



Aquatic Survey - Howse Pit Study Area

HML

Howse Minerals Limited

Technical Report

Our file: PR185-18-13

Your order: 2013554

November 19, 2014

PROJECT TEAM

GRUPE HÉMI SPHÈRES

Simon Barrette	Biologist, M.Sc. Biol., Project Manager, Field and Drafting
Hugo T. Robitaille	Biologist, M.Sc. Env., Director
Daniel Néron	Wildlife Technician, Geographer, M.Sc., Revision
Elissa Dickoum	Geographer, Master (France), Geomatic and Field

(Refer also to the list of personal communications in the References section)



Recyclable and made of 100% recycled paper.
Paper made with wind energy and contributing to the responsible use of forest resources.

This report has been formatted for double-sided printing.

REVISION AND PUBLICATION		
Number	Date	Modification or Publication Data
00	2014-02-28	Preliminary Technical Report 01
01	2014-11-29	Technical Report, Final

V:\Contrat en cours\PR185-18-13_Howse Pit\Rapport\Rapport de terrain\Aquatique\Hemis_PR185-18-13_Howse_Aquatic_141119_VF.docx

Report prepared by:



Simon Barrette.
Biologist, M.Sc. Biol.

Report revised by:



Daniel Néron
Wildlife technician, M.Sc. Geog.

This document should be cited as:

Groupe Hémisphères (2014) *Aquatic Survey - Howse Pit Study Area*. Technical Report Submitted to TSMC, 35 pages and 7 appendices.

TABLE OF CONTENTS

LIST OF TABLES	IV
LIST OF FIGURES	IV
LIST OF APPENDICES	V
1 INTRODUCTION.....	1
1.1 MANDATE AND OBJECTIVES	1
1.2 BIOPHYSICAL DESCRIPTION OF THE LOCAL STUDY AREA	1
1.3 QUALITY CONTROL.....	2
1.4 NOMENCLATURE	2
2 METHODOLOGY	5
2.1 SURVEY METHODOLOGY	5
2.2 WATERBODIES	5
2.2.1 Bathymetrie	5
2.2.2 Water Quality	5
2.2.3 Sediment	9
2.2.4 Benthos	9
2.2.5 Experimental Fishing.....	9
2.2.6 Characterization, Classification and Quantification of Fish Habitat	9
2.3 WATERCOURSES	10
2.3.1 Water Quality	10
2.3.2 Sediment Quality	10
2.3.3 Benthos	10
2.3.4 Index Electrofishing	10
2.3.5 Characterization, Classification and Quantification of Fish Habitat	11
3 RESULTS.....	12
3.1 WATER BODIES.....	12
3.1.1 Characterization, Classification and Quantification of Fish Habitat	12
3.1.2 Water Quality	19
3.1.3 Sediment Quality	21
3.1.4 Benthos	22
3.1.5 Experimental Fishing.....	22
3.2 WATERCOURSES	23
3.2.1 Characterization, Classification and Quantification of Fish Habitat	23
3.2.2 Water Quality	24
3.2.3 Sediment Quality	29
3.2.4 Benthos	30
3.2.5 Index Electrofishing	31
4 CONCLUSION.....	32
5 REFERENCES	33
APPENDICES	35

LIST OF TABLES

Table 1. Characteristics of the Four Habitat Classification Types Identified by Beak (1980)	11
Table 2. <i>In situ</i> Water Quality of Water Body.....	19
Table 3. Laboratory Analysis Results for Surface Water Quality in Triangle Lake	20
Table 4. Laboratory Analysis Results for Sediment Quality in Triangle Lake.....	21
Table 5. Fishing Effort by Waterbodies	22
Table 6. <i>In situ</i> Water Quality of Watercourses	25
Table 7. Laboratory Analysis Mean Results for Surface Water Quality in Watercourses.....	27
Table 8. Laboratory Analysis Results for Sediment Quality in Burnetta Creek	29
Table 9. Benthos Statistics for Burnetta Creek	30
Table 10. Electrofishing Effort in Watercourses of the Study Area	31

LIST OF FIGURES

Figure 1. Location	3
Figure 2. Fish and Fish Habitat.....	7
Figure 3. Bathymetric Map of Triangle Lake	13
Figure 4. Bathymetric Map of Pinette Lake	17
Figure 5. Particle Size Distribution of the Sediment in Triangle Lake	22
Figure 6. Particle Size Distribution of the Sediment in Burnetta Creek.....	30

LIST OF APPENDICES

Appendix I Experimental Licence

Appendix II Photographs

Appendix III Raw Data: Watercourse characterization, Lake Characterization, Lake Experimental Fisheries

Appendix IV Habitat Suitability Index and Habitat Equivalent Unit Calculation for Lakes

Appendix V Laboratory Certificates

Appendix VI Benthic Invertebrate Raw Data

Appendix VII Habitat Suitability Index and Habitat Equivalent Unit Calculation for Streams

1 INTRODUCTION

This technical report presents the baseline survey of the aquatic environment in the sectors directly or indirectly affected by the Howse Project in conformity with the provisions of Sub-sections 36(5)(a) to (e) of the Fisheries Act and Appendix 2 of the Metal Mining Effluent Regulations. The objective of the study was to collect the information required to characterize and quantify fish habitat. The survey includes a biophysical description of the selected water bodies and water courses as well as the results of experimental fishing.

1.1 Mandate and Objectives

HML mandated Groupe Hémisphères to carry out, among other tasks, biological surveys on the Howse Project site, including the aquatic survey. The surveys undertaken in 2008 by the sub-contractor AMEC Earth & Environmental dealt with some of the water bodies potentially affected by the Howse Project. The general objective of this study is to conduct a baseline study for the Howse Projects concerning the limnology and the aquatic fauna of the various waterbodies in and around the footprints of the Project.

The specific objectives of this study are:

- To record historical data about the sector;
- To collect baseline water quality parameters;
- To collect laboratory data on water and sediment quality and on benthos;
- To collect baseline data on fish habitat, such as absence/presence;
- To identify the fish species present;
- To classify the watercourses in terms of fish habitat;
- To quantify each water course and water body in terms of fish habitat; and
- To cover the whole sector potentially affected by the Howse Project.

In order to better understand the distribution and quality of fish habitat throughout the Project area, this report incorporates the results of the study entitled Fish and Fish Habitat Investigation for the Direct-Shipping Ore Project, New Millennium Capital Corp. (AMEC 2009).

1.2 Biophysical Description of the Local Study Area

This section briefly describes the biophysical environment of the study area surveyed during this study. Figure 1 shows the drainage basins in the study area, which lies northeast of the large Howell River drainage basin. The description of the terrestrial ecosystems and the geomorphology were taken from an ecological mapping study and floristic survey of the entire Project area (Groupe Hémisphères *In Progress*). The geology throughout the study area is of sedimentary origin and comprises relatively old rock composed of Ruth shale or cherty Sokoman sandstone (Envir-Eau 2009).

The Howse Project is located south of the 55th parallel in Newfoundland-Labrador (Figure 1). It is proximate to the Timmins pits formerly mined by the Iron Ore Company of Canada (IOC) and currently exploited through TSMC's DSO3 project. This explains the presence of large areas that have been disturbed and numerous sites where the infrastructure footprint is visible. Undisturbed areas display predominantly a High Subarctic Tundra ecosystem, dominated by low Alpine shrubs and subxeric lichen. Several small areas of mesic Glandular birch scrublands are also present, as well as a large section of xeric rock outcrops with Crowberry. Closer to the Howells River, which flows through a wide, open valley, the change in elevation is accompanied by a transition towards a Mid Subarctic Forest ecosystem dominated by Black spruce and White spruce, Labrador tea and Feathermoss. This study area is characterized by a generally flat terrain

with rolling to undulating plains. Surficial deposits generally originate from ground moraine made up of silt, sand and boulders. There is also a large wetland complex west of the Howse deposit.

1.3 Quality Control

The surveys and related analyses were conducted using standard operating procedures (SOP) that are part of the quality control system of Groupe Hémisphères. A number of these SOP consist in using various field forms throughout the survey. They involve the following activities:

- Water and sediment sampling;
- Measurement of waterbody temperature and oxygen profiles;
- Bathymetry;
- Reconnaissance of fish and macroinvertebrate habitat;
- Electrofishing;
- Management and transmission of GPS field data;
- Data entry and analysis;
- Report writing.

The procedures are based on best practices in the field, as well as on the accumulated experience of the firms' specialists. The purpose of the SOP is to ensure that the work is carried out according to the highest standards. The SOP are available upon request. The data on the field forms were entered into the computer at the end of each day. These steps made it possible to identify deficiencies and to avoid any confusion that might arise during the survey. In addition to the field forms, another SOP consisted in checking the field forms against the data entered into the computer once the teams returned from the field. As for the laboratory analyses, chains of responsibility forms were filled out to document sampling dates and conservation, delivery and reception methods. The accredited laboratory was responsible for a part of this procedure. All the compiled and analyzed data were reviewed by a competent third party and the technical report was meticulously reviewed by the project managers and directors.

1.4 Nomenclature

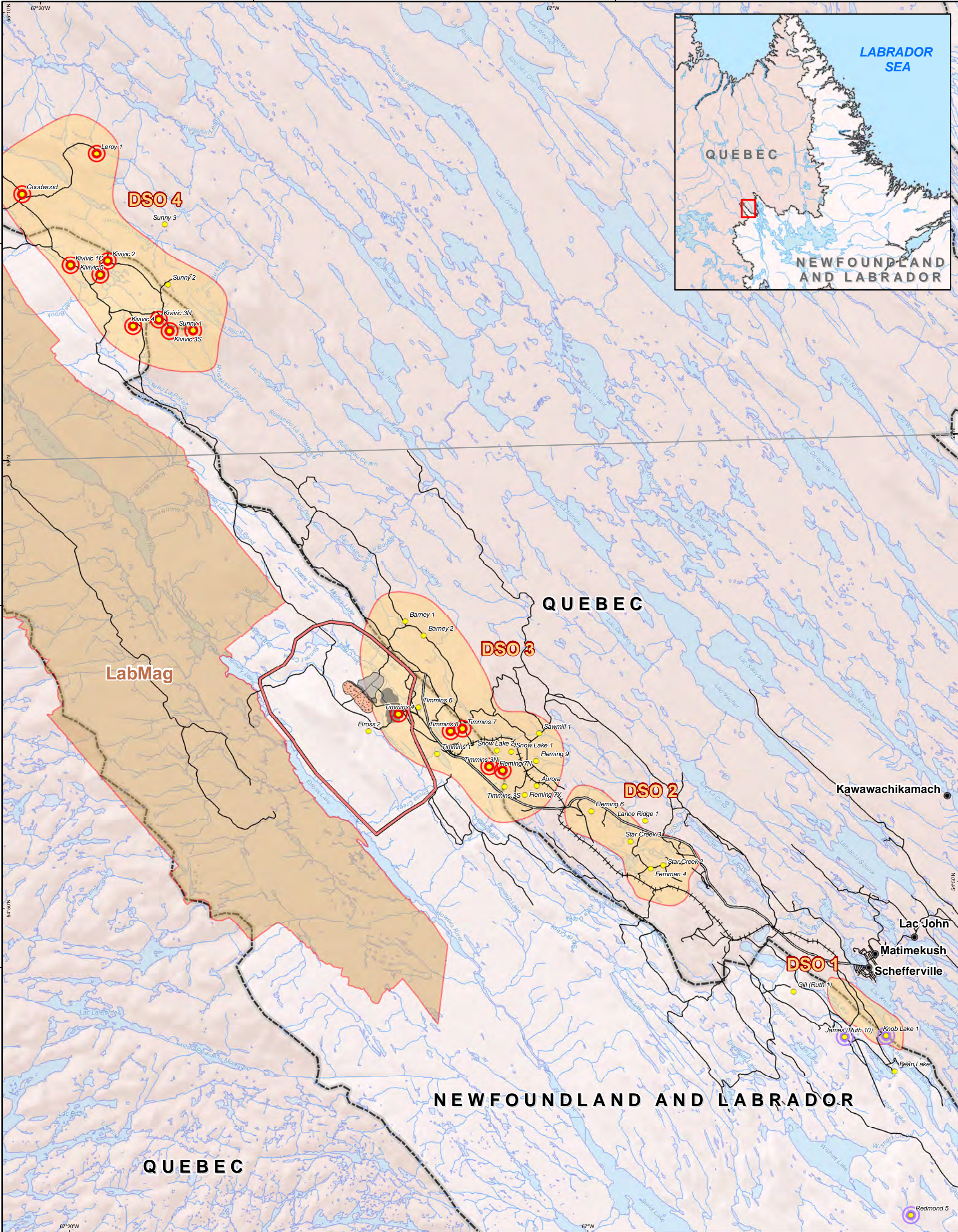
The official names of lakes and watercourses were taken from the 1/50 000 scale maps in Natural Resources Canada's National Topographic Database (NTDB). Unnamed hydrographic features surveyed were given a topological code in the office indicating their relationship with a known lake or parent watercourse. Some unknown lakes were named after a characteristic feature.

Georeferencing and Topographic Database

All sampling points were georeferenced using a portable GPS device (Wgs84). All GPS devices had wide area augmentation system (WAAS) correction capability to ensure positional accuracy of down to 3 m in this region. The bathymetric data have the same horizontal accuracy. The 5 m contour lines were provided by the terrain model generated from the 1/10 000 scale aerial photographs taken in 2008. The hydrography was adjusted using these photographs and validated following the field survey.

615000

630000



LEGEND

Infrastructure And Mining Components

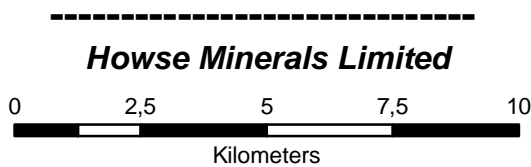
- DSO - Deposit
- LIM Project
- TSMC Project
- Proposed Howse Pit
- Proposed Low Grade/Overburden Stockpile
- Proposed Crushing/Screening Facility
- Proposed Waste Rock Dump

- DSO Howse
- Local study area
- DSO - Other Site
- Taconite - LabMag

- Basemap**
- Town
 - +++ Railroad
 - Road
 - Watercourse
 - Waterbody
 - Provincial Boundary

Figure 1

Location



SCALE:
1:150 000



UTM 19N Nad 83

FILE, VERSION, DATE, AUTHOR:
GH-0466, 03, 2014-02-25, E.D., J.T.

