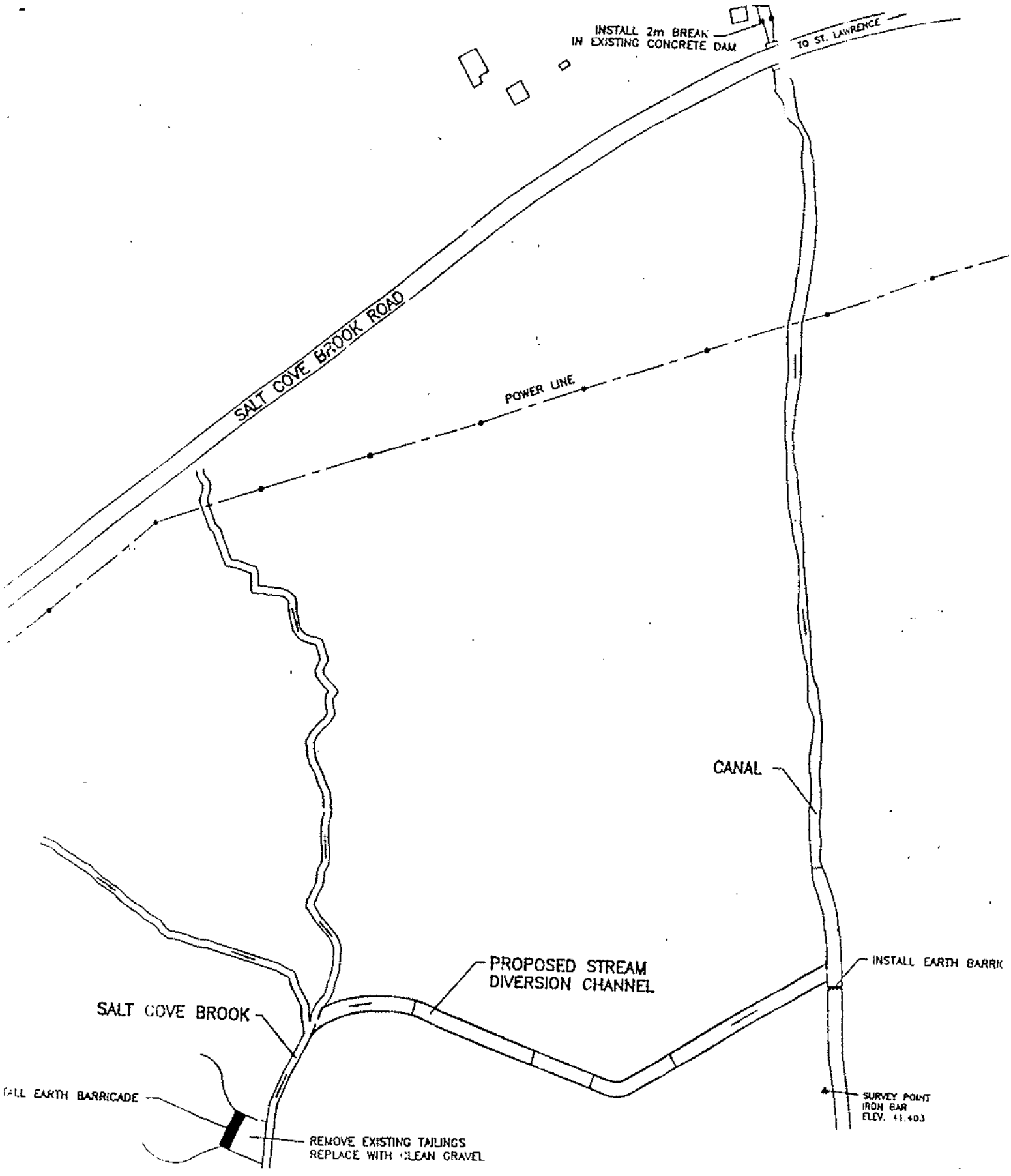
Regional Director General
Newfoundland Region

Signed, sealed and delivered by a representative of Burin Minerals Limited in the presence of )

Witness

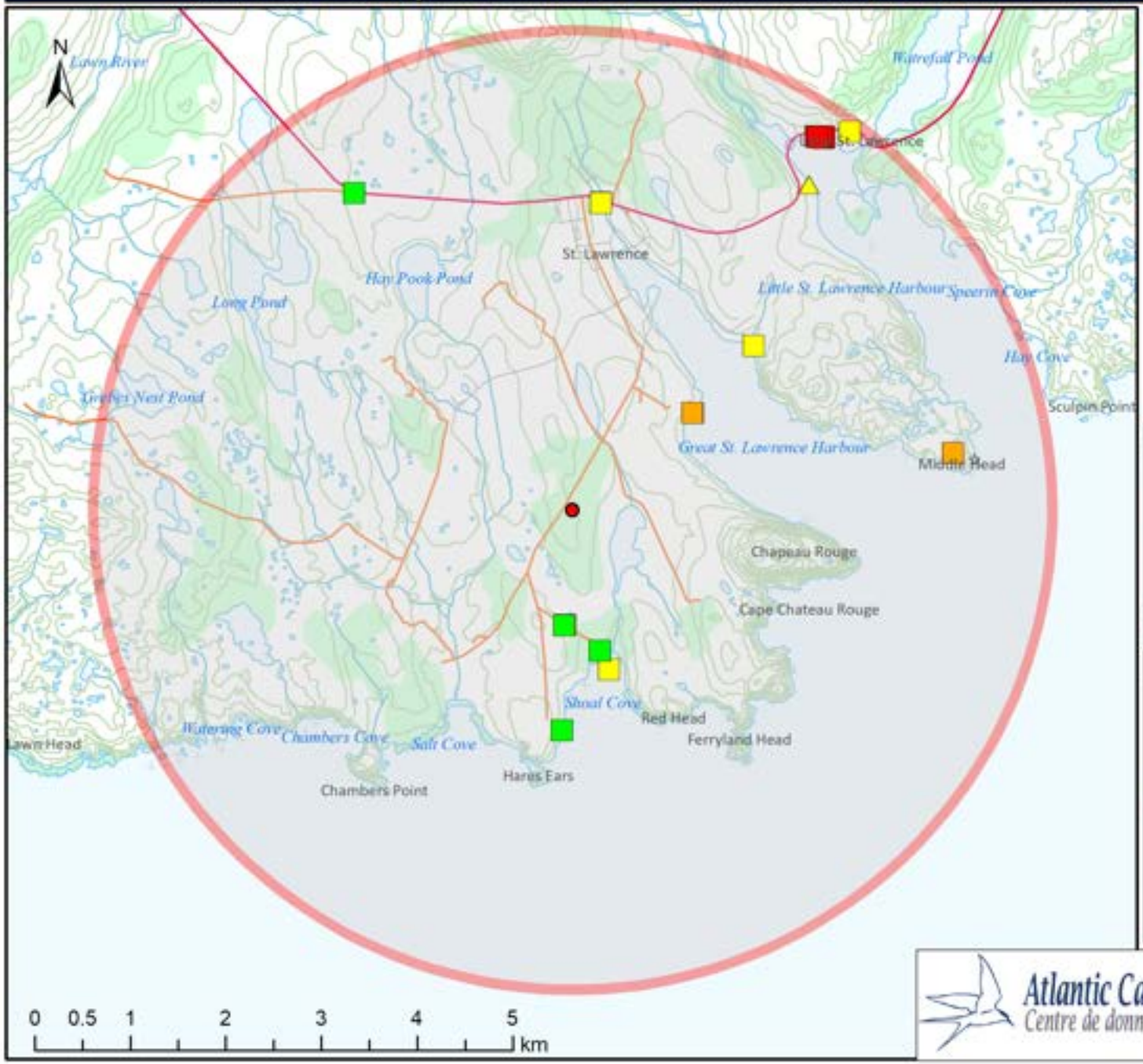
Authorized Signatory

# SCHEDULE "A"


INSTALL 2m BREAK IN EXISTING CONCRETE DAM
TO ST. LAWRENCE
SALT COVE BROOK ROAD
POWER LINE
CANAL
PROPOSED STREAM DIVERSION CHANNEL
INSTALL EARTH BARRI
SALT COVE BROOK
TALL EARTH BARRICADE
REMOVE EXISTING TAILINGS REPLACE WITH CLEAN GRAVEL
SURVEY POINT IRON BAR ELEV. 41.403

# Appendix 6.7-1: ACCDC Data

# GIS Scan of Rare and Provincially/Federally Listed Species for Canada Fluorspar Inc Mine in St. Lawrence, Newfoundland and Labrador




## Legend

- Point of Interest (POI)
- 5 km Buffer Around POI

**Rare Flora**

- 1000m Accuracy

**Rare Fauna**

- 10m Accuracy
- 100m Accuracy
- 200m Accuracy
- 244m Accuracy
- 1000m Accuracy

Atlantic Canada Conservation Data Centre
October 8, 2025
For: LGL
Data Request: RQ1267

Datum: Transverse Mercator NAD83
Note: Interpretations of this map should always be conducted in relation with data provided in spreadsheets and any other communications.

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada atlantique

October 8, 2025

To: LGL Limited,
Attached are the results for your ASAP data request near St. Lawrence, Newfoundland and Labrador.

Summary: Within 5km of your point of interest, there was 1 rare flora record and 78 rare fauna records found. This 1 rare plant record is for a plant not on the provincial Endangered Species Act (ESA) or federal COSEWIC lists, and outside of Newfoundland & Labrador, this species is not considered globally rare.

As for the 78 rare fauna records, there was 1 Short-eared Owl record (listed as Threatened under both COSEWIC and our ESA), 1 Bobolink record (Threatened under COSEWIC, Vulnerable under the ESA), 1 Evening Grosbeak record, 2 Barn Swallow records (both Special Concern under COSEWIC, Vulnerable under our ESA), and 3 Piping Plover records (Endangered under both COSEWIC and our ESA). The remaining rare fauna records are for species which aren't provincially or nationally listed but are considered rare on the Island of Newfoundland.