SOURCES:

Map base
Government of Canada, NTDB, 1:50,000, 1979
SNC Lavalin, Groupe Hémisphères, Hydrology update, 2013.

Infrastructure and Mining Components
New Millennium Capital Corp., Mining sites and roads
TATA Steel Minerals Canada Limited/ MET-CHEM, Howse Deposit
Design for General Layout, 2013



2 METHODOLOGY

2.1 Survey Methodology

Groupe Hémisphères reconnoitered the watercourses and waterbodies in and around the planned mine sites for fish habitat. It then conducted experimental fishing in the water bodies that contained water at the time of the visit. This survey was carried out in two phase. The first phase was conducted between August 28th and September 2nd, 2013, and a total of 8.3 km of watercourse and two (2) waterbodies was visited. The second phase was conducted on the July 4th and 6th, 2014 and one (1) waterbody was visited.

The methods used for experimental fishing were based on Portt *et al.* (2006), whereas the method used for characterization of habitats in waterbodies was based on Bradbury *et al.* (2001) and that for watercourses on Sooley *et al.* (1998).

The experimental licenses obtained from DFO is presented in Appendix I.

2.2 Waterbodies

Where the presence of fish was confirmed, the team established bathymetric and *in situ* physicochemical profiles, characterized the fish habitat, and sometimes evaluated water and sediment quality. Figure 2 shows the distribution of the sampling activities. Analysis of the above parameters served to quantify the fish habitat. Further details on sampling techniques are given below.

2.2.1 Bathymetrie

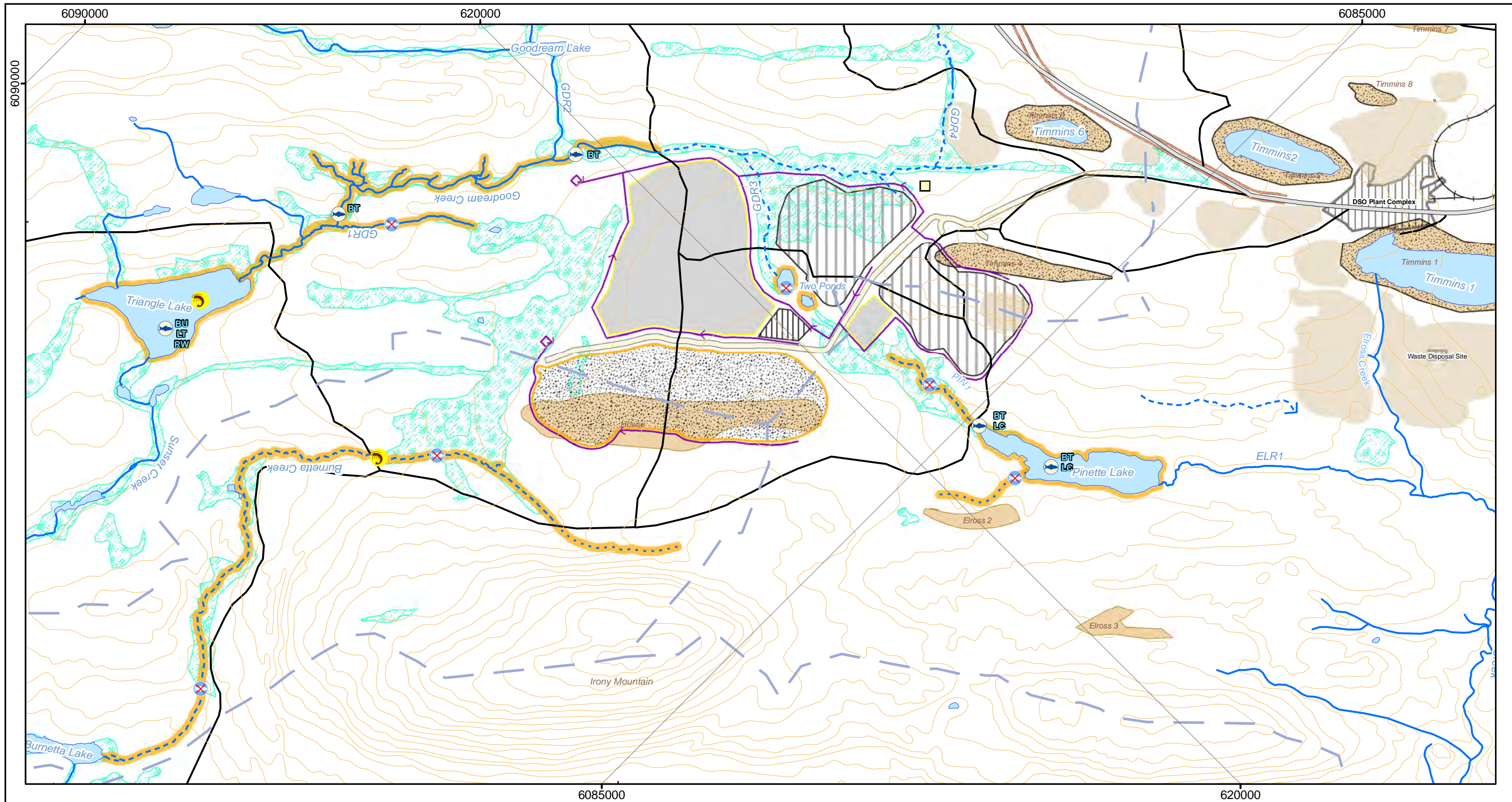
Bathymetric mapping was carried out using a small boat equipped with a Garmin GPSmap 420s sonar. Depth measurements were recorded every 10 m along transects covering the entire lake. The horizontal accuracy of the device was about 3 m and the vertical accuracy around 0.1 m. The water bodies' bathymetric profil was mapped, their deepest points identified, and aquatic habitats quantified. The data were mapped with ArcGIS 9.3.1 software, which was also used for the morphometric and volumetric analyses. Further calculations generated a biophysical description of the water bodies, including total area of the littoral and non-littoral zones, volume, maximum depth and elevation.

2.2.2 Water Quality

All water samples were taken 30 cm below the water surface at the deepest part of the lake—the most representative point in terms of the physicochemical characteristics of the waterbody as a whole—so that data could be compared over time and between waterbodies (MDDEP and CRE Laurentides 2009).

Water samples for physicochemical analysis were taken in Triangle Lake and sent to the Maxxam laboratory, accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL). The parameters analyzed were compared with the CCME water quality guidelines (protection of aquatic life) (CCME 1999). Duplicates were also sent to the laboratory for repeatability tests. If the recommendation were exceeded, the values were underlined in the tables.

In situ measurements were made in Triangle and Pinette lakes. The pH, temperature, conductivity were measured at 30 cm below the water surface and dissolved oxygen and temperature were measured over the entire water column over the deepest point of the lake using a Hanna portable probe (HI-9828060-1). Transparency was measured with a Secchi disk. Water samples were taken to measure turbidity with a portable LaMotte 2020e turbidimeter.



<p>LEGEND</p> <p>Surveys</p> <p>Fish habitat</p> <ul style="list-style-type: none"> Fish No fish <p>Fish species</p> <ul style="list-style-type: none"> BT : Brook trout LT : Lake trout RW : Round whitefish BU : Burbot LC : Lake chub 		<p>Basemap</p> <ul style="list-style-type: none"> Permanent watercourse Intermittent watercourse Storm run-off Disappearing stream Artesian spring Waterbody <p>Contour line (50 pi)</p> <ul style="list-style-type: none"> Main access road Existing road Provincial Border Wetland Watershed Boundary 		<p>Infrastructure And Mining Components</p> <ul style="list-style-type: none"> Potential Road to DSO Area 4 Proposed Railroad Eiross Lake Area Iron Ore Mine (ELAION) Plant Infrastructure footprint Existing Dump Deposit Other Pit Timmins 4 Sedimentation Pond-3 Proposed Ditch Proposed Howse Pit Proposed Topsoil/Overburden Stockpile Proposed Crushing/Screening Facility Proposed Waste Rock Dump Proposed Sedimentation Pond Mine Haul Road 		<p>FILE, VERSION, DATE, AUTHOR: GH-0470-02, 2014-10-01, E.D.</p> <p>0 1 500 SCALE: 1:21 000 Meters UTM 19N NAD 83</p> <p>SOURCES:</p> <p>Basemap Government of Canada, NTDB, 1:50,000, 1979 Government of NL and government of Quebec, Boundary used for claims, Groupe Hémisphères, Hydrology and Wetland update, 2013</p> <p>Surveys AMEC Earth and Environmental, (2009). Fish and Fish Habitat Investigation for the Direct-Shipping Ore Project, New Millennium Capital Corp., Report TF1615902. Prepared for Groupe Hémisphères, 39 pages and 3 appendices</p> <p>Groupe Hémisphères (2013) Baseline Aquatic Fauna Characterization: Eiross Lake Area Iron Ore Mine (ELAION) Environmental Effects Monitoring (EEM). Field Report Submitted to TSMC, 12 pages and 2 appendices.</p>		<p>Fish And Fish Habitat</p> <p>Howse Minerals Limited</p> <p>Figure 2</p> <p>GroupeHemispheres</p>	
---	--	---	--	---	--	---	--	---	--

*Hydronyms are oriented along the direction of water flow

2.2.3 Sediment

Sediment was sampled in Triangle Lake using a Ponar sampler with a sampling area of 0.023 m² and a volume of 0.0024 m³ and a 500 µm mesh. Three grab were taken and combined, and the composite was used to fill the laboratory supplied containers. All instruments were cleaned with Alconox and rinsed thoroughly in water from the water body being sampled between each station. The samples were kept cold and sent to the MAXXAM laboratory for total extractible metals, total organic carbon and particle size analysis.

The parameters analyzed were compared with the CCME water quality guidelines (protection of aquatic life) (CCME 1999). Duplicates were also sent to the laboratory for repeatability tests. Thus the parameters can vary between stations. If the recommendation were exceeded, the values were underlined in the tables.

2.2.4 Benthos

The benthos was sampled in Triangle Lake using a Ponar sampler with a sampling area of 0.023 m² and a volume of 0.0024 m³ and a 500 µm mesh. The method consisted screening the complete content of a grab with a 500 µm sieve. The content of the sieve was then transferred to a watertight plastic jar containing 70% alcohol for subsequent identification. The procedure was repeated at three different places. All the benthos samples were sent to a laboratory for identification at the family level. Diversity indices were then estimated using standard methods: taxonomic richness (T), the Shannon-Wiener diversity index (H'), and the evenness (J'). Methods for calculation of those indices come from Krebs (1999). A family variation of the Hilsenhoff biotic index (FBI) was also calculated to provide an indication of the habitat quality.

2.2.5 Experimental Fishing

Minnow traps and gillnets standardized for Brook trout were used to determine the presence of fish in the waterbodies. The Minnow traps, baited with dog food, were installed in locations suitable for small fish. The gillnets, composed of multifilament (multi-41 model), were 22.86 m long by 1.83 m high and had six panels of 25.4 mm, 31.75 mm, 38.1 mm, 50.8 mm, 63.5 mm, and 76.2 mm mesh, respectively. The nets were installed perpendicular to the shore and distributed over the entire waterbody. They were strategically placed in order to sample the various environments suitable for fish in different habitats and at various depths to increase the chances of capturing a maximum number of species. The times at which the traps were installed and withdrawn were recorded in order to obtain the exact duration of sampling. The objective was to obtain a fishing effort equivalent to an overnight set of an 18 to 24 hour fishing period including the period between 6:00 p.m. and 9:00 a.m. the next morning. This is a standardized, comparative method of obtaining the catch per unit effort (CPUE) (Portt *et al.* 2006). For all the waterbodies in this survey in 2013, four minnow traps and three gillnets were installed overnight. As for Two Ponds, fished in 2014, one gillnet and five minnow traps were installed overnight.

The dead captured fish were kept on ice for subsequent examination. The number of individuals, as well as the species, length, weight, sex and stomach contents of all specimens were evaluated. Scales were collected from the first ten specimens of salmonids from each net to estimate the age of the fish populations, as necessary. The live fish captured in the minnow traps and gillnets were counted, identified, measured and weighted in the field and immediately returned to the water.

2.2.6 Characterization, Classification and Quantification of Fish Habitat

Fish habitat was characterized, classified and quantified in the waterbodies where experimental fishing had confirmed the presence of fish. The method prescribed in Bradbury *et al.* (2001) was used along with a habitat characterization field form developed by Groupe Hémisphères.

A DFO-generated spreadsheet was used for habitat quantification; this calculation file was used in conjunction with the habitat and species data collected in the field.

2.3 Watercourses

The method prescribed in Sooley *et al.* (1998) was used. A series of watercourses was selected using a map updated with photo-interpretation and field observations. The watercourses were divided into designated reaches based on flow topology. A reach could contain one or more homogeneous segments. One cross section per homogeneous segments served as a sampling location for analyzing, profiling and mapping. A watercourse habitat characterization field form developed by Groupe Hémisphères was used. Further details on sampling techniques are given below.

2.3.1 Water Quality

Surface water samples for physico-chemical analysis were taken in Burnetta Creek (Burnetta.d) and were treated in the same way as the surface water samples taken in the water bodies.

Water samples for physicochemical analyses were taken downstream from Burnetta Creek (Burnetta.d) at mid-depth. *In situ* parameters, including temperature, pH and conductivity were measured using portable Hanna probe (HI 98129). Water samples were also taken to measure turbidity at the end of the day with a portable LaMotte 2020e turbidimeter.

2.3.2 Sediment Quality

Sediment was sampled in Burnetta Creek (Burnetta.d) using a trowel. Sediments from three sites within this homogeneous segment were mixed to provide a composite sample. This sample was treated in the same way as the sediment samples taken in the water bodies.

2.3.3 Benthos

The benthos was sampled in Burnetta Creek using a Mini-Surber benthos net with a sampling area of 0.023 m² and a 500 µm mesh collecting net. Sampling was conducted in segment Burnetta.d. The method consisted in cleaning the first 5 cm of substrate inside the sampling area with a soft brush or by hand for a period of five minutes. The content of the net was then transferred to a watertight plastic jar containing 70% alcohol for subsequent identification. The procedure was repeated at three different places, each time a little farther upstream to ensure that the sampling area had not been disturbed. The benthos samples were treated in the same way as the ones taken in the water bodies.