Secondly, our Expert Opinion Maps are the result of our work with species-specific experts to gather suggestions about locations where species at risk - either provincially or COSEWIC listed - may be found. While we don't have observations in our database for these species within 10 km of your site, our Expert Opinion Maps suggest that Banded Killifish are possible, while Boreal Felt Lichen is considered possible, but unlikely. Your area is also said to be within the Barrow's Goldeneye's range.

For more information, including a map of the area showing the locations of the rare flora and rare fauna, please refer to the following attached documents:
Map.jpg - shows the locations of the rare flora, rare fauna and the 5 km buffer around the coordinates provided.
RareFlora.xls - list of the rare flora, including their SRANK, NRANK, GRANK, and habitats.
RareFauna.xls - list of the rare fauna, including their SRANK, NRANK, GRANK and habitats.
Data Dictionary.doc - Explains the meaning of the different columns in RareFlora.xls and RareFauna.xls.
Ranking.rtf - explains the S, N and GRANKS
Herbaria.xls - A list of herbariums in case you would like to follow up on the specimens included in this request.
Caveats.doc - The fine print - please read. This is also included at the end of this email.
RQ1267.pdf – The invoice for this ASAP data request.

Please do not hesitate to contact me if you have any questions.

Adam Durocher
Data Manager
Atlantic Canada Conservation Data Centre
Corner Brook, NL
709-637-2494

DATA SOURCES:
All data housed at Atlantic Canada Conservation Data Centre (ACCDC). Refer to the 'CITATION' field for data sources.

---

CAVEATS:
ACCDC rare taxa occurrence records are offered as a guide recognizing that the ability to find plants and animals will depend upon the season. The ACCDC makes a strong effort to verify the accuracy of all the data it obtains, generates and manages, but it will not be held responsible for inaccuracies in data that it provides.

---

PLEASE NOTE:
* ACCDC data is restricted for use by the specified data user only; any third party requiring data must make its own request to the ACCDC.
* Specified data users may not publish any information provided by the ACCDC or its partners without prior permission.
* To ensure the currency of the data, the ACCDC requires Data Users to destroy all copies of data 18 months after the date of receipt.
* ACCDC data reports are restricted to that data in our Data System at the time of the request.
* Data accuracy is qualified as to location (Accuracy) and time (Date)
* ACCDC data reports are not to be constructed as exhaustive inventories of taxa in an area.
* The non-occupancy of a taxon cannot be inferred by its absence in an ACCDC data report.
* Museum databases, which are the basis for more accessible public databases, such as those of the ACCDC, are works in progress. Essentially, they are finding aids and dynamic data records, constructed primarily to serve scientists engaged in the continuing, active process of plant systematics and taxonomy. Ongoing additions of new collections, and frequent upgrades to the identifications of all plant specimens housed in museum herbaria, may not always be reflected, in real time, by databases such as those of the ACCDC. Specifically, the conservation status of individual species recorded in the ACCDC database may not be absolutely current. It is therefore the responsibility of the data user to contact the relevant museums directly, in order to check for the most current identifications of specimens of interest, and to ascertain from the scientists concerned, their current understanding of the conservation status of individual species in question. The absolute conservation status of any given species is dynamic, and subject to change over short periods of time.

# Appendix 6.13-1: Historic Resources Impact Assessment (HRIA)

**St. Lawrence Mine**
**Historic Resources Impact Assessment**

Archaeological Investigation Permit #14.55
Golder Associates Limited Document #0010-rev 1

*Grebe's Nest cairn/lookout over Lawn Bay (STL14.435).*

Submitted to
Provincial Archaeology Office
Department of Business, Tourism, Culture and Rural Development
Confederation Building
St. John's, NL
A1B 4J6
&
Canada Fluorspar Inc.
P.O. Box 337
St. Lawrence, NL
A0E 2V0

Submitted by
Gerald Penney Associates Limited
P.O. Box 428, St. John's, NL
A1C 5K4

27 January 2015

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8. *Looking south across the mouth of Great St. Lawrence, 2009, towards Chapeau Rouge, Blue Beach Point at centre, right* [p. 12].
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24. *Looking across Shoal Cove Pond towards Chapeau Rouge, from the old tailings pile (left). The proposed route of the tailings pipeline runs from bottom right, towards the pond from the existing (abandoned) mill site* [p. 25].
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**Letter of Transmittal**

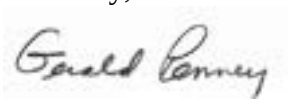
27 January 2015

Martha Drake
Provincial Archaeologist
Department of Business, Tourism, Culture and Rural Development
Confederation Building
St. John's, NL
A1B 4J6

Dear Martha,

Please find enclosed our report "St. Lawrence Mine Historic Resources Impact Assessment" under Archaeological Investigation Permit #14.55.

Sincerely,



Gerald Penney
President

/encls

cc. Phonce Cooper, Canada Fluorspar Inc.
Michel Wawrzkow, Golder Associates

104-40 Quidi Vidi Road · St. John's · NL · A1A 1C1
**T** 709.739.7227 · **E** gpaltd@nl.rogers.com · **W** geraldpenneyassociates.com

## Executive Summary

Under Archaeological Investigation Permit #14.55, Gerald Penney Associates Limited (hereinafter GPA) conducted a Stage 2-Historic Resources Impact Assessment (hereinafter HRIA) at a proposed mine/mineral exploration site on a peninsula lying between St. Lawrence Harbour and Little Lawn Harbour.

No historic resources were encountered, other than evidence of previous mining and mineral exploration activity, including a 19th century mine, at Mine Cove, Little Lawn Harbour.

*Plate 1: Looking east over Grebes Nest Pond in early morning, Chapeau Rouge in the distance (STL14.449).*

## Participants

| | |
|---|---|
| Gerald Penney, M.A. | principal investigator |
| Blair Temple, M.A. | field archaeologist; report preparation |
| Toby Simpson, B.A. | drafting/digital mapping |
| Robert Cuff, M.A. | historical research; report preparation |

The assistance of the Phonce Cooper and Frank Pitman (Canada Fluorspar Inc.), Michel Wawrzkow of Golder Associates, as well as the Provincial Archaeology Office is acknowledged.

## Introduction

In the summer of 2014, Gerald Penney Associates Limited (hereinafter GPA) was contacted by Michel Wawrzkow of Golder Associates requesting a Historic Resources Impact Assessment (hereinafter HRIA) of the proposed fluorspar mine reactivation near St. Lawrence, Burin Peninsula. The development as proposed will work fluorspar veins 3-4 km west of previous mines (1933-1991) and includes the construction of an access road or roads, a possible new mill site[1] and a system of piping to carry tailings from a production facility to a previously-employed tailings pond near Shoal Cove.

*Plate 2: Map indicating areas specified for investigation.*

GPA was requested to investigate five specified components of the proposed mine (see Plate 2), referenced below as Project Areas (PAs) 1-5:

PA1 – The proposed AGS mine site.
PA2 – A proposed access road to the AGS mine site, from Old Lawn Road (Option #1 on the above map).
PA3 – A proposed access road to the AGS mine site, from the Hay Pook mill site (Option #2).
PA4 – A proposed mill site, southwest of Hay Pook Pond.
PA5 – A proposed tailing pipeline from the Hay Pook mill site to Shoal Pond, including the proposed tailings facility at Shoal Pond.

[11] One of the options being considered in 2014 is that the new mill would be built at the former Clarkes Pond mill site. Being a potential safety risk, and in any case being a highly-disturbed area with no historic resources potential, this former mill site was not assessed on the ground by GPA.

*Plate 3: From the end of the AGS road, looking over Little Lawn, at left, and the country overlying the Mine Cove vein, at right (STL14.439).*

**Study Area/Natural Features**

The study area is located west of St. Lawrence, on a peninsula between Little Lawn Harbour (see Plate 3) and Great St. Lawrence Harbour. This peninsula is approximately 8.5 km wide (west-to-east) and 5 km long. The coastline proximate to the proposed construction/mining activity largely consists of a number of bold headlands, framing open coves to the southwest of Great St. Lawrence Harbour. The current proposal is to mine a fluorspar deposit (hereinafter, the "AGS vein") on the west side of the peninsula, approximately 500 m east of Little Lawn Harbour. The coastline proximate is quite bold and does not appear to have useful landings for small boats, with the exception of Mine Cove, which is approximately 700 m northwest of the proposed development, and from which access to the surrounding country is not tenable due to high, crumbling cliffs.

The inland portions of the study area are, in part, a "brown field," having been the locus of extensive fluorspar mine workings 1933-1978 and 1986-1991. Even undisturbed, such inland areas are a poor prospect for the survival of significant historic resources. (That is, apart from the St. Lawrence mine workings itself, were they to be considered a historic resource. See Underwriters Survey Bureau 1956: plates 1-1 and 11, for the above-ground components of the mines at that date).

The area primarily consists of bog, marsh and heathland with very little forest cover, excepting tuckamore in low-lying areas and scrub conifers on some slopes (see Plate 7). There are numerous shallow ponds on the peninsula (see Plate 4), the approaches to which are drained by small brooks that generally tumble from the cliffs to the shoreline in dramatic waterfalls. In that there is no realistic prospect of historic traverse by shallow-draft watercraft, expected past use is over land, through country that is quite wet inland and hilly near the coast, but otherwise without significant natural obstacles.

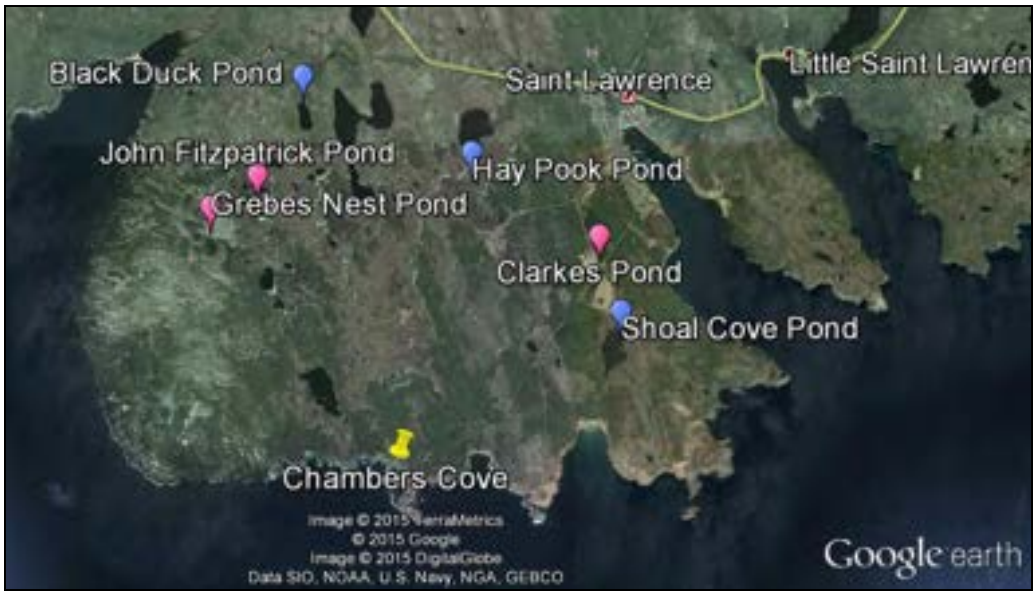



*Plate 4: Locations of ponds mentioned in the text.*

The general area of the proposed AGS mine site includes a pond which actually overlays the vein, Grebes Nest Pond – we noted that the National Topographic Service attaches this name to another pond approximately 300 m to the NE, but in local usage this pond is known as "John Fitzpatrick Pond."

**Previous Archaeology**

There has not been a complete archaeological survey of either the study area per se or the proximate coastline.[2] GPA's 2009 investigations (2009a; 2009b) of the eastern side of the study area/peninsula included further recording of onshore shipwreck remains at Blue Beach, a registered archaeological site, Blue Beach Wreck (CfAu-03). Research identified this as a 1946 wreck, of the tug *Rio Sama*. Another piece of wreckage, a steel open boat, possibly also of 1940s vintage, was documented at Shoal Cove.

There have been only six small pre-contact finds on the whole "Boot of the Burin" (see Plate 5). The known pre-contact site closest to the study area is Lawn 1 (CfAv-03), approximately 15 km west of St. Lawrence. As with four of the six pre-contact sites on the southern Burin Peninsula, Lawn 1 was registered on the basis of an incidental spot find by a local resident. Only one other registered site is identified with what might be described as the "outer coast" of the Peninsula and is also a lay spot find – Garnish Wharf (ChAv-01). Four other sites have been registered either at Mortier Bay or at ponds and shallow arms of interior of Mortier Bay. Two of these sites were discovered and investigated by trained archaeologists,[3] but both were very small sites yielding undiagnostic pre-contact material. It is difficult to generalize from such a limited sample, however it may be noted that tentative cultural identifications have included all the major pre-contact traditions: Maritime Archaic, Palaeoeskimo and Recent Indian. The majority of sites are associated with either Mortier Bay or the overland route between the inner arms of that bay and Burin Inlet. A major distinction of the study area *vis a vis* the rest of Newfoundland is an absence of pack ice, and subsequently a lack of harp seals, known to be a significant source of protein for pre-contact cultures. It is certainly possible that a dearth of coastal sites may also be related to the exposed nature of the Burin Peninsula coast and its few offshore islands and/or the "drowning" of coastal sites by rising sea

[2] For our current purpose, this encompasses an area of 40 km radius around St. Lawrence harbour, which takes in the whole "Boot" – south of a line drawn across the "ankle" from Garnish to Mortier Bay.
[3] Spanish Room 1 (ChAs-01) was investigated by Penney in 1984 and Southwest Arm (CgAt-01) by Jim Tuck in 1988.

levels. It is equally possible that this is explained by the lack of a sustained archaeological program.

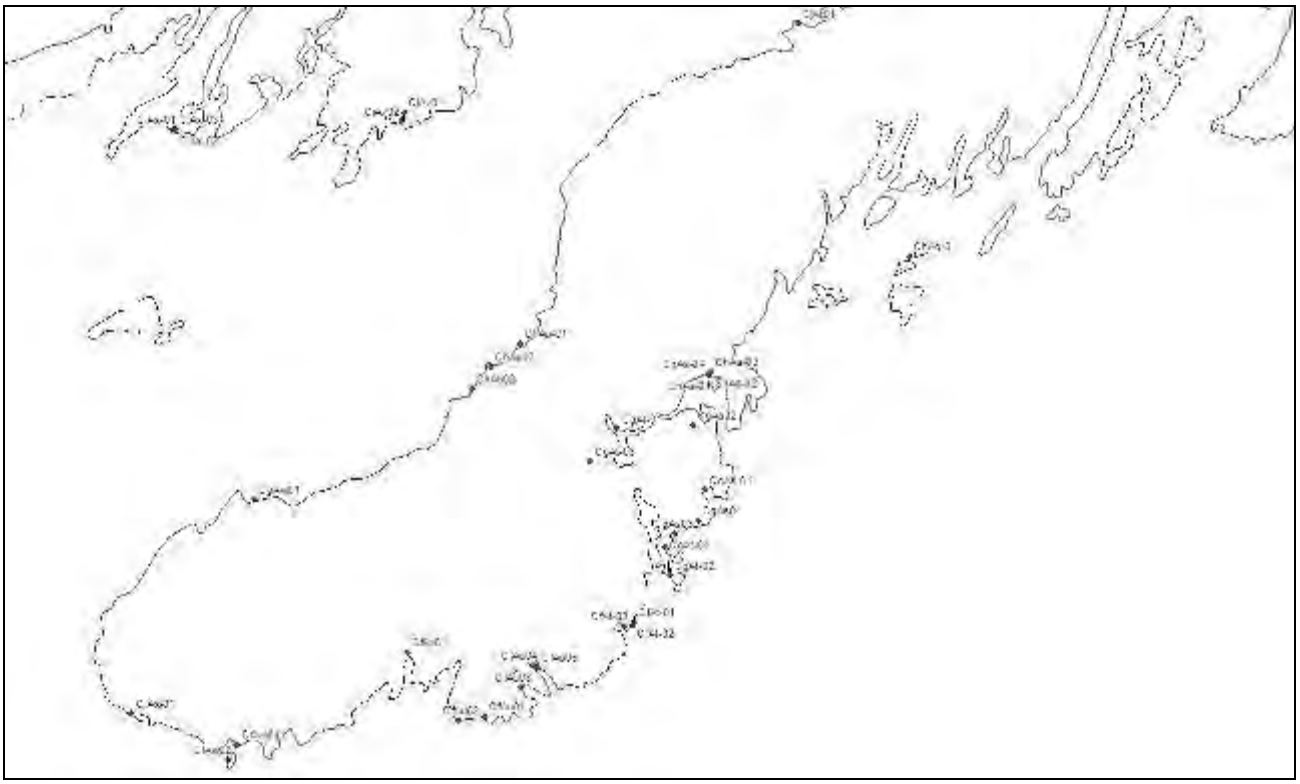


*Plate 5: Archaeological sites on the southern Burin Peninsula, including both pre-contact and historic sites (PAO).*

Also worthy of note are the known pre-contact archaeological sites in inner Placentia Bay. A 1970 National Museums survey located ten sites, three of which were multi-component sites (exhibiting archaeological evidence of more than one culture). Most were discovered on islands, the most notable "mainland" site being Bordeaux 2 (CkAm-5, Palaeoeskimo). The two others on the main – Bordeaux 1 (CkAm-5, possibly Palaeoeskimo) and Come by Chance (CkAl-1, indeterminate) – were minor sites (Linnamae 1971:15-17). It is noteworthy that the more significant and/or multi-component sites were located on sand bars or beaches. Multi-component island sites include Long Island Neck (Maritime Archaic and Palaeoeskimo), Tacks Beach (Palaeoeskimo and Recent Indian) and Great Brule (Palaeoeskimo and indeterminate). Ingeborg Marshall classifies Great Brule as Recent Indian and adds Merasheen on Linnamae's authority (Marshall 1996:265). There were also two Recent Indian burials

discovered in the late 19th century at Ragged Islands: Hangmans Island and Indian Hole Tilt (Howley 1915:292-294).

In the post-contact era there are very few accounts of aboriginal inhabitants in Placentia Bay. While there were rumours among the inhabitants of the English Shore that French fishers traded with the Indians, the only surviving first-hand account of an encounter occurred at the harbour of "Pesmarck," on the west side of Placentia Bay, in 1594. The "Savages" (presumed Beothuk) cut the moorings of boats belonging to the *Grace* of Bristol, which hurriedly departed from the harbour "fearing a shrewder turne." Marshall suggests Presque for the location, while E.R. Seary's identification of Pesmarck as being Breton for "Horse's Head," suggests Great Gallows Harbour (St. Josephs), a prominent landmark of which is a peak of that name (Marshall 1996:23-24; Harris 1993). In French cartography "Pennemark" is consistently depicted as being on the main due north of Cap Judas. Great Gallows Harbour is about 20 km due north of Cape Jude.

Investigations by GPA in 2009, under Permit # 9.07, determined that onshore remains of a shipwreck would be directly impacted by the proposed Blue Beach marine terminal. This wreck is a registered archaeological site, Blue Beach Wreck (CfAu-03, see Plate 6). Research has identified this as a 1946 wreck, of the tug *Rio Sama*. A mitigation scenario was proposed, to preserve the most significant portions of the wreck, and to provide public interpretation. Another piece of wreckage, a steel open boat, possibly also of 1940s vintage, was documented at Shoal Cove – within the mineral license being surveyed in 2009, but unlikely to be impacted directly by this proposed development.