2.3.4 Index Electrofishing

The electrofishing techniques used were based on those of Scruton and Gibson (1995). For practical reasons and because the goal was essentially to identify the species present in the streams it was decided to opt semi-quantitative approach based on a length-frequency sampling using fixed electrofishing effort. We aimed for a fishing effort of about 300 seconds per 1,000 meters of stream length in order to ensure proportionality. At least one electrofishing session was carried out per habitat type in each watercourse. The fishing effort covered the entire stream. Sampling was done with an electrofishing device, and fish nets were held downstream to recover the fish. The team started sampling at the downstream end of a homogeneous segment and slowly moved upstream covering the entire width of the streambed. The electric current was turned on intermittently to avoid repelling the fish (Scruton and Gibson 1995). All the fish caught were kept in a pail containing water from the stream until the end of the sampling session. The length of the site, the number and species caught and the duration of the fishing session in electroseconds were recorded. All specimens were measured and weighed.

2.3.5 Characterization, Classification and Quantification of Fish Habitat

Fish habitat was characterized, classified and quantified in the watercourses. The method prescribed in Sooley *et al.* (1998) was used along with a habitat characterization field form developed by Groupe Hémisphères. Since the only species fished in all streams was the Brook Trout, it was decided to use solely the Beak (1980) classification system which is specifically designed to classify salmonid macro-habitats. Table 1 describes the categories of this classification.

Table 1. Characteristics of the Four Habitat Classification Types Identified by Beak (1980)

TYPE I	<p>Good salmonid spawning and rearing habitat; often with some feeding pools for larger age classes:</p> <p>flows: moderate riffles current: 0.1 - 0.3 m/s depth: relatively shallow, 0.3 - 1 m substrate: gravel to small cobble size rock, some larger rocks or boulders general habitat types: primarily riffle, pool</p>
TYPE II	<p>Good salmonid rearing habitat with limited spawning, usually only in isolated gravel pockets, good feeding and holding areas for larger fish in deeper pools, pockets or backwater eddies:</p> <p>flows: heavier riffles to light rapids current: 0.3-1m/s depth: variable from 0.3 - 1.5 m substrate: larger cobble/rubble size rock to boulders and bedrock, some gravel pockets between larger rocks general habitat types: run, riffle, pocketwater, pool</p>
TYPE III	<p>Poor rearing habitat with no spawning capabilities, used for migratory purposes:</p> <p>flows: very fast, turbulent, heavy rapids, chutes, small waterfalls current: 1 m/s or greater depth: variable, 0.3 - 1.5 m substrate: large rock and boulders, bedrock general habitat types: run, pocketwater, cascades</p>
TYPE IV	<p>Poor juvenile salmonid rearing habitat with no spawning capability, provides shelter and feeding habitat for larger, older salmonid (especially brook trout):</p> <p>flows: sluggish current: 0.15 m/s depth: variable but often 1 m substrate: soft sediment or sand, occasionally large boulders or bedrock, aquatic macrophytes present in many locations general habitat types: flat, pool, glide</p>

3 RESULTS

Photographs of the habitats surveyed can be seen in Appendix II and raw data can be consulted in Appendix III.

3.1 Water bodies

Both water bodies surveyed in 2013 are permanent lakes with tributaries and emissaries. The presence of fish was confirmed in both lakes. On the contrary, Two Ponds is composed of two isolated wetland ponds sheltering no fish. Therefore, only the lakes surveyed in 2013 have been characterised, classified and quantified for fish habitat.

3.1.1 Characterization, Classification and Quantification of Fish Habitat

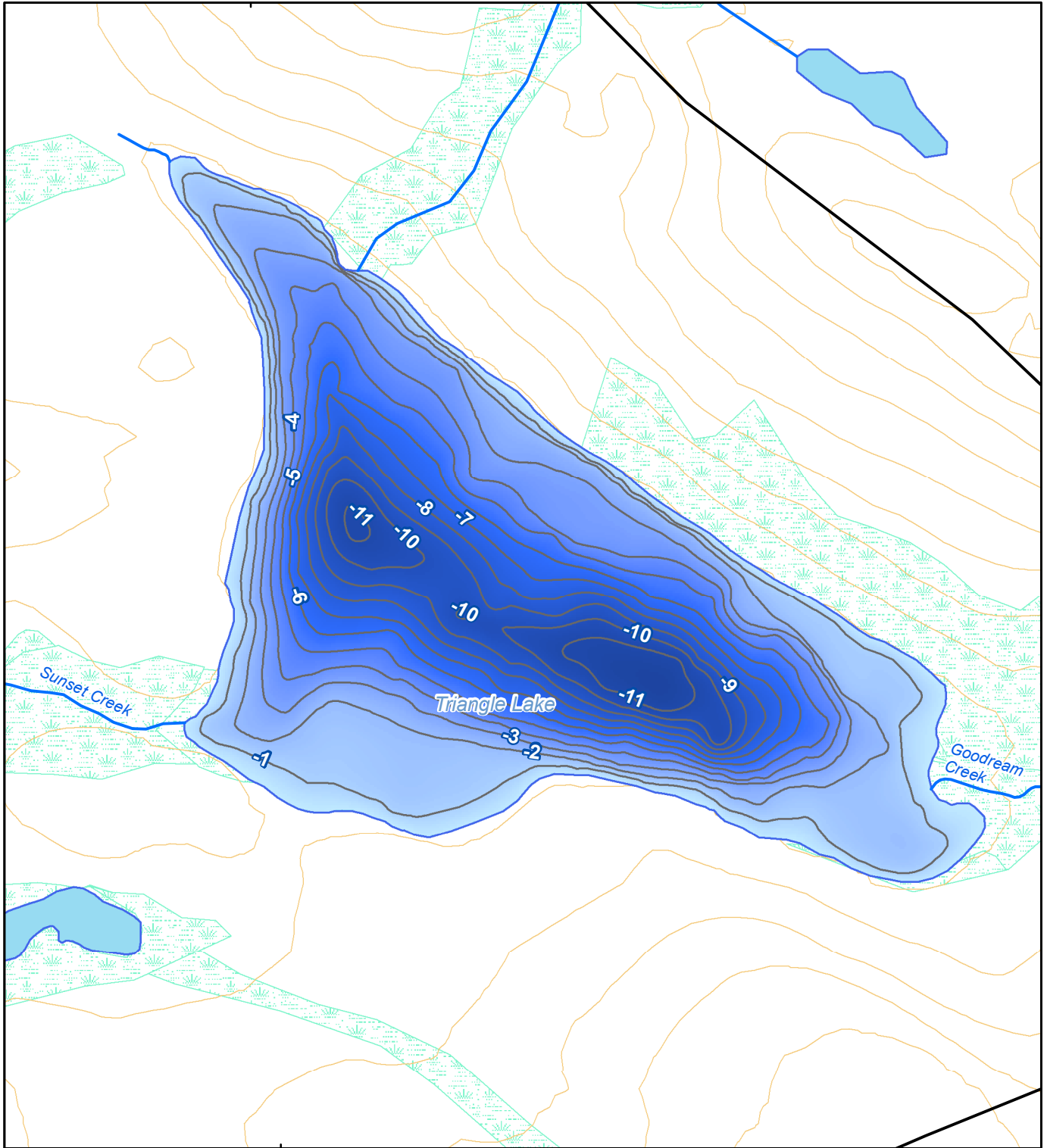
Triangle Lake

Triangle Lake is a natural lake with a few tributaries; the main one being Goodream Creek. The emissary is named for Sunset Creek. The lake has a total area of 20.8 ha with a maximum water depth of 11.9 m. The substrate composition consists mainly of silt with considerable proportions of cobbles, rubbles in the 0-1 m depth zone and blocs in the 1-2 m depth zone. Figure 3 presents the bathymetric profile. The littoral zone of Triangle Lake was homogeneous on its entire periphery and only one homogeneous segment was delimited. The littoral zone, going from 0 to 2 m water depth, circled the lake but was divided in two rings since coarser substrate was present in the 0 to 1 m water depth section.

Since Lake Trout is by far the most valuable species both in terms of social and economic value, the total habitat equivalent units (HEU) have been calculated for that species. In any case, this species presents the highest HEU of all the species present in that lake. Total HEU is therefore estimated at 12.6 ha and broken down as follows:

- 0.5 ha of Littoral Coarse, No Vegetation;
- 1.3 ha of Littoral Medium, No Vegetation;
- 1.7 ha of Littoral Fine, No Vegetation;
- 0.06 ha of Littoral Coarse, Vegetation;
- 0.4 ha of Littoral Fine, Vegetation;
- 0.1 ha of Pelagic Coarse; and
- 8.5 ha of Pelagic Fine;

Print screens of the DFO spreadsheet used can be seen in Appendix IV.



LEGEND

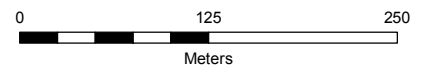
Basemap

- Bathymetric contour
- Existing road
- Contour line (5m)
- Permanent watercourse
- - - Intermittent watercourse
- - > Storm run-off
- Disappearing stream
- Artesian spring
- Waterbody
- Wetland

Figure 3

Bathymetric Map of Triangle Lake

Howse Minerals Limited



SCALE: 1:5 000

UTM 19N NAD 83

FILE, VERSION, DATE, AUTHOR:
GH-0514-02, 2014-11-13, E.D., J.T.

SOURCES:

Basemap:
Government of Canada, NTDB, 1:50,000, 1979
Government of NL and government of Quebec,
Boundary used for claims,
Groupe Hemispheres, Hydrology and Wetland update, 2013
Infrastructure and Mining Components:
New Millennium Capital Corp., Mining sites and roads
TVA Steel Minerals Canada Limited
MET-CHEM, Howse Deposit Design for General Layout, 2013

Sources:
AMEC Earth and Environmental, (2009),
Fish and Fish Habitat Investigation for the Direct-Shipping Ore Project,
New Millennium Capital Corp., Report TR161692C,
Prepared for Groupe Hemispheres, 39 pages and 3 appendices
Groupe Hemispheres (2013) Baseline Aquatic Fauna Characterization:
Eloos Lake Area Iron Ore Mine (ELAOM) Environmental Effects
Monitoring (EEM),
Field Report Submitted to TSMC, 12 pages and 2 appendices.

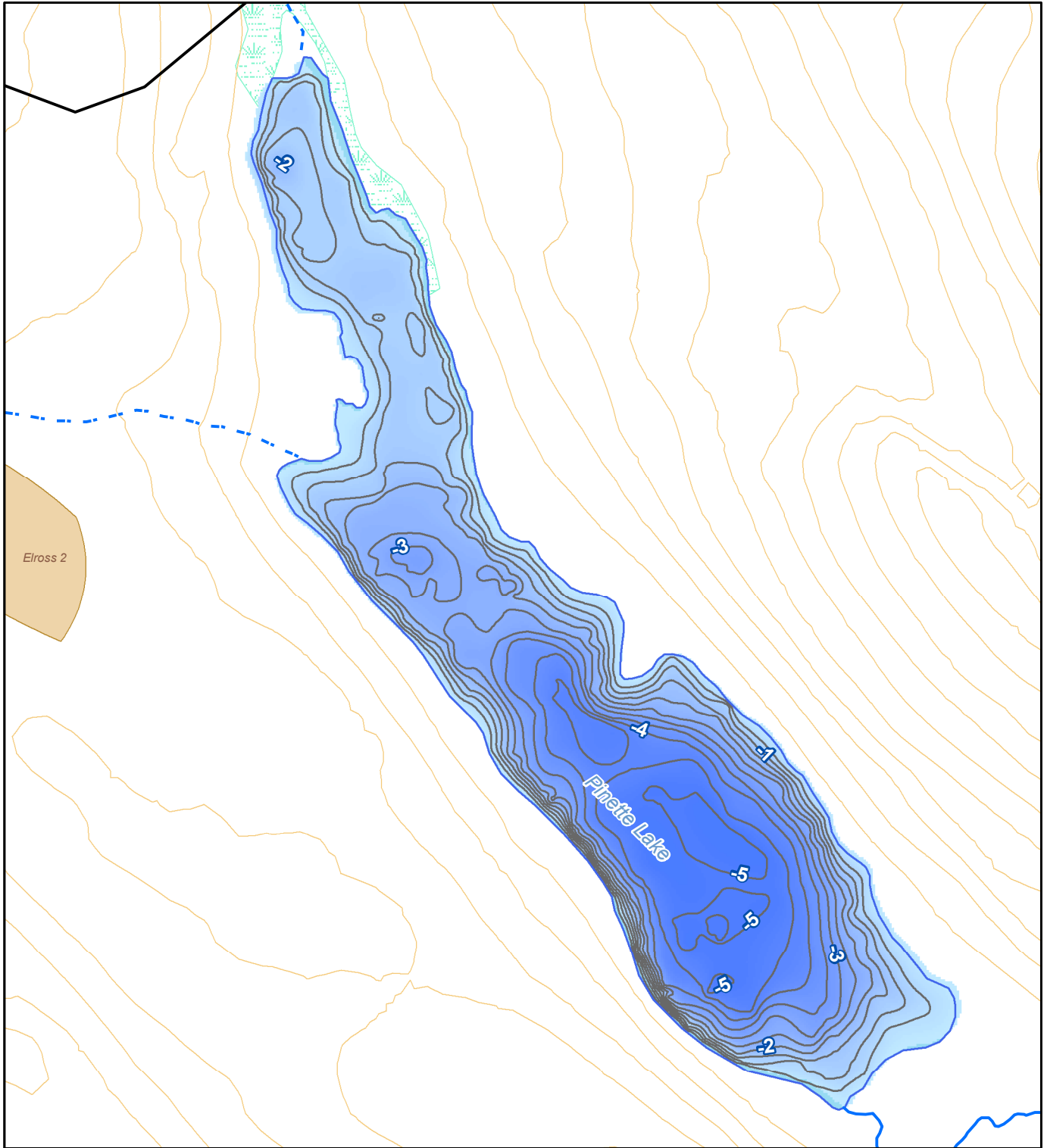
Pinette Lake

Pinette Lake, also known as Meneikshakikawiss by the First Nations, is a natural lake that is sometime used for recreation and fishing by local people. This lake has one identified tributary (PIN1) and an emissary named ELR1 jointing with Elross Creek downstream. The lake has a total area of 15.0 ha with a maximum water depth of 5.2 m. The substrate composition consists mainly of silt with variable amounts of cobbles, rubbles and boulders in the littoral zone. Figure 3 presents the bathymetric profile. The littoral zone of Pinette Lake was divided into six homogeneous segments homogeneous differentiated according to proportion of their different substrate classes and their vegetation cover.