*Plate 6: The Blue Beach wreck in 2014 (STL14.427).*

*Plate 7: General aspect of the country overlying the western end of the AGS vein, looking NE (STL14.441).*

**Historic Context**

Chapeau Rouge was lyrically described by able seaman Aaron Thomas in 1794:

> Chapeau Rouge… the most remarkable Cape in all Newfoundland, an immense heap of ragged, craggy rocks placed one upon the other. When viewed from the sea every fathom of your move gives it a new shape. Its appearance is said to be most striking when fog is hovering about it. It appears like a Dutchman without legs, afterwards like a hat, then a lion rampant, a bust, a broken turret, a rough dome, and lastly a broken, irregular, craggy, inaccessible mountain. This cape is the southern angle of Great St. Lawrence's Harbour (Murray 1968:145).

This landmark not only marks the entrance to Great St. Lawrence harbour, but also the west side of Placentia Bay, visible for up to 30 km out to sea (see Plate 8). Most importantly, the Cape is a mark for what were historically some of the richest fishing grounds in southern Newfoundland, *le côte de Chapeau Rouge* (the coast of the red hat). Records concerning the French and Basque fishers in southern Newfoundland during the 16$^{th}$ and 17$^{th}$ centuries are not specific as to the harbours being employed on the Coast of Chapeau Rouge. Historic cartography suggests that these migratory fisheries operated by

anchoring ships at Great St. Lawrence from whence small-boat crews were dispatched to beaches close to the lucrative headland fishing grounds in the area, where their catches could be dried in the French fashion by being spread on *gréves* (cobble beaches).

*Plate 8: Looking south across the mouth of Great St. Lawrence, 2009, towards Chapeau Rouge, Blue Beach Point at centre, right (SL.157).*

Although the earliest appearance of the name St. Lawrence (as *C[ape] de SLorenza*) on a chart is not until 1625, the fishing grounds about Chapeau Rouge were known to the French and Basques long before. Linguistic and cartographic evidence indicates that the earliest fishing stations in Placentia Bay (*Plaisance* [Placentia], *Petit Plaisance* [Argentia] and *Chapeau Rouge* [St. Lawrence]) were in use by the mid-16$^{th}$ century, and were recorded as having been in use for many years by 1640 (La Morandiere 1962:431-436; Head 1976:12). Indeed, the French fishery of 1640 superseded an earlier Basque presence at both *San Lorenz Audia* and *San Lorenz Chumea* [Great and Little St. Lawrence] (Prowse 1895:48-49). An expedition by Charles Leigh to Cape Breton and the Magdalene Islands in 1597 mentions “Cape Laurence” (from context, clearly Chapeau Rouge). They put in briefly at both Great and Little St. Lawrence, encountering one Spanish ship at the former and “certaine Basks” at the latter (Quinn 1979:68-75).

The earliest suggestion of a year-round French presence at Great and Little St. Lawrence is from 1702. Early in Queen Anne's War the English conducted a raid on the French fisheries in southern Newfoundland which included the burning of "houses" at both harbours (Prowse 1895:246, Edwards 1983:12-15).

After the French had been defeated and forced to abandon their fishery, St. Lawrence was visited by surveyor William Tavernor on 3 March 1714, who reported that for the French it was "a harbour that exceeds all the rest for Ships" and "an extraordinary good place for Codfishing."

> [From Burin] thence I went to Little St. Lawrence which is a good harbour; and good for Codfishing, but no Salmon, there is very little woods in those parts, A man may goe 30 or 40 Miles in the Countrey, upon the plains, and scarse find a Tree to Shelter him, abundance of Hares, Patridge, and Deer, but the Countrey being so plaine the hunters cannot come at the Deer very often, There ffishes one planter, who hath not taken the Oath, he caught the last year about 280 Quintls of ffish p boat, there are Two ffish[g] Roomes. for Ships, which is all fflakes. from thence I went to great St. Lawrence, which is a harbour, that exceeds all the rest for Ships, there are Two very fine beeches large enough for 20 Boats, which lyes on the West side, and on the East side, there is roome enough for 40 boats, in that harbr Turn in or out, when they please, and Ships may be [landd?] aground, within the high Mountain, called Chapeauxrouge is all Barren Levell Land, its esteemd by the ffrench, to be an extraordinary good place, for Codfishing, in Time of the Late Warr they have had 300 Boats, from Placentia, I have been credibly Informd that they did this Successively, one Year after another,[4] the whole Time of the Warr (Taverner 1718:230-231).

The next account of the fishery at St. Lawrence is from surveyor Captain James Cook in 1762, when he charted Great and Little St. Lawrence and hired a local resident, John Beck, to be his guide to the coast thereabouts. He noted "...severall inhabitants employ'd in the Fishery and likewise severall Stages and Fishing Rooms and convenient places for severall more" at Great St. Lawrence, but no inhabitants at Little St. Lawrence (Cook 1767).

[4] Taverner's phraseology here implies that the French presence is still a seasonal one. However, Humphrey (1970:19-20) indicates that overwintering took place at many locations during the war. His reference to "two very fine beeches" on the west side of the harbour may be a reference to Shingle Point and Blue Beach.

In 1773 Christopher Spurrier, a merchant from Poole, England, who had his main fishing and trading premises at Oderin, began building ships at Great St. Lawrence (Prowse 1895:165). In 1784 the Dartmouth, England/St. John's-based fishery and supply firm Newman and Company built trading premises at Little St. Lawrence. Newman and Company remained the largest trader on the west side of Placentia Bay until c. 1810, when they moved their chief south coast establishment to Little Bay, in Fortune Bay.

Among other early settlers were Henry Beck (who captured a French banking vessel in 1814), William Tulk (who taught school to 30 pupils in 1817) and David Slaney (granted land at Great St. Lawrence in 1844). An unofficial census of 1827-28 recorded a population of 553 (probably a summer figure which included the immediate surrounding area). The official *Census* of 1836 showed a total of 232 people at Great St. Lawrence.

By 1891, 26 men from the community were fishing on the banks, but after 1900 the shore fishery was again the dominant activity. Whaling was encouraged after a processing factory began operation in Little St. Lawrence in 1898. At the turn of the century there were 799 people, including seven merchants, in Great St. Lawrence.

*Plate 9: Beach at Mine Cove (STL14.470).*

*Plate 10: Adit in the cliff at Mine Cove (STL14.468).*

Geologist J.B. Jukes noted extensive fluorspar deposits at St. Lawrence as early as 1841.

The earliest mining activity in the study area was in 1860, at Mine Cove (see Plate 9):

> … Charles Bennett's one-million-acre grant… covered most of the Burin Peninsula… Bennett persisted in considering the entire grant as his property and accosted those men who dared to exploit minerals within its boundaries.
>
> The Newfoundland government unknowingly aroused Bennett's territorial instincts in August 1860 by giving the mineral rights for a lead deposit near Lawn on the Burin Peninsula to a St. John's land surveyor named Frederick Page and a Burin farmer named Isaac Collins. Page and Collins approached Harry Verran, who… agreed to develop the claim. However, when Bennett learned of their intentions he confronted the men with orders either to accept him as the controlling partner or to expect court action. They capitulated to his forceful character and gave him a controlling share in the mine.
>
> Excavations at the Lawn mine consisted of a small adit reaching into the cliff along a lead-bearing fluorspar vein [see Plate 10]. In the process of following the lead ore, miners struck and shoveled aside what appeared to be sand and gravel. A few rainy days later they noticed that the washed-out debris contained lumps of native silver: lumps that were small enough to be pilfered behind Verran's back and large enough to fetch heavy prices from jewelers in St. Pierre and St. John's. The

> miners depleted what little silver existed in the claim, leaving the mine to collapse figuratively for lack of ore and literally when a landslide buried the workings.[5]

This 19th century mine is of at least passing historic interest. However, its workings were very close to shore, and were abandoned within a very short timeframe.

Although St. Lawrence fluorspar attracted some attention early in the 20th century, it was not until 1933 that commercial mining began. The St. Lawrence Corporation of Newfoundland (1933-1965) found a market with the Dominion Steel and Coal Corporation of Cape Breton for its use as a flux in iron refining. At the time the St. Lawrence deposit was the largest in North America.

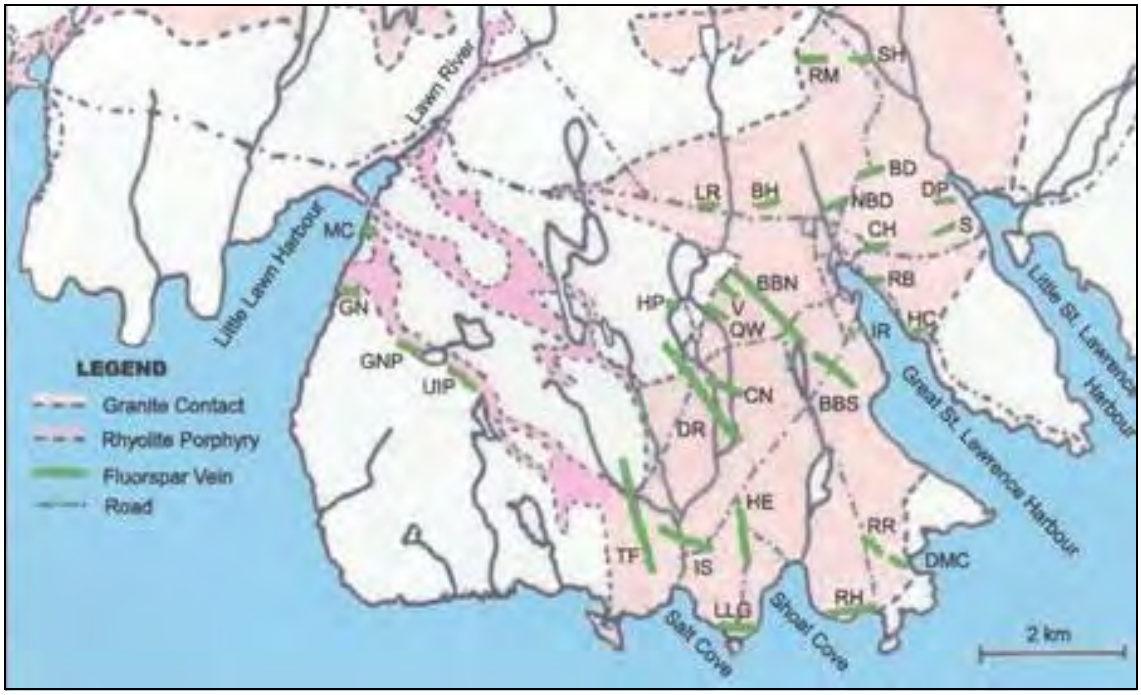



*Plate 11: Fluorspar veins in the St. Lawrence area. The current proposal is to mine the GN, GNP and UIP veins, referred to collectively as the "AGS vein."*

The St. Lawrence Corporation began mining the Black Duck vein, north of St. Lawrence Harbour, and then the Iron Springs vein, southwest of the harbor and north of Salt Cove (see Plate 11). Although nine veins were mined to some degree prior to World War II, by 1945 the Corporation concentrated its operations at Iron Springs and the Blue Beach vein, nearest St. Lawrence Harbour.

[5] Martin (1983:11).

*Plate 12: Director Mine, headframe, 1949 (St. Lawrence Miner's Memorial Museum).*

A second company, the American Newfoundland Fluorspar Co., began operating in 1937, primarily working what came to be known as the Director's (see Plate 12) and Tarefare veins (see Plate 13). The company was acquired by the Aluminum Company of Canada (ALCAN) in 1939 and operated as the Newfoundland Fluorspar Co., or Newfluor.

> Early mining procedures consisted of surface stripping, but because poor weather conditions often meant that mining often had to be suspended, underground methods were soon put into effect. Shafts were sunk and mining by a form of shrinkage stoping was undertaken in eight fluorspar veins in the St. Lawrence area. This method of mining involves reduction of bed volume by excavation in a series of horizontal steps either above or below the bed level. By 1948 mining had progressed to a depth of 107 m (350 ft) below the surface. Initially processing of the ore was done by washing, hand-picking and crushing but in 1942 the St. Lawrence Corporation installed a flotation mill. Alcan, however, continued to ship the ore, crushed, to Arvida, Quebec where it was processed by the method used in Newfoundland by the St. Lawrence Corporation. By 1948 Newfoundland ranked fifth in world fluorspar production… (Shepherd 1984).

In the late 1950s the St. Lawrence Corporation was beginning to experience a number of difficulties, including competition from Mexican fluorspar, a catastrophic collapse at the Blue Beach mine in 1957, and the death of Corporation founder Walter Siebert in 1961. In 1965 its assets were sold to Newfluor, which then reopened the Tarefare mine and sank new shafts on the Directors and Blue Beach veins.

> Before the mining of fluorspar in the Province ceased in 1977 when Alcan closed down, serious health problems of the workers at the Alcan mine had become apparent, and a Royal Commission had been set up in 1967 to seek the cause. The Commission found that radon, a hazardous, radioactive, gaseous product of uranium decay, was being concentrated in the mine by ground-water flowing through the granite surrounding the fluorspar vein. As a result of the Commission's findings, the ventilation of the mine was then improved by the installation of a system which continuously supplied fresh air from the outside, and production, in a presumably safer working environment, continued (Shepherd 1984).

The relative prosperity of St. Lawrence came to an end in 1978 when ALCAN closed the mines, choosing to rely upon Mexican fluorspar.[6] The mines were reactivated in 1985 and run by a subsidiary of the St. Lawrence Corporation, Minworth Ltd., until 1991.

*Plate 13: Dominant features of the landscape in 2014: bog/heathland, Chapeau Rouge and the former Tarefare mine site, at left (STL14.492).*

[6] See Martin 1983:66-73, for a fuller history of fluorspar mining 1933-78.

**Field Results**

Field investigation occurred from 28-30 October 2014, and was conducted by Robert Cuff and Blair Temple of GPA. Upon arrival at the CFI mine office, we were given a site introduction and safety briefing by Frank Pitman of Canada Fluorspar Inc., followed by a site orientation of the various access roads, and the pending AGS mine site (see Plate 14) and infrastructure.

*Plate 14: A good illustration of the mix of ridge, bog, tuckamore and pond overlaying the AGS vein. Grebes Nest Pond is at top, centre, with Chapeau Rouge visible to its right (STL14.450).*

*PA1 – AGS vein/mine site (investigated 29 October 2014).* This proposed mine site was the focus of investigations on the best "weather day" forecast. Investigation began by driving to the far western end of the AGS access road to the headland/hill known as "Grebes Nest"[7] (see cover). Much of vein/mine site is overlain by ponds, gullies, and bog, and has limited potential for historic resources (see Plates 7, 15). The walkover survey began along the hillsides to the south of the vein, along which drill crews were

[7] Possibly a corruption of "Greep's Nest," a common Newfoundland name for coastal lookouts, "greep" being a local name for bald eagle.

working. From overview assessment, significant historic resources were not anticipated in this area. The walkover did provide an opportunity to visually assess the wider area, confirming the suspicions that the area was largely unsuitable for habitation and an unlikely location for an archaeological site. Prominent hilltops were assessed as potential hunting lookouts and for wayfinding markers or cairns with none being located, apart from a recent cairn at Grebes Nest (see cover). We also visited Mine Cove, and followed Mine Cove Brook for some distance inland without encountering 19th century workings except at the cove itself. (See Appendix C, Area A).

*Plate 15: John Fitzpatrick Pond looking east from Option #2. Option #1 traverses the country on the far side (STL14.484).*

*PA2 – Option #1 access road (assessed 29 and 30 October 2014).* To the north of the AGS road, the Option #1 access road route is primarily across open, wet country, with some drier ground covered with scrub forest to the north and west of Black Duck Pond (see Plate 16) and John Fitzpatrick Pond (see Plate 15).

*Plate 16: Black Duck Pond, looking east from the Option #1 route (STL14.522).*

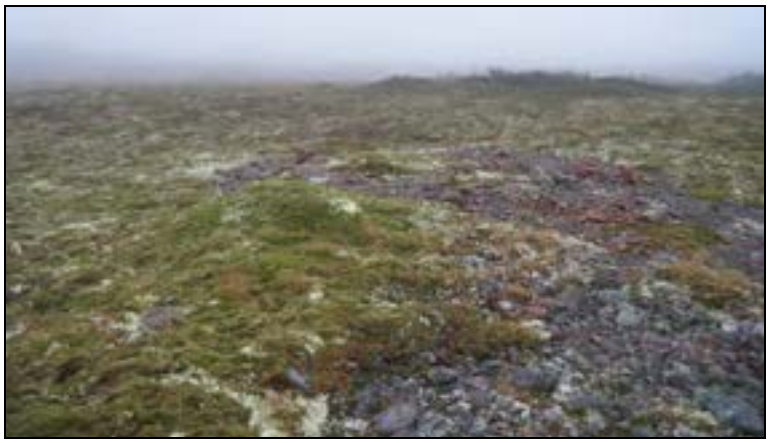


*Plate 17: Outcrop SW of Black Duck Pond, showing previous disturbance by prospectors, Option 1 route (STL14.528).*

For both access road options, areas near the AGS road were assessed first, with similar results. The landscape is largely a mix of bog and marsh, with sporadic rock outcrops (see Plate 17). Evidence of past mineral exploration activity was observed, as well as recent staking (see Plate 18), but no other cultural modifications of the landscape. Option #1 begins in the north off the Old Lawn Road (the former Burin Peninsula Highway, re-routed farther inland in the 1970s). Other than a grown-over gravel pit near the proposed beginning of this access road option, and an ATV trail from the gravel pit to a cabin on the east side of Black Duck Pond, no cultural features were observed near the road. (See Appendix C, Area A and Area B).

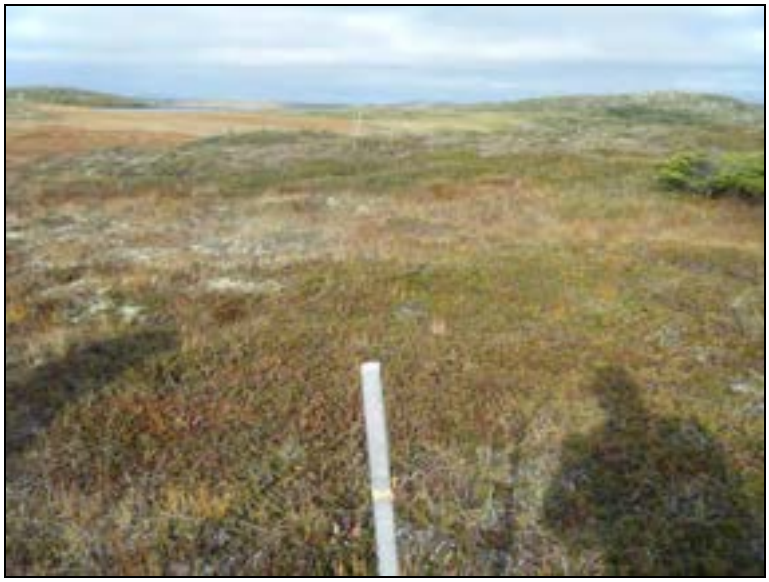


*Plate 18: Staking in the Mine Cove vein/Option #1 country, looking north from near the AGS road (STL14.464).*

*PA3 – Option #2 access road (assessed 29 and 30 October 2014).* This access road option would be employed were it decided to build a new mill near Hay Pook Pond, rather than re-develop the old mill site near Clarkes Pond.

*Plate 19: Aspect of the Option 2 country, near the AGS road. Note the previous-sampled outcrop at centre (STL14.479).*

Towards the SW end of the Option #2 access road (as the route approaches the AGS road) the country is barren and undulating, but largely undisturbed. As with option #1, areas of outcrop showed evidence of previous prospecting/sampling of indeterminate age (see Plate 19). To the NE, near Hay Pook Pond, the Option #2 route skirts a disturbed area, associated with the former Directors Mine site (see Plates 20 and 21, and Appendix C, Area A and Area B).