Since Brook Trout is by far the most valuable species both in terms of social and economic value, the total habitat equivalent units (HEU) have been calculated for that species. In any case, this species presents the highest HEU of all the species present in that lake. Total HEU is therefore estimated at 9.3 ha and broken down as follows:

- 1.4 ha of Littoral Coarse, No Vegetation;
- 1.2 ha of Littoral Medium, No Vegetation;
- 1.7 ha of Littoral Fine, No Vegetation;
- 0.02 ha of Littoral Coarse, Vegetation;
- 0.04 ha of Littoral Medium, Vegetation
- 0.09 ha of Littoral Fine, Vegetation;
- 0.1 ha of Pelagic Coarse; and
- 4.8 ha of Pelagic Fine;

Print screens of the DFO spreadsheet used can be seen in Appendix IV.



LEGEND

Basemap

- Bathymetric contour
- Permanent watercourse
- - - Intermittent watercourse
- - - Storm run-off
- Disappearing stream
- Artesian spring
- Waterbody
- Existing road
- Contour line (5m)

*Hydronyms are oriented along the direction of water flow



Figure 4

**Bathymetric Profile
of Pinette Lake**

Howse Minerals Limited



FILE, VERSION, DATE, AUTHOR:
GH-0514-01, 2014-02-28, E.D., J.T.


 0 125 250

 Meters
 SCALE: 1:5 000 UTM 19N NAD 83

SOURCES:

Basemap:
 Government of Canada, NTDB, 1:50,000, 1979
 Government of NL and government of Quebec,
 Boundary used for claims,
 Groupe Hemispheres, Hydrology and Wetland update, 2013
Infrastructure and Mining Components:
 New Millennium Capital Corp., Mining sites and roads
 TWX Steel Minerals Canada Limited
 MET-CHEM, Howse Deposit Design for General Layout, 2013

Sources:
 RMEC Earth and Environmental, (2009),
 Fish and Fish Habitat Investigation for the Direct-Shipping Ore Project,
 New Millennium Capital Corp., Report TR161692C,
 Prepared for Groupe Hemispheres, 39 pages and 3 appendices
 Groupe Hemispheres (2013) Baseline Aquatic Fauna Characterization:
 Elross Lake Area Iron Ore Mine (ELAOM) Environmental Effects
 Monitoring (EEM)
 Field Report Submitted to TSMC, 12 pages and 2 appendices.

3.1.2 Water Quality

In situ water quality measurements were made in Triangle and Pinette Lakes. These values are presented in Table 2, and the temperature and dissolved oxygen profile results are shown in Appendix III. Values are typical of the region with waters slightly acidic and very low to low conductivity.

Table 2. *In situ* Water Quality of Water Body

WATERBODY	SURVEY DATE	TEMPERATURE (°C)	PH	CONDUCTIVITY (µS/cm)	SECCHI (m)	DO (mg/L)
Pinette Lake	August 30 to 31, 2013	12.67	6.75	4	4.25	10.38
Triangle Lake	September 1 to 2, 2013	8.81	6.33	34	4.70	12.46

Both lakes showed no stratification and no major shift in parameters from surface to bottom, which is also typical of the region and the season of the survey.

Surface water samples were taken for laboratory analysis in Triangle Lake and the results are presented in Table 3. Most of the metals analyzed for in the laboratory were not detected. The only parameters that exceed the CCME guidelines were pH and aluminum, the former being the reason why the second exceeds. Indeed, when the pH is below 6.5, the guideline changes from 100 µg/L to 5 µg/L, making it difficult to respect. In any case, concentrations of aluminum are naturally high in the region (Groupe Hémisphères 2014a, Groupe Hémisphères and Groupe Synergis 2010, AMEC 2009). Due to the extremely low water hardness value, the criteria and recommendations based on them are extremely low, but they are nonetheless in compliance. The laboratory certificate is found in Appendix V.

Table 3. Laboratory Analysis Results for Surface Water Quality in Triangle Lake

PARAMETER	UNITS	RDL ¹	CCME ²	RESULT
Conventional				
Acidity (CaCO ₃)	mg/L	10	-	10
Ammonia (N-NH ₃)	mg/L	0.02	32.4	0.02
Bicarbonates (HCO ₃ as CaCO ₃)	mg/L	1	-	15
Chloride (Cl)	mg/L	0.05	120	0.22
Conductivity	µS/cm	0.001	-	0.037
Fluoride (F)	mg/L	0.1	0.120	<0.1
Nitrate (N) and Nitrite (N)	mg/L	0.02	-	0.11
pH	pH	N/A	<6.5 or >9	6.33
Sulphate (SO ₄)	mg/L	0.5	-	2.2
Total Alkalinity (CaCO ₃) pH 4.5	mg/L	1	-	15
Total Phosphorus (TP)	µg/L	10	-	<10
Total Suspended Solids (TSS)	mg/L	2	-	3
Metal (total/dissolved)				
Aluminum (Al)	µg/L	10	5	18
Arsenic (As)	µg/L	1.0	5	<1.0
Cadmium (Cd)	µg/L	0.20	0.09	<0.20
Calcium (Ca)	µg/L	500	-	2700
Copper (Cu)	µg/L	1.0	2	<1.0
Total Hardness (CaCO ₃)	µg/L	1,000	-	16,000
Iron (Fe)	µg/L	60	300	75
Magnesium (Mg)	µg/L	100	-	2,300
Manganese (Mn)	µg/L	1.0	-	6,5
Molybdenum (Mo)	µg/L	1.0	73	<1.0
Mercury (Hg)	µg/L	0.10	0.026	<0.10
Nickel (Ni)	µg/L	2.0	25	<2.0
Lead (Pb)	µg/L	0.50	1	<0.50
Potassium (K)	µg/L	500	-	<500
Selenium (Se)	µg/L	3.0	1	<3.0
Sodium (Na)	µg/L	500	-	580
Uranium (U)	µg/L	1	15	<1.0
Zinc (Zn)	µg/L	7.0	30	<7.0

¹ RDL, Reported Detection Limit

² CCME (1999) Water Quality Guidelines for the Protection of Aquatic Life, when available

N/A = not applicable

3.1.3 Sediment Quality

Sediment quality analyses were also conducted on sediments from Triangle Lake. The results are presented in Table 4. Results were compared to the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Two determining standard guidelines for sediment quality were identified on the basis of risk analysis studies done by the CCME:

- the interim sediment quality guideline (ISQG): when the concentration is exceeded without exceeding the threshold concentration producing the PEL. Within this range, adverse biological effects on biota are sometimes observed (25-50% of cases);
- the probable effect level (PEL): in this range, adverse biological effects on biota are frequently observed (more than 50% of cases).

The first ascertainment is that no parameter exceeds the PEL guidelines. Arsenic, cadmium and zinc concentrations exceed the ISQG, but those elements are naturally high in this region. Indeed, according to MDDEFP (1999), background values for those elements in the Labrador Trough geological province are 10, 1.5 and 230 mg/kg respectively for arsenic, cadmium and zinc. Taking that into account, only arsenic still surpasses the background value. Nevertheless, since this lake has not been impacted yet, this concentration represents the normal value for sediment in this water body.

Table 4. Laboratory Analysis Results for Sediment Quality in Triangle Lake

PARAMETER	UNITS	RDL ¹	CCME ²		RESULT
			ISQG	PEL	
Conventional					
Total Organic Carbon (TOC)	% g/g	5	-	-	2.9
Metal (total/dissolved)					
Aluminum (Al)	mg/kg	20	-	-	12,000
Arsenic (As)	mg/kg	2	5.9	17	15
Cadmium (Cd)	mg/kg	0,2	0.6	3.5	0,8
Calcium (Ca)	mg/kg	30	-	-	1,200
Copper (Cu)	mg/kg	1	35.7	197.0	27
Iron (Fe)	mg/kg	10	-	-	95,000
Magnesium (Mg)	mg/kg	10	-	-	4,000
Manganese (Mn)	mg/kg	2	-	-	3,400
Molybdenum (Mo)	mg/kg	2	-	-	<2
Mercury (Hg)	mg/kg	0.05	0.170	0.486	0.13
Nickel (Ni)	mg/kg	1	-	-	31
Lead (Pb)	mg/kg	5	35.0	91.3	16
Potassium (K)	mg/kg	20	-	-	980
Selenium (Se)	mg/kg	10	-	-	<10
Sodium (Na)	mg/kg	10	-	-	41
Zinc (Zn)	mg/kg	5	123	315	150

¹ RDL, Reported Detection Limit

² CCME (1999) Sediment Quality Guidelines for the Protection of Aquatic Life, when available

Particle size analysis was also conducted on the sediment sample and the result is summarised at Figure 5.

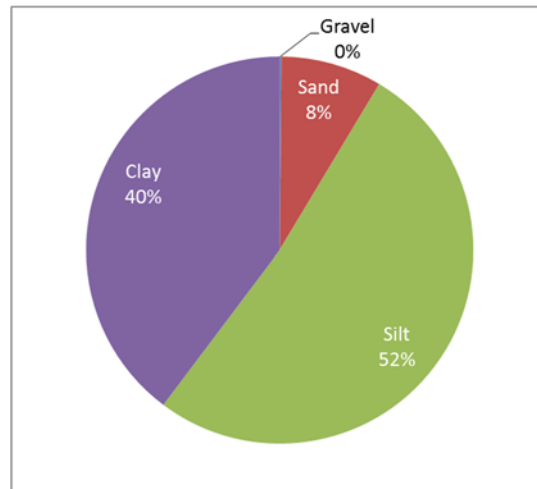


Figure 5. Particle Size Distribution of the Sediment in Triangle Lake

3.1.4 Benthos

Benthos was collected in Triangle Lake. Only three individuals were identified in the triplicate and they were all bivalves from the same family, namely the *Sphaeriidae*. Therefore, no statistics could be calculated for that site. Details of the identification can be seen in Appendix VI.

3.1.5 Experimental Fishing

Fishing effort figures are presented in Table 5. Five (5) species of fish were captured in the lakes of the study area, i.e., Burbot (*Lota lota*), Lake Trout (*Salvelinus namaycush*), Round Whitefish (*Prosopium cylindraceum*), Lake Chub (*Couesius plumbeus*) and Brook Trout (*Salvelinus fontinalis*). Triangle Lake is deeper and is populated by Lake Trout, Whitefish and Burbot, while Pinette Lake is shallower and sits at a higher elevation and is populated by Brook Trout and Lake Chub.

Table 5. Fishing Effort by Waterbodies

WATERBODY	AREA (m ²)	ENGINE	NB OF ENGINE	SPECIES	NB OF INDIVIDUALS	CPUE (catch/engine*night)
Triangle Lake	208,374	Minnow Trap	4	Burbot	1	0.25
		Gillnet	3	Lake Trout Round Whitefish	17 13	5.67 4.33
Pinette Lake	150,181	Minnow Trap	4	Lake Chub	14	3.50
		Gillnet	3	Brook Trout Lake Chub	20 34	6.67 11.33
Two Ponds	8,549 +3,251	Minnow Trap	5	-	0	0
		Gillnet	1			

3.2 Watercourses

Four (4) watercourses were surveyed in the study area: PIN1, Goodream Creek, GDR1 and Burnetta Creek. Goodream Creek is a permanent streams downstream of the access road between GDR2 and GDR3 junctions, but is intermittent upstream from that crossing. The three other watercourses are intermittent, with their surface flow disappearing underground in many sections, even though the flow is surficial in other sections (Groupe Hémisphères 2014b). This is common in this sector where soil permeability is known to be very important. Fish was caught only in Goodream Creek, but some fishes were seen at the mouth of PIN1. Photos and raw data can be consulted in Appendix II and III respectively.

3.2.1 Characterization, Classification and Quantification of Fish Habitat

PIN1

PIN1 is the only tributary to Pinette Lake and has an intermittent water flow. It's about 550 m long and is mostly flat in its downstream section (first 130 m) and alternates between riffles and runs in its upstream section before it disappears completely underground. Its channel width is around 0.5 m except for a pool about 20 m wide. **The first 185 m (PIN1.a) are considered as Type IV habitat** according to Beak (1980), but **the intermittent upstream sections are not considered fish habitat** (Table 10). Its substrate is a mix of sand, gravel, cobble and rubble at its mouth, but muck and silt dominate the substrate in the other segments. Riparian vegetation cover is important and there are some aquatic plants in the pool. The downstream segment is braided and could represent an obstacle to fish passage in dryer times and the stream completely disappears in a wetland at about 220 m from Pinette Lake, representing a permanent obstacle to fish passage.

Based on the substrate and water velocity data collected, the total HEU was calculated to be of 185 m² of Type IV habitat in segment PIN1.a.

Details of the calculation can be seen in Appendix VII.

Goodream Creek

Goodream Creek is the major stream of the study area. It is about 4.5 km in length and has a permanent water flow for most of its length except for the last upstream 2 km showing intermittent water flow. Only the permanent downstream first 2.5 km have been characterized in 2013 since the intermittent upstream section was already characterized and fished in previous aquatic surveys (AMEC 2009, Groupe Hémisphères 2014a, 2013a, 2013b, 2010). **The first 560 m (Goodream.a, b and c) are considered as Type II habitats** and are mostly rapids with some running sections and a little flat section at the mouth of the stream. The substrate is dominated by medium sized substrates with some blocks and some boulders in the rapids. Vegetation cover is unimportant. **The next 240 m (Goodream.d) are considered as Type IV habitats**. This segment is heavily braided and is considered a seasonal obstacle to fish passage. It is mostly flat with a few riffles and its substrate is dominated by silt with some blocs and rubbles. It is flowing in a wetland area and the riparian vegetation covers about 40% of the watercourse. **The next 1,300 m (Goodream.e) are considered as Type II habitats**. It consists mainly of riffles and runs with medium to coarse substrate with a considerable amount of organic matter originating from the riparian wetland. Riparian vegetation covers between 10 to 20% of the watercourse. **The next 590 m (Goodream.f and g) are considered as Type IV habitats**. It is a flat sluggish area created by the presence of beaver dams at its downstream end. It is wide for the first 300 m and retracts to about 1.5 m width in its upstream end. The substrate is a mix of sand and silt with variable amounts of medium substrate. **The last 220 m characterised (Goodream.h) are considered as Type II habitats**. The wet width is of about 2.5 m and the substrate is dominated by cobbles and rubbles. Riparian vegetation covers about 10% of the watercourse. The stream then crosses an access road and is considered intermittent in its upstream section not characterized in 2013. Fish was caught in different segments of this stream.