*Plate 20: Overgrown brown field (Directors Mine) SW of Hay Pook Pond (STL14.493).*

*Plate 21: Partially-buried timbers (wpt "Portal?") Directors Mine (STL14.503).*

*PA4 – Hay Pook Pond.* The Option #2 access road is presumably predicated on a mill being constructed at a site SW of Hay Pook Pond rather than by re-developing the old mill site near Clarkes Pond. As noted above, this is the general area of the former Directors Mine, and is much disturbed 500 m SW of the Pond. Meanwhile, the area directly south of Hay Pook Pond is presently undisturbed and is at least somewhat drier than the country west, north and east of the pond (see Plate 22 and Appendix A, Area C).

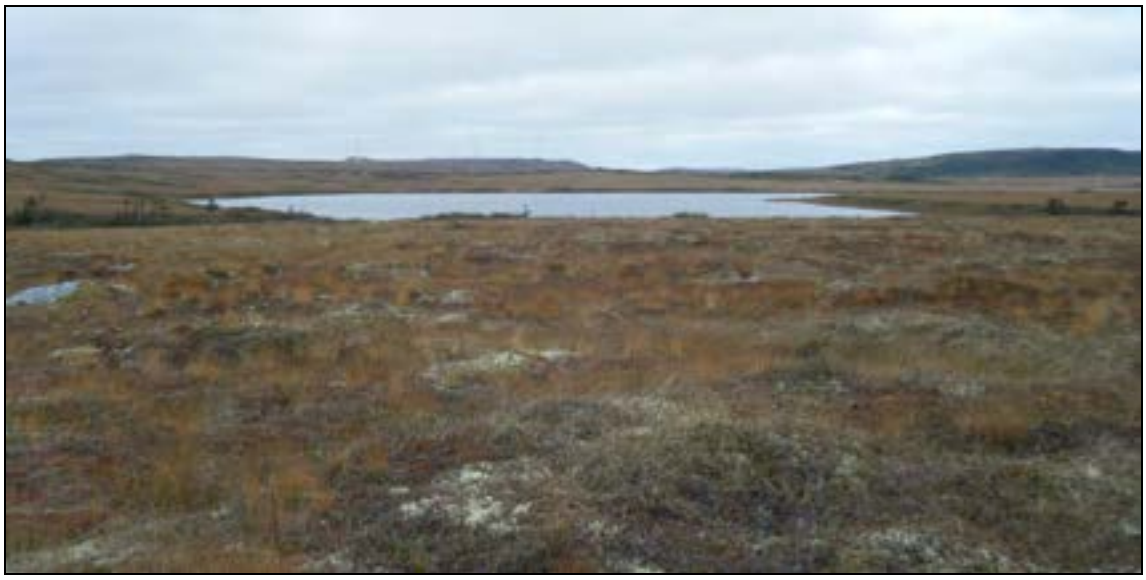


*Plate 22: Hay Pook Pond, view north towards the Burin Peninsula highway from the proposed alternate mill site (STL14.499).*

*Plate 23: North end of Shoal Cove Pond, the old tailings pile runs across the middle of the photo, while the former mill site at Clarkes Pond can be seen on the horizon (STL14.414).*

*PA5 – Shoal Cove tailings pond (investigated 28 October).* After a brief examination of Shoal Cove, the first portion of the study area to be investigated was the proposed tailings pond at Shoal Pond, and the associated piping route from the proposed mill site (which would follow a similar course whether the Hay Pook or Clarkes Pond mill option were chosen). Shoal Pond was previously used as a tailings pond (see Plate 23), and much of the landscape to the west showed clear signs of extensive disturbance by heavy machinery. A brook running along the south of this massive, terraced, pile of tailing debris had a series of silt pens constructed. Investigation northwest along the tailings-pipe

route identified several small access roads and ATV trails, but no historic resources (see Plate 24 and Appendix C, Area D).

*Plate 24: Looking across Shoal Cove Pond towards Chapeau Rouge, from the old tailings pile (left). The proposed route of the tailings pipeline runs from bottom right, towards the pond from the existing (abandoned) mill site (STL14.415).*

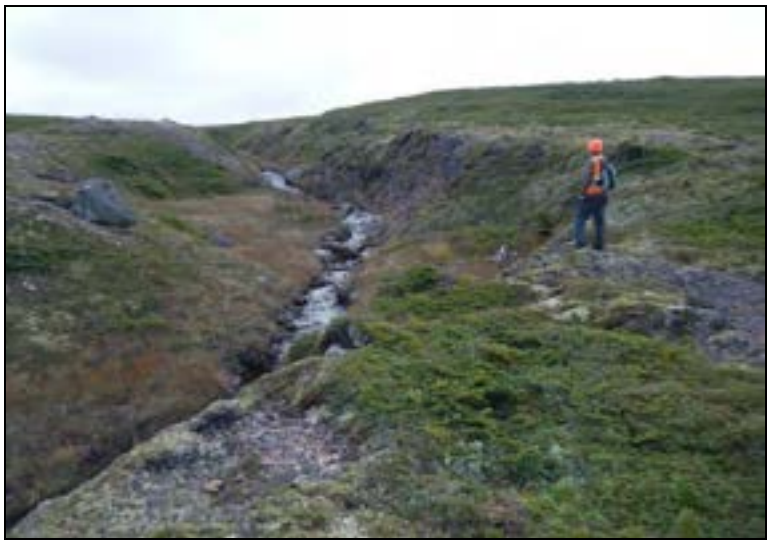


*Plate 25: Mine Cove Brook (STL14.472).*

**Discussion/Recommendations**

During three days of field investigation, no historic resources were identified, other than evidence of previous mining and mineral exploration activity. This included a 19th century mine, at Mine Cove, Little Lawn Harbour, which is of at least passing historic interest. However, mine workings there were accessed from the beach, presumably at some peril, and were abandoned within a very short timeframe. Although GPA's team followed Mine Cove Brook for some distance inland, no further 19th century workings were encountered (see Plate 25).

Based on field level assessment, no Project Area was judged to have significant site advantage for habitation, and only one (Shoal Cove Pond) seemed likely to have seen much use or transit from St. Lawrence prior to the opening of the first fluorspar mine in 1933. Of course, this PA was found to have been profoundly disturbed by previous milling of fluorspar. No further assessment of the proposed mine/mill reactivation is recommended.

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**Appendix A – Clearance Letter**

08 December 2014

Martha Drake
Provincial Archaeologist
Department of Business, Tourism, Culture and Rural Development
Confederation Building
St. John's, NL
A1B 4J6

RE: Clearance letter – St. Lawrence fluorspar mine reactivation, HRIA

Dear Martha,

From 29 to 31 October 2014, Blair Temple and Robert Cuff, Gerald Penney Associates Limited (hereinafter GPA), conducted a Historic Resources Impact Assessment (hereinafter HRIA) at the site of the former fluorspar mine at St. Lawrence. It is currently proposed to mine a different vein that those in production historically. Canada Fluorspar Inc. is currently in the preliminary stages of resuming production, with a new mine site, piping to a tailings pond, and processing plant proposed.

The larger mine area was surface surveyed over the course of three days, including the proposed AGS mine site at the west end of the property; a proposed mill site c. 2 km from the former, abandoned mill; two optional road-routes to the mine site, one from the old Lawn Road, and the other from the proposed mill site; and the route of a proposed pipeline between the mill site and an existing tailings pond (Shoal Pond). Surface survey determined most areas (excluding parts of the adjacent shorelines) to be an unlikely location for pre-contact or historic-era historic resources. Much of the project area was comprised of a mix of rocky and/or boggy terrain, with ponds, streams, and gullies throughout. In addition, most of the western half has a steep shoreline, with little in the way of suitable coves for landing water craft between Little Lawn and Chambers Cove. Due to decades of mining and mineral exploration activity in the area, extensive disturbance has occurred throughout. With the exception of 20$^{th}$ century mining-related features and debris, no historic resources were identified during the HRIA.

The beach at Shoal Cove and Shoal Cove Brook was visited, as Shoal Pond is intended as a tailings pond. A metal boat identified by GPA in 2008 still lies at the site. One tangential find of historic significance, is C.F. Bennett's former lead/silver mine at Mine

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Cove, Little Lawn Harbour, c. 1860). An extraction tunnel was identified in the cliff side, at a significant distance above the underlying beach; its location making access difficult for anything other than photography.

The client has been made aware of the former silver mine, and informed of its precise location and its historic resource significance. It is several hundred metres south and west of proposed mineral exploration and mining related activities, and should be beyond the impact zone of impending development. The client has also been informed that if historic resources are identified during construction excavations, the PAO is to be notified immediately.