Based on the substrate and water velocity data collected, the total HEU was calculated to be of 10,593 m² broken down as:

- 7,735 m² of Type II habitat; and
- 2,858 m² of Type IV habitat.

Details of the calculation can be seen in Appendix VII.

GDR1

GDR1 is an intermittent tributary to Goodream Creek. It is originating in a wetland area. Its flow is braided and disappears underground in places, which represents a seasonal obstacle to fish passage. It's about 707 m long and alternates between riffles and flats. **It is not considered as fish habitat.** The braided channels are between 0.5 to 1 m wide throughout a width of 20 to 50 m and present a substrate dominated by fine particles accompanied by considerable amounts of cobbles and rubbles in its upstream half. Riparian vegetation covers from 50 to 100% of the watercourse.

Since this stream is not considered fish habitat, no HEU was calculated.

Burnetta Creek

Burneta Creek is a tributary to Burnetta Lake that circumvents the north side of Irony Mountain. Its flow is intermittent at mid-course over most of its 4,100 m. **The first 1,200 m (Burnetta.a and b) are not considered fish habitat.** Indeed, it is both intermittent en highly braided and is considered an obstacle to the passage of fish. As a matter of fact, a proper channel could not even be found in some areas and the water flow is believed to be subterranean in those areas. The second part of the stream (2,900 m; Burnetta.c and d) could be considered as Type II habitat with it medium to coarse substrate and is riffle type flow but the low water depth (<10cm) is limiting. Since segments a and b are considered an obstacle to fish passage and since no fish habitat exists upstream, **this section is also not considered fish habitat.** The fishing results corroborate this affirmation (Table 10). After segment d, the channel disappears.

Since this stream is not considered fish habitat, no HEU was calculated.

3.2.2 Water Quality

In situ water quality measurements were taken in all watercourses visited. These values are presented in Table 6. Values are typical of the region with waters slightly acidic with low conductivity and turbidity.

In August 2013, the significantly lower temperature in Goodream Creek and GDR1, a tributary, is probably due to the fact that they are largely fed by groundwater resurgences in the surrounding wetland. Higher conductivity values observed in Goodream Creek and GDR1 seems to confirm this hypothesis since groundwater is generally known to be more conductive. It is also notable that all the pH values are acidic.

A great variation of the pH is also notable in PIN1 and Goodream Creek, but no correlation with other parameters is evident.

Table 6. *In situ* Water Quality of Watercourses

WATERCOURSE	SURVEY DATE	TEMPERATURE (°C)	PH	CONDUCTIVITY (µS/cm)	TURBIDITY (NTU)	DO (mg/L)
PIN1	June 9, 2013	-	6.38	-	-	-
	August 14, 2013	6.3	6.38	4	1.3	-
	August 28, 2013	9.0	5.90	7	0.31	10.38
	October 9, 2013	-	6.35	5	0.9	-
	June 10, 2014	8.2	5.94	4	1.1	-
	July 14, 2014	13.0	6.82	14	0.7	-
	August 20, 2014	-	5.85	4	0.7	-
	September 29, 2014	-	6.39	5	0.9	-
Goodream Creek	June 10, 2013	-	7.25	-	-	-
	August 14, 2013	6.3	5.87	3	1.5	-
	August 28-29, 2013	3.8	5.69	41	-	13.12
	October 9, 2013	-	7.15	25	0.4	-
	June 10, 2014	6.1	5.84	3	0.7	8.93
	July 14, 2014	10.3	6.41	9	0.3	5.26
	September 29, 2014	-	5.82	5	2.5	-
GDR1	August 29, 2013	3.8	5.69	41	-	13.12
Burnetta Creek	August 29, 2013	6.4	5.39	6	0.45	10.59

Surface water samples were also taken for laboratory analysis in many of the watercourses and results are presented in Table 7. Most metals analyzed for in the laboratory were not detected. The main parameters that did not respect the CCME guidelines were pH and aluminum, the former modifying the second as discussed earlier in the water bodies section. The laboratory certificate is found in Appendix V. There was also an exceedance of iron in Goodream Creek in September 2014, but by only 3.3% and the occurrence seems to be unique.

Table 7. Laboratory Analysis Mean Results for Surface Water Quality in Watercourses

PARAMETER	UNITS	CCME ¹	BURNETTA CREEK	PIN1							GOODREAM CREEK					
				Aug 29 2013	Sep 29 2014	Aug 20 2014	Jul 14 2014	Jun 10 2014	Oct 9 2013	Aug 14 2013	Jun 9 2013	Sep 29 2014	Jul 14 2014	Jun 10 2014	Oct 9 2013	Aug 14 2013
Conventional																
Acidity (CaCO ₃)	mg/L	-	<10	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia (N-NH ₃)	mg/L	32.4	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	-	<0.02	0,02	<0.02	<0.02	<0.02	<0.02
Bicarbonates (HCO ₃ as CaCO ₃)	mg/L	-	2	2	<1	6	2	2	2	2	<1	4	1	8	<1	1
Chloride (Cl)	mg/L	120	0.11	0.13	0.06	0.06	0.10	0.11	0.08	0.07	0.27	<0.05	0,07	0,11	<0.05	<0.05
Conductivity	µS/cm	-	5	5	4	14	4	5	4	-	5	9	3	25	3	-
Fluoride (F)	mg/L	0.120	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate (N) and Nitrite (N)	mg/L	-	<0.02	0.03	-	0.02	0.02	0.19	<0.02	<0.02	<0.02	<0.02	<0.02	0,10	<0.02	<0.02
pH	pH	<6.5 or >9	5.39	6.39	5.85	6.82	5.94	6.35	6.38	6.38	5.82	6.41	5.84	7.15	5.87	7.25
Sulphate (SO ₄)	mg/L	-	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	0.9	<0.5
Total Alkalinity (CaCO ₃) pH 4.5	mg/L	-	23	2	<1	6	2	2	2	2	<1	4	1	8	<1	1
Total Phosphorus (TP)	µg/L	-	<10	<10	21	<10	20.00	120	<10	-	<10	<10	<10	<10	<10	-
Total Suspended Solids (TSS)	mg/L	-	5	<2	<2	<2	<2	-	3	<2	<2	<2	<2	-	7	2
Metal (total/dissolved)																
Aluminum (Al)	µg/L	5-100	130	17	13	12	17	17	32	17	120	38	75	<10	76	53
Arsenic (As)	µg/L	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium (Cd)	µg/L	0.09	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Calcium (Ca)	µg/L	-	<500	<500	<500	<500	<300	<500	<500	<300	<500	<500	450	2300	<500	<300
Copper (Cu)	µg/L	2	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	1.9	<0.50	<1.0	<1.0	<0.50	<1.0	1.0	<0.50
Total Hardness (CaCO ₃)	µg/L	-	1.200	1800	1300	1400	1500	1700	<1000	-	1800	2100	1800	11000	<1000	-
Iron (Fe)	µg/L	300	220	<60	84	62	<100	200	140	140	310	66	<100	<60	160	<100
Magnesium (Mg)	µg/L	-	290	210	190	200	180	220	220	200	210	220	180	1300	<100	170
Manganese (Mn)	µg/L	-	23	3.6	3.0	2.3	6.5	12.0	8.0	22.0	18.0	1.9	4.2	3.2	33.0	4.7
Molybdenum (Mo)	µg/L	73	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50
Mercury (Hg)	µg/L	0.026	<0.10	<0.01	<0.01	<0.10	<0.10	<0.10	<0.10	-	<0.01	<0.10	<0.10	<0.10	<0.10	-
Nickel (Ni)	µg/L	25	<2.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<1.0	<2.0	<2.0	1,2	<2.0	3,5	<1.0
Lead (Pb)	µg/L	1	<0.50	<0.50	<0.50	<0.50	<0.10	<0.50	<0.50	<0.10	<0.50	<0.50	<0.10	<0.50	<0.50	<0.10
Potassium (K)	µq/L	-	<500	<500	<500	<500	<100	<500	<500	<100	<500	<500	<100	<500	<500	<100
Selenium (Se)	µg/L	1	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0	<3.0	<1.0	<3.0	<3.0	<1.0	<3.0	<3.0	<1.0
Sodium (Na)	µg/L	-	<500	700	<500	<500	410	720	540	390	840	<500	490	<500	<500	390
Uranium (U)	µg/L	15	<1.0	<1.0	<1.0	<1.0	<1.0	24	-	-	<1.0	<1.0	<1.0	<10	-	-
Zinc (Zn)	µg/L	30	<7.0	<7.0	11	<7.0	<5.0	<7.0	<7.0	<5.0	7.3	<7.0	25	11	<7.0	<5.0

¹ CCME (1999) Water Quality Guidelines for the Protection of Aquatic Life, when available

N/A = not applicable

3.2.3 Sediment Quality

Sediment quality analyses were also conducted on sediments from Burnetta Creek. The results are presented in Table 8 and were treated in the same manner as those from the water bodies.

The first ascertainment is that no parameter exceeds the PEL guidelines. Arsenic concentrations exceed the ISQG, but this element is naturally high in this region. Indeed, according to MDDEFP (1999), background values for this element in the Labrador Trough geological province is 10 mg/kg. Still, arsenic also surpasses the background value. Nevertheless, since this stream has not been impacted by anything but path fording, this concentration represents the normal value for this watercourse.

Table 8. Laboratory Analysis Results for Sediment Quality in Burnetta Creek

PARAMETER	UNITS	RDL ¹	CCME ²		RESULT
			ISQG	PEL	
Conventional					
Total Organic Carbon (TOC)	% g/g	5	-	-	1
Metal (total/dissolved)					
Aluminum (Al)	mg/kg	20	-	-	9,100
Arsenic (As)	mg/kg	2	5.9	17	15
Cadmium (Cd)	mg/kg	0,2	0.6	3.5	0.3
Calcium (Ca)	mg/kg	30	-	-	350
Copper (Cu)	mg/kg	1	35.7	197.0	22
Iron (Fe)	mg/kg	10	-	-	91,000
Magnesium (Mg)	mg/kg	10	-	-	4,200
Manganese (Mn)	mg/kg	2	-	-	1,700
Molybdenum (Mo)	mg/kg	2	-	-	3
Mercury (Hg)	mg/kg	0.05	0.170	0.486	0.06
Nickel (Ni)	mg/kg	1	-	-	23
Lead (Pb)	mg/kg	5	35.0	91.3	14
Potassium (K)	mg/kg	20	-	-	630
Selenium (Se)	mg/kg	10	-	-	<10
Sodium (Na)	mg/kg	10	-	-	28
Zinc (Zn)	mg/kg	5	123	315	69

¹ RDL, Reported Detection Limit

² CCME (1999) Sediment Quality Guidelines for the Protection of Aquatic Life, when available

Particle size analysis was also conducted on the sediment sample and the result is summarised at Figure 6.

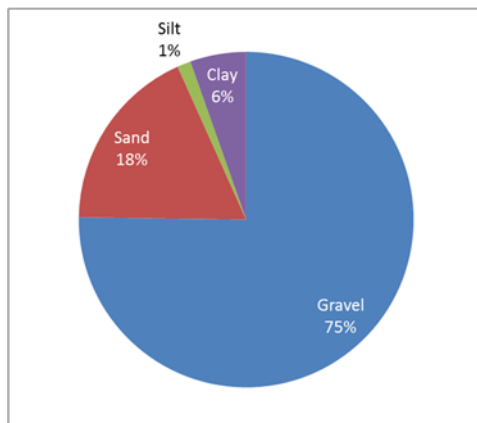


Figure 6. Particle Size Distribution of the Sediment in Burnetta Creek

3.2.4 Benthos

Benthos was collected in Burnetta Creek. Table 9 shows the statistics calculated from the identification of the organisms sampled. Details of the identification can be seen in Appendix VI.

Table 9. Benthos Statistics for Burnetta Creek

STATISTIC	TRIPLICATE			MEAN	SRD. DEV.
	A	B	C		
Number of organisms (N)	11	11	4	8,67	4,04
Taxonomic richness (T)	4	3	3	3,33	0,58
Shannon-Weiner diversity index (H')	1,79	1,10	1,50	1,46	0,35
Equitability (J')	0,89	0,69	0,95	0,84	0,13
Hilsenhoff index – family level (FBI)	5,55	7,82	7,00	6,79	1,15

The FBI value is somewhat elevated and would correspond to a very substantial organic pollution, but the intermittent nature of the stream could also explain this value by selecting species more tolerant to drought. Indeed, apart from some TSS generated by fording in one place upstream, no evident pollution sources exist yet in this stream's watershed.

3.2.5 Index Electrofishing

Fishing effort figures are presented in Table 10. Brook Trout was the only species captured by electrofishing and they were all caught in Goodream Creek.

Table 10. Electrofishing Effort in Watercourses of the Study Area

WATERBODY	SEGMENT FISHED	DURATION	SETTINGS	SPECIES	NB OF INDIVIDUALS	CPUE (catch/300 ES)
		(ES*)				
PIN1	a, b, c	146	500V, DC	-	0	0
Goodream	b	104	500V, DC	Brook Trout	4	11.54
GDR1	Not fished, no habitat					
Burnetta Creek	c, d	121	500V, DC	-	0	0

* ES = Electroseconds or the amount of time, in seconds, that a current is actually being applied to the water

All individuals captured were below 10 cm in length and suggests that the stream is mainly used as a rearing habitat since not adult fishes were caught, even though it was the spawning season. Results from Groupe Hémisphères (2013a) corroborate this interpretation.

4 CONCLUSION

The only two water bodies studied are Pinette Lake and Triangle Lake. They respectively represent 9.3 ha and 12.6 ha of HEU. Fishes caught in Triangle Lake are Lake Trout, Round Whitefish and Burbot, whereas Brook Trout and Lake Chub were captured in Pinette Lake. These types of lakes are common in the region and do not represent unique habitats but they are nonetheless good fish habitat and will have to be taken into account for impact assessment.