Yours sincerely,

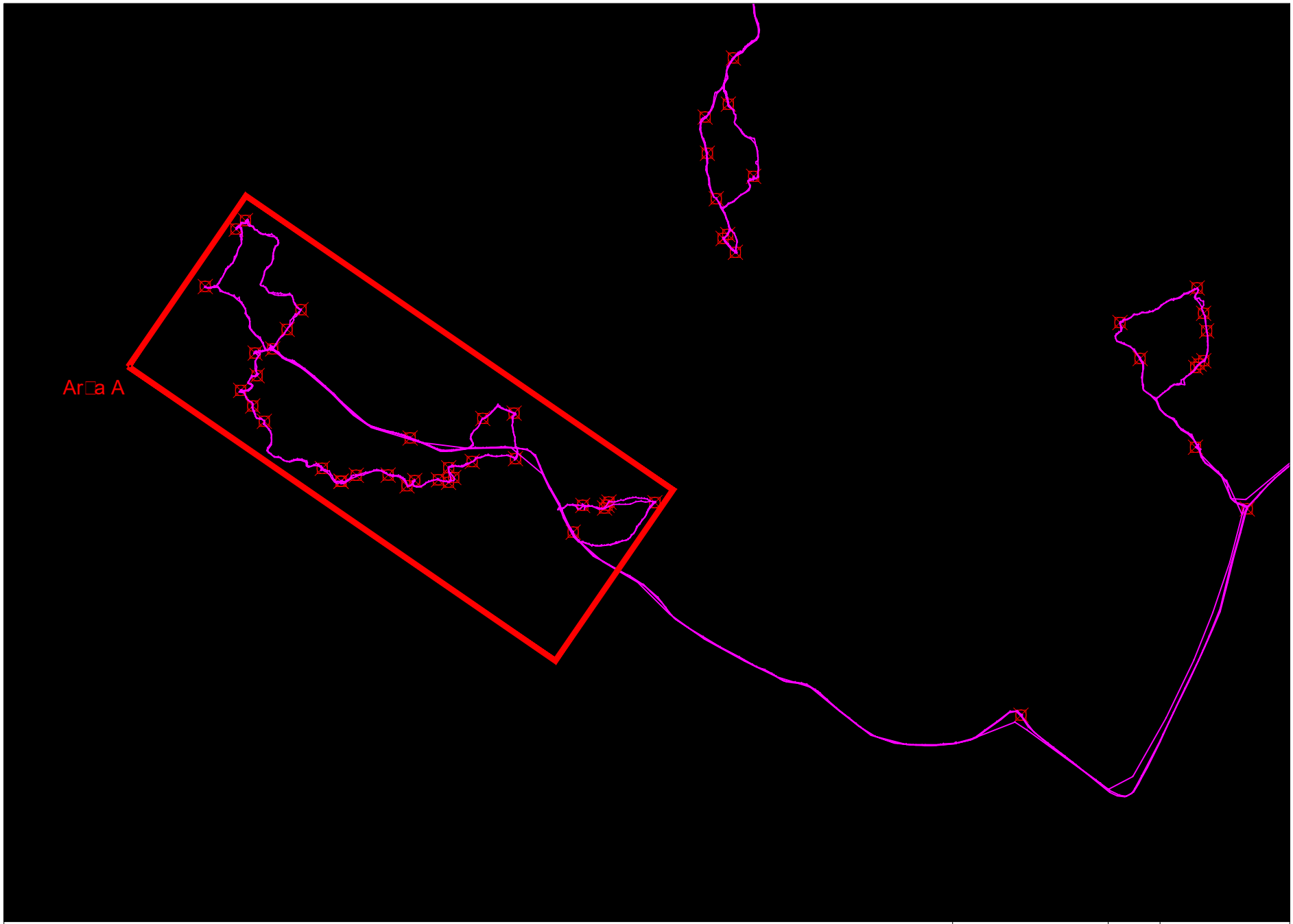
Gerald Penney

cc: Michel Wawrzkow (Golder Associates)

**Appendix B – Waypoints** (NAD 1983)

| *Waypoint* | *Date* | *Coordinates* | *Elevation* |
|---|---|---|---|
| 2Flags | 29-OCT-14 | 620186 5196664 | 58 m |
| 3 Test | 30-OCT-14 | 617928 5197186 | 127 m |
| 603 | 28-OCT-14 | 621237 5194796 | 22 m |
| 604 | 29-OCT-14 | 615601 5196446 | 103 m |
| 610 | 29-OCT-14 | 616027 5196083 | 153 m |
| 611 | 29-OCT-14 | 616100 5196112 | 134 m |
| 612 | 29-OCT-14 | 616344 5196061 | 119 m |
| 613 | 29-OCT-14 | 616570 5196101 | 113 m |
| 614 | 29-OCT-14 | 616659 5196177 | 114 m |
| 615 | 29-OCT-14 | 615767 5196815 | 101 m |
| 616 | 29-OCT-14 | 617297 5195954 | 133 m |
| 617 | 29-OCT-14 | 617308 5195968 | 133 m |
| 618 | 29-OCT-14 | 617318 5195982 | 133 m |
| 619 | 29-OCT-14 | 620185 5196892 | 59 m |
| 620 | 29-OCT-14 | 620164 5196648 | 57 m |
| 621 | 29-OCT-14 | 620147 5196632 | 56 m |
| 622 | 30-OCT-14 | 617918 5198124 | 143 m |
| Abc | 29-OCT-14 | 615372 5197021 | 18 m |
| Akid | 29-OCT-14 | 616496 5196090 | 115 m |
| Altar | 30-OCT-14 | 617891 5197272 | 123 m |
| Bbbx | 28-OCT-14 | 621014 5195053 | 26 m |
| Bdp So | 30-OCT-14 | 617836 5197444 | 118 m |
| Bduck N | 30-OCT-14 | 617782 5197838 | 128 m |
| Bdview | 30-OCT-14 | 617893 5197900 | 139 m |
| Boat | 28-OCT-14 | 621968 5193512 | -4 m |
| Brrrk | 29-OCT-14 | 615622 5196592 | 84 m |
| Cairn | 29-OCT-14 | 615612 5196701 | 97 m |
| Carn 2 | 29-OCT-14 | 615936 5196144 | 149 m |
| Cttar | 28-OCT-14 | 621727 5193512 | 61 m |
| Dig | 29-OCT-14 | 617192 5195966 | 139 m |
| Directors | 29-OCT-14 | 620395 5195950 | 48 m |
| Endbrown | 29-OCT-14 | 619782 5196848 | 67 m |
| Ffdire | 28-OCT-14 | 621792 5195122 | 27 m |
| Ffiirreepl | 30-OCT-14 | 617793 5197664 | 120 m |
| Gnpbk | 29-OCT-14 | 616867 5196191 | 112 m |
| Gnpd W | 29-OCT-14 | 616546 5196147 | 113 m |
| Gnpdpix | 29-OCT-14 | 616545 5196078 | 117 m |
| Gpjct | 30-OCT-14 | 618013 5198437 | 155 m |
| Gs 14 94 | 29-OCT-14 | 616382 5196086 | 119 m |
| Hiptdrk | 30-OCT-14 | 617869 5197253 | 127 m |
| Hpmill? | 29-OCT-14 | 620200 5196807 | 59 m |
| Jjct | 29-OCT-14 | 619879 5196675 | 66 m |
| Minecv | 29-OCT-14 | 615521 5197299 | 21 m |

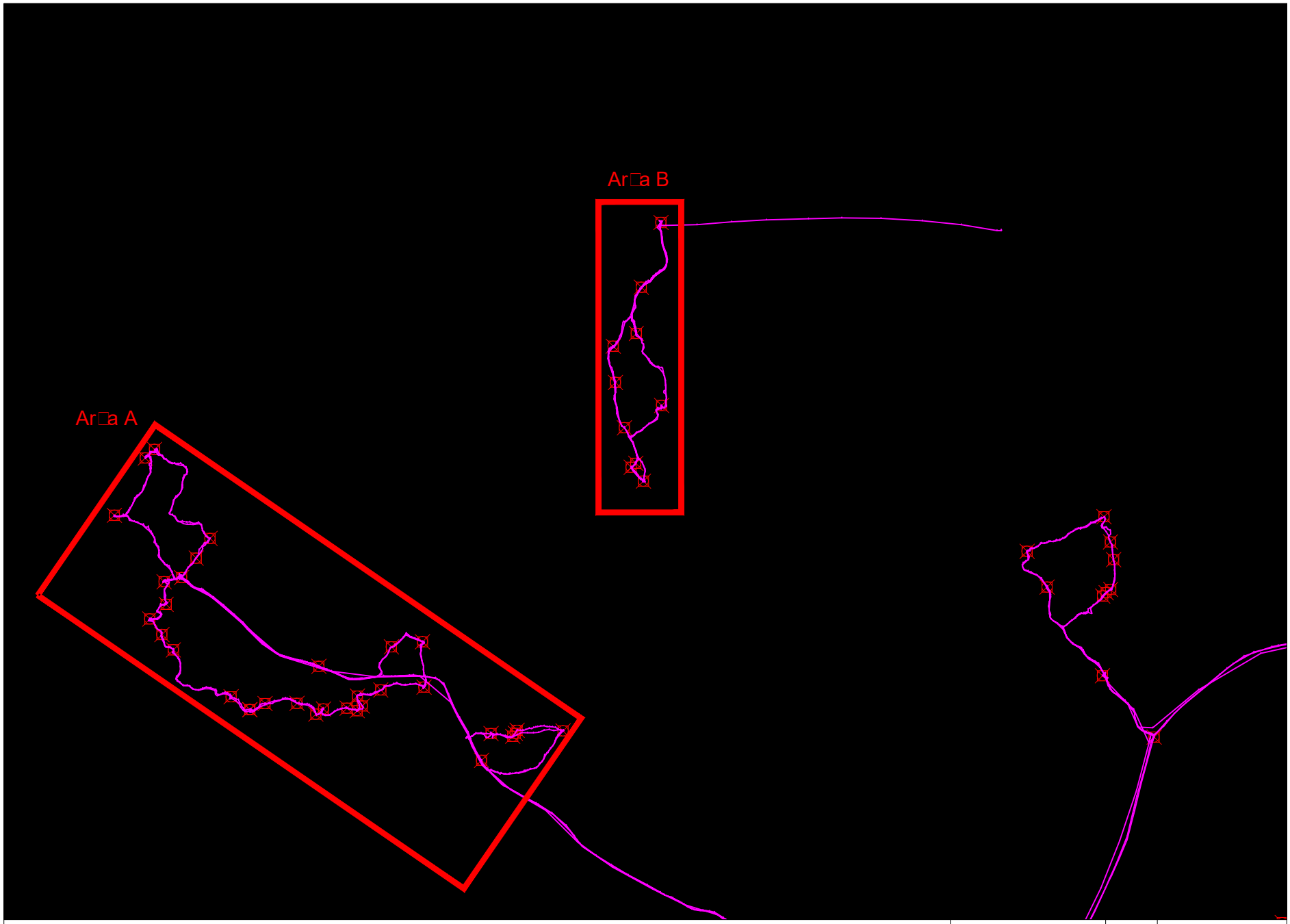
| | | | |
|---|---|---|---|
| Nextnub | 29-OCT-14 | 616026 5196083 | 153 m |
| Opt 1So | 29-OCT-14 | 616360 5196292 | 124 m |
| Opt 1Vw | 29-OCT-14 | 616861 5196411 | 121 m |
| Opt 2Nob | 29-OCT-14 | 617539 5195980 | 144 m |
| Opt 2W | 29-OCT-14 | 617146 5195838 | 124 m |
| Parked | 29-OCT-14 | 615696 5196720 | 97 m |
| Pile | 28-OCT-14 | 622002 5195036 | 11 m |
| Pook Pond | 29-OCT-14 | 620154 5197015 | 57 m |
| Portal? | 29-OCT-14 | 620146 5196247 | 49 m |
| R I P | 28-OCT-14 | 621693 5195183 | 38 m |
| Ritmine Cv | 29-OCT-14 | 615566 5197340 | 26 m |
| Shangrila | 30-OCT-14 | 618016 5197552 | 109 m |
| Smerr | 29-OCT-14 | 615657 5196372 | 126 m |
| Stake | 29-OCT-14 | 615543 5196521 | 86 m |
| Stkcor 1 | 29-OCT-14 | 616710 5196385 | 117 m |
| Stklines | 29-OCT-14 | 616254 5196113 | 125 m |
| Sttkk | 29-OCT-14 | 615834 5196909 | 97 m |
| Swanmarsh | 28-OCT-14 | 622437 5194752 | 4 m |
| Tail | 28-OCT-14 | 622194 5195029 | 6 m |
| Tarefare | 29-OCT-14 | 619305 5194955 | 58 m |
| Turnttail | 28-OCT-14 | 621727 5195048 | 26 m |