Four streams were characterised and fished. Of the lot, only Goodream Creek and the downstream end of PIN1 are considered fish habitats. They respectively represent 10,593 and 185 m² of HEU. Goodream Stream, because of its proximity to the projected infrastructures and because of the large area of habitat it represents is definitely the most sensible element of the aquatic environment to take into account for impact assessment.

5 REFERENCES

Bibliography

- AMEC Earth & Environmental (2009) *Fish and Fish Habitat Investigation for the Direct-Shipping Ore Project, New Millennium Capital Corp. Report TF8165902*. Prepared for Groupe Hémisphères, 39 pages and 3 appendices
- Beak (1980) *Fisheries Resources of Tributaries of the Lower Churchill River*. Prepared by Beak Consultants Limited for the Lower Churchill Development Corporation, St. John's, Newfoundland and Labrador
- Bradbury, C., A.S. Power and M.M. Roberge (2001) *Standard Methods Guides for the Classification/Quantification of Lacustrine Habitat in Newfoundland and Labrador*. Department of Fisheries and Oceans Canada, St. John's, N.F., 60 pages
- CCME [Canadian Council of Ministers of the Environment] (1999) *Canadian environmental quality guidelines*, Canadian Council of Ministers of the Environment, Winnipeg
- Envir-Eau (2009) *Rapport hydrogéologique – Secteur de DSO2 et DSO3 – Schefferville (Québec) et Elross Lake (Terre-Neuve-et-Labrador)*. Préparé pour Groupe Hémisphères, 39 pages et 5 annexes
- Groupe Hémisphères (*In Progress*) *Terrestrial ecosystem mapping, Howse pit study area*. Preliminary technical report submitted to Howse Minerals Limited.
- Groupe Hémisphères (2014a) *Field Report – 2013 Baseline Aquatic Fauna Characterisation: Elross Lake Area Iron Ore Mine (ELAOM) Environmental Effect Monitoring (EEM)*. Technical report submitted to Tata Steel Minerals Canada Ltd., 14 pages and 3 appendices
- Groupe Hémisphères (2014b) *Hydrological Campaign 2013 for the Howse Property Project*. Field report submitted to Tata Steel Minerals Canada Ltd., 5 pages and 1 appendices
- Groupe Hémisphères (2013a) *Field Report – Baseline Aquatic Fauna Characterization: Elross Lake Area Iron Ore Mine (ELAOM) Environmental Effects Monitoring (EEM)*. Technical Report submitted to Tata Steel Minerals Canada Ltd., 12 p. and 2 appendices
- Groupe Hémisphères (2013b) *Complementary Surveys along the Goodwood – Timmins Haul Road Routings*. Technical Report Submitted to TSMC, 11 pages and 5 appendices
- Groupe Hémisphères (2010) *Unofficial Translation. Survey of Fish Habitat Along Two Hypothetical Corridors for the Main Access Road Between the DSO3 and DSO4 Sectors, DSOP*. Technical report submitted to New Millennium Capital Corp., 15 p. and 7 Appendices
- Groupe Hémisphères and Groupe Synergis (2010) *DSOP Aquatic Environment Surveys*. Technical Report submitted to New Millennium Capital Corp., 138 pages and 10 appendices
- MDDEP [Ministère du Développement durable, de l'Environnement et des Parcs] (1999) *Politique de protection des sols et de réhabilitation des terrains contaminés, Annexe 2 : Les critères génériques pour les sols et pour les eaux souterraines*. Direction du suivi de l'état de l'environnement, ministère du Développement durable, de l'Environnement et des Parcs, Québec, ISBN 978-2-551-19765-1 (PDF), 120 p. et 4 annexes
- MDDEP & CRE Laurentides [Ministère du Développement durable, de l'Environnement et des Parcs and Conseil régional de l'Environnement des Laurentides] (2009) *Protocole d'échantillonnage de la qualité de l'eau*. Bibliothèque et archives nationales du Québec, ISBN 978-2-550-55699-2, 9 p.
- Portt, C.B., G.A. Coker, D.L. Ming and R.G. Randall (2006) *A review of fish sampling methods commonly used in Canadian freshwater habitats*. Can. Tech. Rep. of Fish. Aquat. Sci., 2604 p.
- Scruton, D.A. and R.J. Gibson (1995) *Quantitative Electrofishing in Newfoundland: Results of Workshops to Review Current Methods and Recommend Standardization of Techniques*. Canadian Manuscript Report of Fisheries and Aquatic Sciences No. v11+148 pages and 4 appendices

Sooley, D. R., E. A. Luiker and M. A. Barnes (1998) *Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador: Rivers & Streams*. Fisheries and Oceans, St. John's, NF., Iii + 50 pages

APPENDICES

Appendix I

Experimental Licence

EXPERIMENTAL LICENCE

**NL-1659-13
Amendment 2**

Groupe Hemispheres
1453, rue Beaubien est, Bureau 301
Montreal, Quebec H2G 3C6

Contact: Simon Barrette 514-509-6573 #23

Pursuant to Section to Section 52 of the Fishery (General) Regulations, permission is hereby granted to **Groupe Hemispheres**, or their designate(s), to conduct fish monitoring under the following conditions:

1. This licence is effective from **August 19, 2013 to September 6, 2013**.
2. **Areas to be fished:** DSO mining complex north of Schefferville (See attached map).
3. **Designates:** Simon Barrette, Elissa Dickoum
4. **Species:** The following species are permitted to be caught and released alive, in the waters from which they were caught: 500 Brook Trout, 100 Lake Trout, 100 White Suckers, 100 Longnose Suckers, 100 Lake Whitefish, 50 Round Whitefish, 40 Mottled Sculpin, 40 Burbot, and 100 Lake Chub.
5. **Sampling:** Scale sampling will be conducted on the first 10 salmonids over 10 cm in length per stream station or per gillnet.
6. **Gear to be Used:** Electrofisher, 4 gillnets and minnow traps.

Electrofishing methodology should be adopted from the following reference: Scruton, D.A. and R.J. Gibson. 1995, Quantitative Electrofishing in Newfoundland and Labrador. Results of Workshops to Review Current Methods and Recommended Standardization of Techniques. Can. Manuscr. Rep. Fish. Fish Aquat. Sci. 2308: vii + 145 pp.

Electrofishing may only be conducted in streams between July 24, 2012, and September 15, 2012 and at water temperatures 18°C or less.

7. Fish caught under the authority of this licence cannot be traded, sold or bartered.
8. If there are any unusual mortalities or diseases identified, please notify Dr. John Bratney, Fish Health Protection Officer, Fisheries & Oceans Canada, PO Box 5667, St. John's, NL A1C 5X1.
9. An electronic report of catch information is to be sent to Carole Grant, Fisheries & Oceans Canada, PO Box 5667, St. John's, NL A1C 5X1. This report shall reference licence # NL- 1645-13 and shall include the date fished, water body fished, species identified, and numbers caught and shall be submitted within 90 days of the licence end date.
10. Prior to activities taking place, the Field Supervisor, Conservation and Protection, Fisheries & Oceans Canada shall be notified verbally of your activities (**Goose Bay (709) 896-6153**).

2013

EXPERIMENTAL LICENCE

**NL-1659-13
Amendment 2**

**Groupe Hemispheres
1453, rue Beaubien est, Bureau 301
Montreal, Quebec H2G 3C6**

Contact: Simon Barrette 514-509-6573 #23

11. Request for amendments to this licence (i.e. Changes or additions to species, quantities, gear, etc.) must be made in writing to Licencing Services, Fisheries & Oceans Canada, PO Box 5667, St. John's, NL A1C 5X1. Phone 772-3687, Fax 772-5133, Email experimentallicenses@dfo-mpo.gc.ca
12. This licence must be carried at all times and must be produced for inspection upon the request of a Fishery Officer.

Appendix II

Photographs

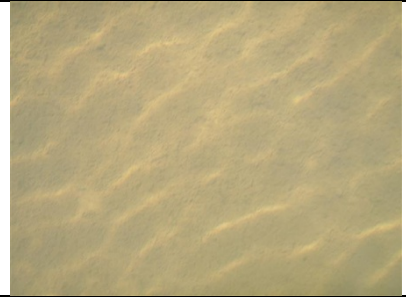
Triangle Lake



Riparian vegetation



0-1m depth substrate



1-2m depth substrate



Lake Trout



Round Whitefish



Burbot

Pinette Lake



General view



Riparian vegetation



Aquatic vegetation, north end













Minnow trap installed



Brook Trout



Lake Chub

Goodream Creek		
Upstream	Downstream	Substrate
Segment a		
		
Segment b		
		
Segment c		
		
Segment e		
		

Segment f
























Segment g



Segment h






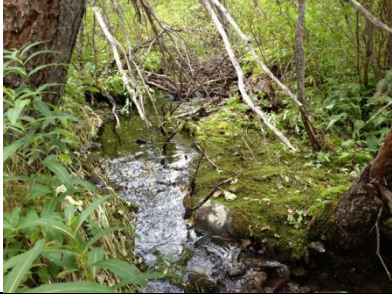








GDR1		
Upstream	Downstream	Substrate
Segment b		
		
Segment c		
		
Segment d		
		
Segment e		
		

PIN1		
Upstream	Downstream	Substrate
Segment a		
		
Segment b		
		
Segment c		
		
Segment d		
		
Segment e		



Segment f



Burnetta Creek		
Upstream	Downstream	Substrate
Segment a		
		
Segment b		
		
Segment c		
		
Segment d		
		

Appendix III

Raw Data:

Watercourse characterization

Lake Characterization

Lake Experimental Fisheries

#	Project	Team	Date	Meteo			Reach	Segment	GPS			Photo	Water Color	Commentary	
				General	T°C	Cloud			Start	Cut	End				
1	HOWSE	SB, ED	2013-08-28	BEAU	13	0	/8	PIN1	A	391	392	394	IPHONE	CLAIRE	ANASTOMOSÉ; 20E D'OMBLE OBSERVÉS
2	HOWSE	SB, ED	2013-08-28	BEAU	13	0	/8	PIN1	B	394		395	IPHONE	CLAIRE	PAS DE POISSON
3	HOWSE	SB, ED	2013-08-28	BEAU	13	0	/8	PIN1	C	395	396	397	IPHONE	CLAIRE	PÊCHE DANS A, B, C : 146s, 500V, DC – PAS DE POISSON
	HOWSE	SB, ED	2013-08-28	BEAU	13	0	/8	PIN1	D	397	398	399	IPHONE	CLAIRE	MILIEU HUMIDE
4	HOWSE	SB, ED	2013-08-28	BEAU	13	0	/8	PIN1	E	399	400	401	IPHONE	CLAIRE	
5	HOWSE	SB, ED	2013-08-28	BEAU	13	0	/8	PIN1	F	401	402	403	IPHONE	CLAIRE	
							/8				404		IPHONE	CLAIRE	NAISSANCE DU COURS = RÉSURGENCE
6	HOWSE	SB, ED	2013-08-28	BEAU	15	0	/8	GOODREAM	A	407	406	408	IPHONE	CLAIRE	
7	HOWSE	SB, ED	2013-08-28	BEAU	15	0	/8	GOODREAM	B	408	409	410	IPHONE	CLAIRE	
8	HOWSE	SB, ED	2013-08-28	BEAU	15	0	/8	GOODREAM	C	410	412	411	IPHONE	CLAIRE	
9	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	D	411		421	IPHONE	CLAIRE	ANASTOMOSÉ
10	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GDR1	A	413		415	-	PEU TURBIDE	
11	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GDR1	B	415		414	IPHONE	PEU TURBIDE	ANASTOMOSÉ
12	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GDR1	C	414	416	417	IPHONE	PEU TURBIDE	
13	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GDR1	D	417		418	IPHONE	PEU TURBIDE	
14	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GDR1	E	418	419	420	IPHONE	PEU TURBIDE	ANASTOMOSÉ
15	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	E	421	422		IPHONE	CLAIRE	
16	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	E		423		IPHONE	CLAIRE	
17	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	E		424		IPHONE	CLAIRE	
18	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	E		425	426	IPHONE	CLAIRE	
19	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	F	426		427	IPHONE	CLAIRE	ÉTANG DE CASTOR
20	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	G	427	428	429	IPHONE	CLAIRE	ANASTOMOSÉ
21	HOWSE	SB, ED	2013-08-29	BEAU	10	2	/8	GOODREAM	H	429	430	431	IPHONE	PEU TURBIDE	SUBSTRAT SEMI-COLMATÉ
22	HOWSE	SB, ED	2013-08-29	NUAGEUX	16	7	/8	Burnetta Creek	A	432	433				ANASTOMOSÉ
23	HOWSE	SB, ED	2013-08-29	NUAGEUX	16	7	/8	Burnetta Creek	B		435				ANASTOMOSÉ
24	HOWSE	SB, ED	2013-08-29	NUAGEUX	16	7	/8	Burnetta Creek	C		436				BASSIN DE 8M; EF:49s à 500V, DC - PAS DE POISSON
25	HOWSE	SB, ED	2013-08-29	NUAGEUX	16	7	/8	Burnetta Creek	D		437				EF: 72s à 500V, DC - PAS DE POISSON
26	HOWSE	SB, ED	2013-08-29	NUAGEUX	16	7	/8	Burnetta Creek			438				PAS DE LIT D'ÉCOULEMENT
27	HOWSE	SB, ED	2013-08-29	NUAGEUX	16	7	/8	Burnetta Creek			439				INFILTRATION SOUS LA ROUTE

Groupe Hemispheres												POISSON - HABITAT, PLAN D'EAU												1/2											
PROJET												HOWSE GON												DATE		11/09/13									
ÉQUIPE												SBS & ED												HEURE		12:30									
LOCALISATION												LAC TRIANGLE / H												MÉTÉO		Soleil + peu de nuage									
NOM DU PLAN D'EAU												LAC TRIANGLE												TEMPÉRATURE		10 °C									
																								NÉBULOSITÉ		2 / 8									
HYDROLOGIE												PHYSICO-CHIMIE																							
HAUTEUR (LNHE - SURFACE)						m						TEMPÉRATURE						°C						COULEUR											
HAUTEUR (SEUIL - SURFACE)						m						pH												SECCHI				4-70				m			
PROFONDEUR (ZMAX)						10.9						CONDUCTIVITÉ						µS/cm						DO				mg/L							
												TURBIDITÉ												NTU											
SEGMENT 1												LITTORAL																							
GPS				SUBSTRAT								VÉGÉTATION				AUTRE				PHOTOS															
DÉBUT		FIN		O		A		Si		Sa		Gr		Ca		Ga		B		RM		SUB.		EMER.		InSitu									
		456						90				3026		3												1		193							
BERGE												COMMENTAIRES												0-1m: (194) photos											
ÉROS.		PENTE		VÉGÉTATION SURP.		CANO.		AUTRE SURP.		PROFONDEUR		NON LITTORAL		Unique SEGMENT																					
F				20																															
SEGMENT 2												LITTORAL																							
GPS				SUBSTRAT								VÉGÉTATION				AUTRE				PHOTOS															
DÉBUT		FIN		O		A		Si		Sa		Gr		Ca		Ga		B		RM		SUB.		EMER.		InSitu									
		456						90										10								15		photos							
BERGE												COMMENTAIRES												(195-196) photos											
ÉROS.		PENTE		VÉGÉTATION SURP.		CANO.		AUTRE SURP.		PROFONDEUR		NON LITTORAL		Resurgence à GPS 455 / photos: 197																					
SEGMENT 3												LITTORAL																							
GPS				SUBSTRAT								VÉGÉTATION				AUTRE				PHOTOS															
DÉBUT		FIN		O		A		Si		Sa		Gr		Ca		Ga		B		RM		SUB.		EMER.		InSitu									
456																																			
BERGE												COMMENTAIRES																							
ÉROS.		PENTE		VÉGÉTATION SURP.		CANO.		AUTRE SURP.		PROFONDEUR		NON LITTORAL																							
SEGMENT 4												LITTORAL																							
GPS				SUBSTRAT								VÉGÉTATION				AUTRE				PHOTOS															
DÉBUT		FIN		O		A		Si		Sa		Gr		Ca		Ga		B		RM		SUB.		EMER.		InSitu									
BERGE												COMMENTAIRES																							
ÉROS.		PENTE		VÉGÉTATION SURP.		CANO.		AUTRE SURP.		PROFONDEUR		NON LITTORAL																							
SEGMENT 5												LITTORAL																							
GPS				SUBSTRAT								VÉGÉTATION				AUTRE				PHOTOS															
DÉBUT		FIN		O		A		Si		Sa		Gr		Ca		Ga		B		RM		SUB.		EMER.		InSitu									
BERGE												COMMENTAIRES																							
ÉROS.		PENTE		VÉGÉTATION SURP.		CANO.		AUTRE SURP.		PROFONDEUR		NON LITTORAL																							
SEGMENT 6												LITTORAL																							
GPS				SUBSTRAT								VÉGÉTATION				AUTRE				PHOTOS															
DÉBUT		FIN		O		A		Si		Sa		Gr		Ca		Ga		B		RM		SUB.		EMER.		InSitu									
BERGE												COMMENTAIRES																							
ÉROS.		PENTE		VÉGÉTATION SURP.		CANO.		AUTRE SURP.		PROFONDEUR		NON LITTORAL																							

SEGMENT 1

FORTE: GPS 458 (10m prof.)

0-1m

1-2m

PROJET
EQUIPE

HOWSE
SBS at D

DATE 2109113
HEURE 8109

meat
my ni
low

#	MTD/#	PAS	ESPECE	LONG.	POIDS	SEX	MAT	AGE		ENVEL.#	GENETIQUE		COMMENTAIRES	PHOTO
								STRUCT.	#		STRUCT.	#		
1	GN1	1	SANA	25	120			écaille	1					
2	GN1	1	PRCY	27.5	170									
3	GN2	1	SANA	59	>600			écaille	2				200	
4	GN2	1	SANA	57	>600			écaille	3					
5	GN2	1	PRCY	31	250			écaille	4					
6	GN2	1	SANA	47	>600			écaille	5					
7	GN2	1	SANA	52	>600									
8	GN2	1	PRCY	29	200									204
9	GN2	1	SANA	32	235			écaille	6					
10	GN2	1	—	46	>600			—	7					
11	GN2	1	—	65	>600			—	8					205
12	GN3	1	—	54	>600			—	9					
13	GN3	1	—	48	>600			—	10					
14	GN3	1	—	47	>600			—	11					
15	GN3	1	PRCY	24	100			—	12					
16	GN3	1	SANA	51	>600			—	13					
17	GN3	1	PRCY	25.5	130			—	14					
18	GN3	1	SANA	66	>600			—	15					
19	GN3	1	SANA	40.5	515			—	16					
20	MTL	1	LOLO	12	35									206
21	GN3	1	PRCY	30	210	M	M						mange des plantes	
22	GN3	1	SANA	49.5	>600	F	i	écaille	15				mange isopode (cravette)	
23	GN3	1	PRCY	18.3	40	M	i							
24	GN3	1	PRCY	17.6	36	M	i							
25	GN3	1	PRCY	15.2	25	M	i							
26	GN1	1	SANA	23.4	110	M	i	écaille	16				mange polychaete	
27	GN2	1	PRCY	21.1	130	F	i							
28	GN2	1	PRCY	28	160	F	M							
29	GN2	1	PRCY	27.6	130	F	i							
30	GN2	1	SANA	33	260	i	i	écaille	17				mange poisson de	
31	GN2	1	PRCY	18.9	46	M	i	écaille						

203?
204 =

↓

PROJET HOUÏRE P19 DATE 30/09/13
 EQUIPE Bruno B & Flicia D HEURE 09h

LOCALISATION _____ METEO Soleil qqes nuages
 ID _____ TEMPERATURE ~ 10 °C
 NOM DU PLAN D'EAU Lac Pinette NEBULOSITE 3 /8

HYDROLOGIE				PHYSICO-CHEMIE			
HAUTEUR (LNHE - SURFACE)		m	TEMPERATURE		°C	COULEUR	
HAUTEUR (SEUIL - SURFACE)		m	pH			SECCHI	<u>4.25</u> m
PROFONDEUR (ZMAX)	<u>5.2</u>	m	CONDUCTIVITE		µS/cm	DO	
			TURBIDITE		NTU		

SEGMENT 1	LITTORAL														
	GPS		SUBSTRAT								VEGETATION			AUTRE	PHOTOS
	DÉBUT	FIN	O	A	Si	Sa	Gr	Ca	Ga	B	RM	SUB.	EMER.	InSitu	
	<u>454</u>	<u>448</u>			<u>73</u>			<u>10</u>	<u>15</u>	<u>3</u>		<u>5</u>	<u>1</u>	<u>1</u>	<u>187</u>
	BERGE		COMMENTAIRES <u>He l'abaie</u>												
	ÉROS.	PENTE	VEGETATION SURP.	CANO.	AUTRE SURP.	PROFONDEUR NON LITTORAL									
	<u>-</u>	<u>F</u>	<u>9</u>	<u>9</u>		<u>1.5</u>									

SEGMENT 2	LITTORAL														
	GPS		SUBSTRAT								VEGETATION			AUTRE	PHOTOS
	DÉBUT	FIN	O	A	Si	Sa	Gr	Ca	Ga	B	RM	SUB.	EMER.	InSitu	
	<u>448</u>	<u>449</u>			<u>60</u>			<u>10</u>	<u>10</u>	<u>40</u>		<u>2</u>		<u>1</u>	<u>188</u>
	BERGE		COMMENTAIRES												
	ÉROS.	PENTE	VEGETATION SURP.	CANO.	AUTRE SURP.	PROFONDEUR NON LITTORAL									
	<u>-</u>	<u>F</u>	<u>9</u>	<u>2</u>		<u>1.6</u>									

SEGMENT 3	LITTORAL														
	GPS		SUBSTRAT								VEGETATION			AUTRE	PHOTOS
	DÉBUT	FIN	O	A	Si	Sa	Gr	Ca	Ga	B	RM	SUB.	EMER.	InSitu	
	<u>449</u>	<u>450</u>			<u>10</u>			<u>15</u>	<u>15</u>	<u>60</u>					<u>179</u>
	BERGE		COMMENTAIRES												
	ÉROS.	PENTE	VEGETATION SURP.	CANO.	AUTRE SURP.	PROFONDEUR NON LITTORAL									
	<u>-</u>	<u>M</u>				<u>2m</u>									

SEGMENT 4	LITTORAL														
	GPS		SUBSTRAT								VEGETATION			AUTRE	PHOTOS
	DÉBUT	FIN	O	A	Si	Sa	Gr	Ca	Ga	B	RM	SUB.	EMER.	InSitu	
	<u>451</u>	<u>452</u>			<u>73</u>			<u>10</u>	<u>15</u>	<u>3</u>		<u>5</u>	<u>1</u>	<u>1</u>	
	BERGE		COMMENTAIRES												
	ÉROS.	PENTE	VEGETATION SURP.	CANO.	AUTRE SURP.	PROFONDEUR NON LITTORAL									
	<u>-</u>	<u>F</u>	<u>2</u>	<u>2</u>		<u>1.6</u>									

SEGMENT 5	LITTORAL														
	GPS		SUBSTRAT								VEGETATION			AUTRE	PHOTOS
	DÉBUT	FIN	O	A	Si	Sa	Gr	Ca	Ga	B	RM	SUB.	EMER.	InSitu	
	<u>452</u>	<u>453</u>	<u>45</u>		<u>50</u>						<u>5</u>	<u>5</u>		<u>3</u>	<u>190</u>
	BERGE		COMMENTAIRES												
	ÉROS.	PENTE	VEGETATION SURP.	CANO.	AUTRE SURP.	PROFONDEUR NON LITTORAL									
	<u>-</u>	<u>F</u>													

SEGMENT 6	LITTORAL														
	GPS		SUBSTRAT								VEGETATION			AUTRE	PHOTOS
	DÉBUT	FIN	O	A	Si	Sa	Gr	Ca	Ga	B	RM	SUB.	EMER.	InSitu	
	<u>453</u>	<u>454</u>			<u>100</u>							<u>60</u>	<u>40</u>		<u>191</u>
	BERGE		COMMENTAIRES												
	ÉROS.	PENTE	VEGETATION SURP.	CANO.	AUTRE SURP.	PROFONDEUR NON LITTORAL									
	<u>-</u>	<u>F</u>													

PROJET HOWSE METEO Soleil qques nuages
 EQUIPE SBS & ED TEMPERATURE 10 °C

NOM DU PLAN D'EAU PIQUETTE LAKE TYPE LAC COURS D'EAU MILIEU HUMIDE

NOM DE TRONÇON _____ # PERMIS _____

SITE/METHODE	# SITE	GPS		MTD#	PHYSICO-CHIMIE			COMMENTAIRES
					TEMP.	COND.	TURB.	
	HOWSE	440		GN1				
	HOWSE	447		MT1				
	HOWSE	441		GN2				
	HOWSE	449		MT2				
	HOWSE	443		GN3				
	HOWSE	444		MT3				
	HOWSE	445		MT4				

SPECIFICATION DES ENJINS	# SITE	MTD#	PAS	POSE		LEVEE		TYPE	LONG.	PROF.	GRAND. MAILLES	EMPLACE.	HABIT.
				DATE	HEURE	DATE	HEURE						
	HOWSE	GN1	1	30108113	15:04	31108113	9:00			3m			
	HOWSE	MT1	1	30108113	15:20	31108113	11:39			5m			
	HOWSE	GN2	1	30108113	15:19	31108113	10:10			6.5m			
	HOWSE	MT2	1	30108113	15:29	31108113	11:18						
	HOWSE	GN3	1	30108113	15:36	31108113	10:45			4m			
	HOWSE	MT3	1	30108113	15:39	31108113	11:29						
	HOWSE	MT4	1	30108113	15:47	31108113	11:10						

PECHE ELECTRIQUE	# SITE	MTD#	PAS	H. DEBUT	H. FIN	TEMPS SEC	LONG.	LARG.	OUVERT	VOLT.	FREQ.	PULS.	MARQUE	MODEL

RESUME POISSON	# SITE	MTD#	PAS	ESPECES	STAGE	AGE	# TOTAL	LONG. MAX	LONG. MIN	ACTIVITE	COMMENTAIRES
		HOWSE	MT2		COPL			11	10cm	6cm	
	HOWSE	GN1		COPL			17	17cm	11cm		320g (Poids)

COMMENTAIRE

#	MTD/FAB	ESPECE	LONG.	POIDS	SEX	MAT	AGE		ENVEL.#	GENETIQUE		COMMENTAIRES	PHOTO
							STRUCT	#		AGE	STRUCT		
1	GN1	Neve	13	17	/	/							
2		Neve	12.5	10									
3		Neve	12	13									
4			11.5	9									
5			12.5	15									
6		Neve	12	12									
7			15.5	31									
8	GN2	SAFO	17	50	F	M	ecaille	1					
9	GN2	MENE	11	13	-	-							
10		COPL	13	18	-	-							
11		COPL	12	10	-	-							
12	GN3	COPL	12	14	/	/							
13	GN3	COPL	12	24	/	/							
14	MT4	COPL	10	10	/	/							
15	MT4	Neve											
16	MT3	Neve	11.4	16									
17	MT3	COPL	8.6	5									
18	GN3	SAFO	20	65	F	i	ecaille	2			mange invertébré	185	
19	GN3	SAFO	21.8	86	F	i	ecaille	3			mange invertébré		
20	GN3	SAFO	27.7	200	F	M	ecaille	4					
21	GN3	SAFO	15.5	28	F	i	ecaille	5					
22	GN3	COPL	11.6	15									186
23	GN2	COPL	12.6	18									
24	GN2	COPL	12.9	18									
25	GN2	SAFO	13.7	57	F	i	ecaille	6			mange invertébré		
26	GN2	SAFO	17.8	41	F	i	ecaille	7			- estomac vide		
27	GN2	COPL	10.7	11									
28	GN2	SAFO	14.9	27	F	i	ecaille	8					
29	GN2	COPL	11.9	14									
30	GN1	SAFO	23.7	130	M	M	ecaille	9			- estomac vide		
31	GN1	SAFO	20	72	F	M	ecaille	10			- estomac vide		
32	GN1	SAFO	25	140	F	M	ecaille	11			mange invertébré		
33	GN1	SAFO	20	61	F	i	ecaille	12					
34	GN1	SAFO	17.8	49	F	i	ecaille	13			- estomac vide.		
35	GN1	SAFO	14.6	23	F	i	ecaille	14			- estomac vide		
36	GN1	SAFO	25	170	M	M	ecaille	15			estomac avec poisson		
37	GN1	SAFO	16.8	37	F	i	ecaille	16			- estomac vide		
38	GN1	SAFO	17.2	48	F	i	ecaille	17			- estomac vide		
39	GN1	SAFO	18.2	69	F	M	ecaille	18					
40	GN1	SAFO	19.4	56	M	i	ecaille	19					
41	GN1	SAFO	13.2	18			ecaille	20					