Ar□a A - Pr□□□□□d m□□□ □□□□. S□□□□□r□ □□d, acc□□□ r□ad □□□□□□ 1 a□d 2. (250 □a).

Sca□□ 1:25000

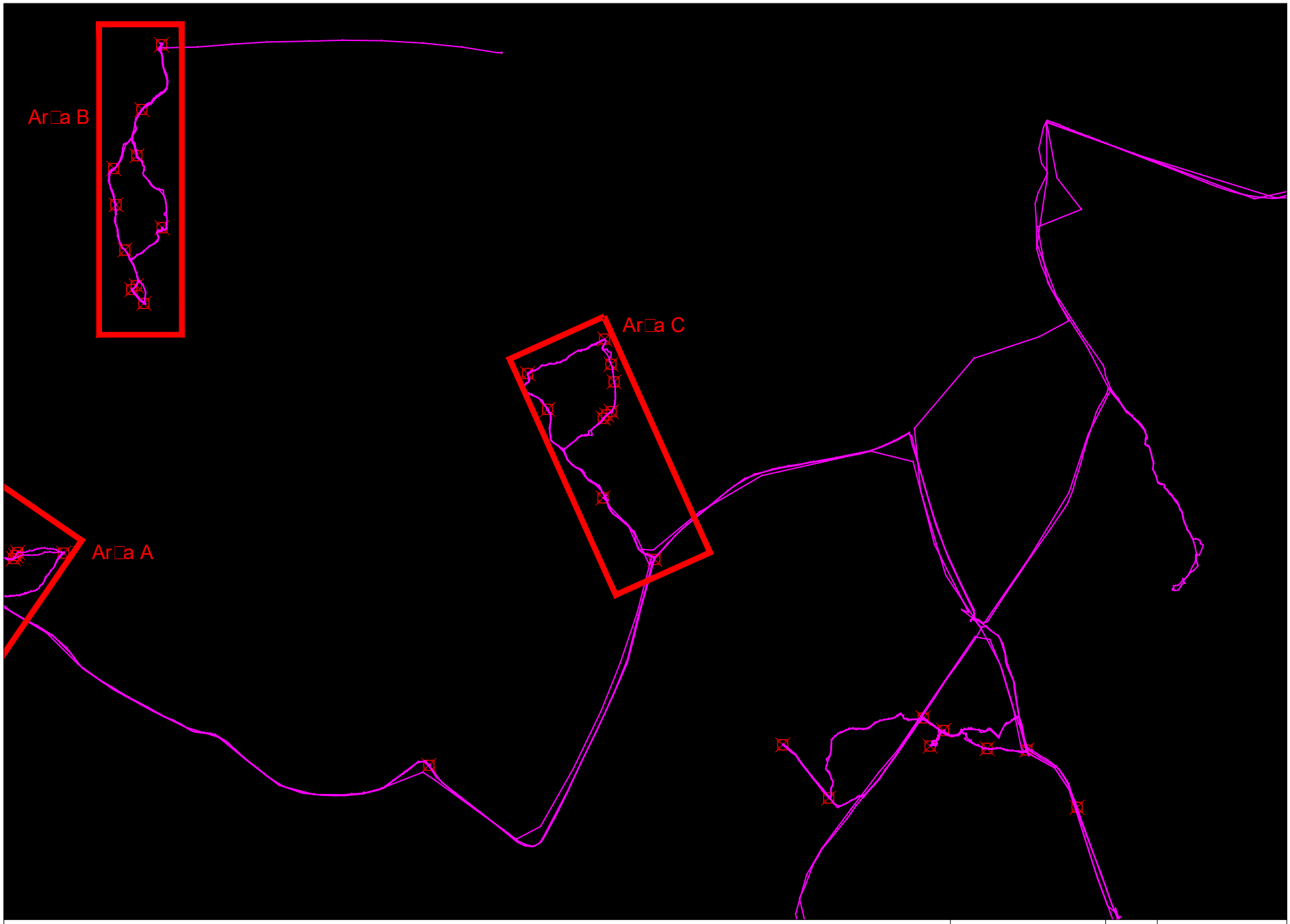
A□□□□d□□ C




Ar□a B - N□r□□□r□ □□d, acc□□□r□ad □□□□□□ 1. (60 □a).

Sca□ 1:25000

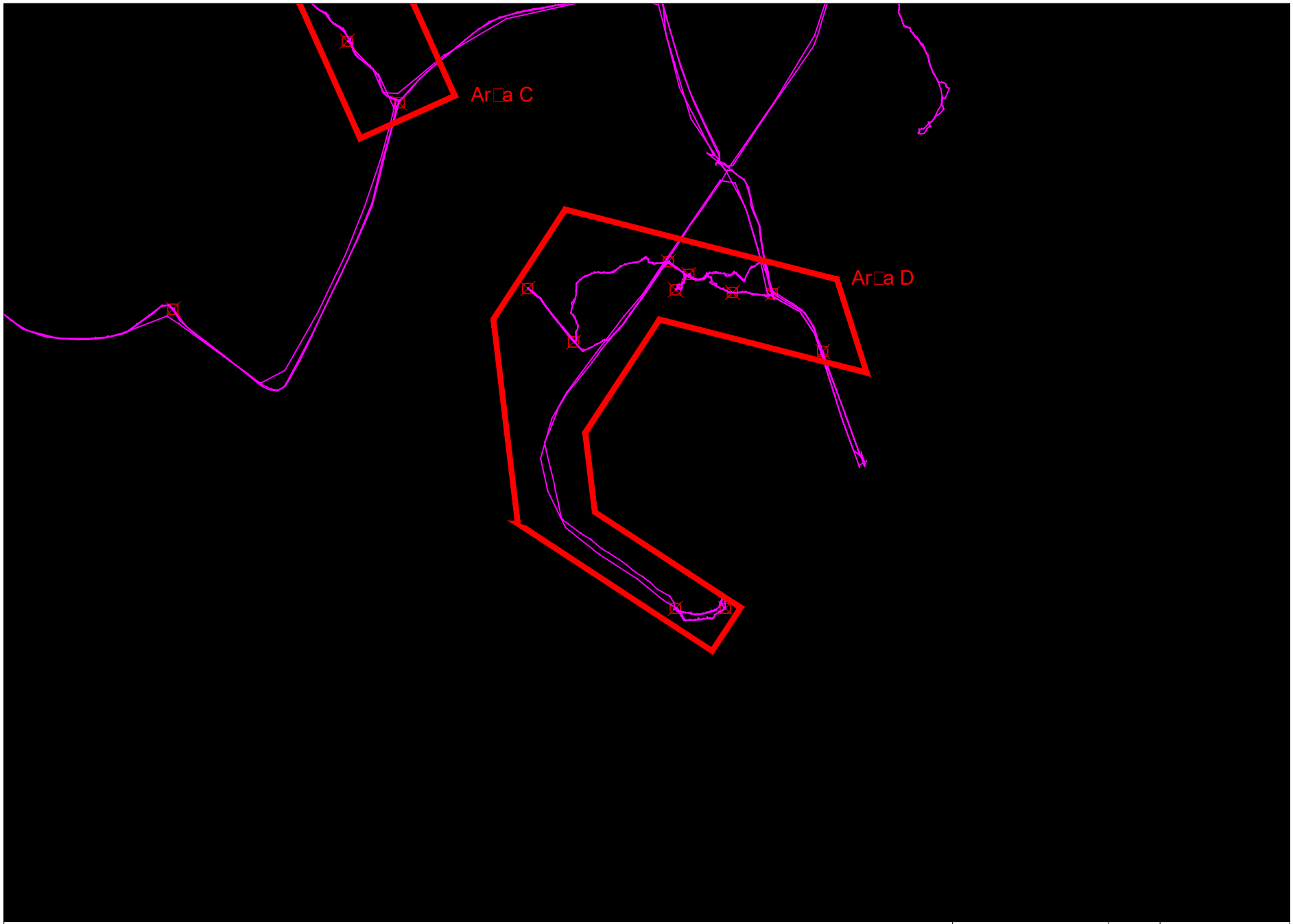
A□□□□d□ C




Ar□a C - Pr□□□□□d m□□□□□□. ( 62.5 □a).

Sca□ 1:25000

A□□□□d□ C




Ar□a D - Pr□□□□□d □a □□□□□ □□□□□□□. ( 141 □a).

Sca□ 1:25000

A□□□□d □ C