PROJET Howse MÉTÉO NUAGEUX
 ÉQUIPE SK + GT TEMPÉRATURE 15 °C

NOM DU PLAN D'EAU TWO PONDS TYPE LAC COURS D'EAU MILIEU HUMIDE

NOM DE TRONÇON _____ # PERMIS _____

SITE/MÉTHODE	# SITE	GPS		MTD/#	PHYSICO-CHIMIE			COMMENTAIRES
		LONG.	LAT.		TEMP.	COND.	TURB.	
	<u>TWO PONDS</u>	<u>TWO PONDS</u>		<u>GN1</u>				
		<u>296</u>		<u>MT1</u>				
		<u>297</u>		<u>MT2</u>				
		<u>298</u>		<u>MT3</u>				
		<u>299</u>		<u>MT4</u>				
		<u>300</u>		<u>MT5</u>				

SPECIFICATION DES ENGINS	# SITE	MTD/#	PAS	POSE		LEVÉE		TYPE	LONG.	PROF.	GRAND. MAILLES	EMPLACE.	HABIT.
				DATE	HEURE	DATE	HEURE						
	<u>TWO PONDS</u>	<u>GT1</u>	<u>1</u>	<u>05/07</u>	<u>14h30</u>	<u>06/07</u>	<u>8h10</u>			<u>2m</u>		<u>Centre</u>	
		<u>MT1</u>	<u>1</u>	<u>05/07</u>	<u>14h45</u>		<u>8h43</u>			<u>32m</u>		<u>River</u>	
		<u>MT2</u>	<u>1</u>	<u>05/07</u>	<u>14h47</u>		<u>8h47</u>						
		<u>MT3</u>	<u>1</u>	<u>05/07</u>	<u>14h50</u>		<u>8h52</u>						
		<u>MT4</u>	<u>1</u>	<u>05/07</u>	<u>14h55</u>		<u>8h56</u>						
		<u>MT5</u>	<u>1</u>	<u>05/07</u>	<u>14h59</u>	<u>V</u>	<u>8h58</u>						

PÊCHE ÉLECTRIQUE	# SITE	MTD/#	PAS	H. DÉBUT	H. FIN	TEMPS SEC	LONG.	LARG.	OUVERT.	VOLT.	FREQ.	PULS.	MARQUE	MODEL

RÉSUMÉ POISSON	# SITE	MTD/#	PAS	ESPÈCES	STAGE	ÂGE	# TOTAL	LONG. MAX	LONG. MIN	ACTIVITÉ	COMMENTAIRES

COMMENTAIRE _____

Appendix IV

Habitat Suitability Index and Habitat Equivalent Unit Calculation for Lakes

Enter Lake name:		Triangle				
Part 1 Entering Lake depth(s):						
IF Lake Depth is less than or equal to 10 m:		IF Lake Depth is greater than 10 m:				
Path 1		OR	Path 2			
A Enter Depth of Littoral Zone:	0	A-1 Enter mean depth of Non-Littoral Zone:	6			
B Enter Mean Depth of Lake:	0	B-1 Enter depth of Benthic Zone:	12			
Path 2 (Continued...)						
IF Lake Depth is greater than 10 m:	Mean depth of Non-Littoral Zone:	6	(Reduced Value)			
	Depth of the Benthic Zone:	12	(Reduced Value)			
	Benthic Pelagic ratio:	11,9:5,89				
Part 2 Enter the values for the estimated bottom surface area:						
Littoral Zone (No vegetation):						
Substrate:	Coarse	m ²	Medium	m ²	Fine	m ²
	Bedrock:	0,00	Rubble:	5 994,00	Sand:	0,00
	Boulder:	4 500,00	Cobble:	7 192,00	Silt:	39 299,00
			Gravel:	0,00	Muck:	0,00
					Clay:	0,00
	SubTotals:	4 500		13 186		39 299
Littoral Zone (Vegetation)						
Substrate:	Coarse	m ²	Medium	m ²	Fine	m ²
	Bedrock:	0,00	Rubble:	0,00	Sand:	0,00
	Boulder:	583,00	Cobble:	0,00	Silt:	5 243,00
			Gravel:	0,00	Muck:	0,00
					Clay:	0,00
	SubTotals:	583		0		5 243
Non-Littoral Zone						
Substrate:	Coarse	m ²	Medium	m ²	Fine	m ²
	Bedrock:	0,00	Rubble:	0,00	Sand:	0,00
	Boulder:	1 456,00	Cobble:	0,00	Silt:	0,00
			Gravel:	0,00	Muck:	144 109,00
					Clay:	0,00
	SubTotals:	1 456		0		144 109
Part 3 Summary Table for Bottom Surface Area Totals:						
Habitat Types	Bottom Surface area (m²)					
Littoral Coarse/No vegetation	4 500					
Littoral Medium/No vegetation	13 186					
Littoral Fine/No vegetation	39 299					
subtotal Littoral/No vegetation	56 985					
Littoral Coarse/Vegetation	583					
Littoral Medium/Vegetation	0					
Littoral Fine/Vegetation	5 243					
Subtotal Littoral/Vegetation	5 826					
Subtotal Littoral	62 811					
Non-littoral Coarse/Pelagic	1 456					
Non-littoral Medium/Pelagic	0					
Non-littoral Fine/Pelagic	144 109					
Subtotal nonlittoral	145 565					
Total Available Habitat	208 376					

	Species	Life Stage	Littoral Zone					Non-Littoral Zone			
			Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic
1	Burbot	Spawning	0,00	0,84	0,00	0,00	NA	0,00	0,00	NA	0,00
		YOY	1,00	1,00	0,00	0,89	NA	0,00	1,00	NA	0,17
		Juvenile	1,00	1,00	0,00	0,89	NA	0,00	1,00	NA	0,00
2	Lake Trout	Spawning	0,00	0,00	0,00	0,00	NA	0,00	0,67	NA	0,00
		YOY	1,00	1,00	0,00	1,00	NA	0,00	1,00	NA	0,00
		Juvenile	0,76	0,67	0,00	0,84	NA	0,00	1,00	NA	0,00
3	Round whitefish	Spawning	0,42	0,00	0,42	0,84	NA	0,84	0,84	NA	0,59
		YOY	0,59	0,84	0,59	0,44	NA	0,44	0,33	NA	0,00
		Juvenile	0,67	1,00	0,00	0,67	NA	0,00	0,00	NA	0,00
		Adult	0,67	1,00	0,00	0,67	NA	0,00	0,67	NA	0,50

	Species	Littoral Zone					Non-Littoral Zone			Total Available Habitat		
		Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic		Fine/Pelagic	
<input type="checkbox"/>	1	Burbot	4500	13186	0	519	0	0	1456	0	24499	44159,9
<input checked="" type="checkbox"/>	2	Lake Trout	4500	13186	16506	583	0	4404	1456	0	85024	125659,0
<input type="checkbox"/>	3	Round whitefish	3015	13186	23186	391	0	2307	976	0	72055	115115,1

Enter Lake name:		Pinette				
Part 1 Entering Lake depth(s):						
IF Lake Depth is less than or equal to 10 m:		IF Lake Depth is greater than 10 m:				
Path 1		Path 2				
A Enter Depth of Littoral Zone:	2	A-1 Enter mean depth of Non-Littoral Zone	0			
B Enter Mean Depth of Lake:	2	B-1 Enter depth of Benthic Zone:	0			
Path 2 (Continued...)						
IF Lake Depth is greater than 10 m:	Mean depth of Non-Littoral Zone:		(Reduced Value)			
	Depth of the Benthic Zone:		(Reduced Value)			
	Benthic Pelagic ratio:					
Part 2 Enter the values for the estimated bottom surface area:						
Littoral Zone (No vegetation):						
Substrate:	Coarse	m ²	Medium	m ²	Fine	m ²
	Bedrock:	0,00	Rubble:	6 467,00	Sand:	0,00
	Boulder:	13 844,00	Cobble:	5 412,00	Silt:	24 994,00
			Gravel:	0,00	Muck:	0,00
					Clay:	0,00
	SubTotals:	13 844		11 879		24 994
Littoral Zone (Vegetation)						
Substrate:	Coarse	m ²	Medium	m ²	Fine	m ²
	Bedrock:	0,00	Rubble:	249,00	Sand:	0,00
	Boulder:	227,00	Cobble:	181,00	Silt:	1 156,00
			Gravel:	0,00	Muck:	0,00
					Clay:	0,00
	SubTotals:	227		430		1 156
Non-Littoral Zone						
Substrate:	Coarse	m ²	Medium	m ²	Fine	m ²
	Bedrock:	0,00	Rubble:	0,00	Sand:	0,00
	Boulder:	977,00	Cobble:	0,00	Silt:	96 677,00
			Gravel:	0,00	Muck:	0,00
					Clay:	0,00
	SubTotals:	977		0		96 677
Part 3 Summary Table for Bottom Surface Area Totals:						
Habitat Types	Bottom Surface area (m²)					
Littoral Coarse/No vegetation	13 844					
Littoral Medium/No vegetation	11 879					
Littoral Fine/No vegetation	24 994					
subtotal Littoral/No vegetation	50 717					
Littoral Coarse/Vegetation	227					
Littoral Medium/Vegetation	430					
Littoral Fine/Vegetation	1 156					
Subtotal Littoral/Vegetation	1 813					
Subtotal Littoral	52 530					
Non-littoral Coarse/Pelagic	977					
Non-littoral Medium/Pelagic	0					
Non-littoral Fine/Pelagic	96 677					
Subtotal nonlittoral	97 654					
Total Available Habitat	150 184					

	Species	Life Stage	Littoral Zone						Non-Littoral Zone		
			Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic
1	Lake Chub	Spawning	0,00	1,00	0,84	0,00	1,00	0,84	0,00	NA	0,00
		YOY	0,00	1,00	0,84	0,00	1,00	0,84	0,00	NA	0,00
		Juvenile	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NA	0,00
		Adult	1,00	0,00	0,00	1,00	0,00	0,00	1,00	NA	0,00
2	Brook Trout (freshwater resident)	Spawning	0,00	0,76	0,67	0,00	0,76	0,67	0,00	NA	0,17
		YOY	1,00	1,00	0,00	1,00	1,00	0,00	1,00	NA	0,00
		Juvenile	1,00	1,00	0,00	1,00	1,00	0,00	1,00	NA	0,17
		Adult	0,00	0,50	0,67	0,00	0,50	0,78	0,00	NA	0,50

	Species	Littoral Zone						Non-Littoral Zone			Total Available Habitat
		Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic	
<input type="checkbox"/>	1 Lake Chub	13844	11879	20995	227	430	971	977	0	0	49323,0
<input checked="" type="checkbox"/>	2 Brook Trout (freshwater resident)	13844	11879	16746	227	430	902	977	0	48339	93344,0

Appendix V

Laboratory Certificates

Attention: Simon Barette
 GROUPE HÉMISPHERES INC.
 13,rue St. Louis
 bureau 201
 Lévis, PQ
 CANADA G6V4E2

Votre # de commande: 93874
 Votre # du projet: PR185-HOWSE
 Adresse du site: HOWSE
 Votre # Bordereau: c#938740, c#93874-01-01

Date du rapport: 2013/09/27
Rapport: NM-456078

Ce rapport a préséance sur tous les rapports précédents pour le même numéro de dossier Maxxam

CERTIFICAT D'ANALYSES

DE DOSSIER MAXXAM: B355654

Reçu: 2013/09/09, 14:50

Matrice: SÉDIMENT

Nombre d'échantillons reçus: 2

Analyses	Quantité	Date de l' extraction	Date Analysé	Méthode de laboratoire	Référence primaire
Métaux extractibles totaux	2	2013/09/13	2013/09/14	STL SOP-00006	MA.200- Mét 1.2
Granulométrie et sédimentométrie (1)	2	N/A	N/A		
Carbone organique total	2	2013/09/16	2013/09/17	STL SOP-00068	MA.310-CS 1.0, Rév2

Matrice: EAU

Nombre d'échantillons reçus: 2

Analyses	Quantité	Date de l' extraction	Date Analysé	Méthode de laboratoire	Référence primaire
Métaux extractibles totaux(basse limite)	2	2013/09/11	2013/09/12	STL SOP-00006	MA.200- Mét 1.2

Matrice: EAU DE SURFACE

Nombre d'échantillons reçus: 2

Analyses	Quantité	Date de l' extraction	Date Analysé	Méthode de laboratoire	Référence primaire
Acidite	2	N/A	2013/09/11	STL SOP-00057	MA.315 Alc-Aci 1.0
Alcalinité totale (pH final 4.5)	2	N/A	2013/09/12	STL SOP-00038	SM 2320B
Anions	2	N/A	2013/09/14	STL SOP-00014	MA. 300 - Ions 1.3
Conductivité	2	N/A	2013/09/12	STL SOP-00038	SM 2510
Fluorures	2	N/A	2013/09/12	STL SOP-00038	SM 4500-F- C.
Matières en suspension	2	2013/09/10	2013/09/10	STL SOP-00015	MA. 104 - S.S. 1.1
Métaux extractibles totaux(basse limite)	2	2013/09/11	2013/09/12	STL SOP-00006	MA.200- Mét 1.2
Azote ammoniacal	2	N/A	2013/09/11	STL SOP-00040	MA. 300 - N 1.1

* Les données brutes sont utilisées pour le calcul du RPD (% d'écart relatif). L'arrondissement des résultats finaux peut expliquer la variation apparente.

(1) Cette analyse a été effectuée par Maxxam Analytics - Bedford

Attention: Simon Barette
GROUPE HÉMISPHERES INC.
13,rue St. Louis
bureau 201
Lévis, PQ
CANADA G6V4E2

Votre # de commande: 93874
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # Bordereau: c#938740, c#93874-01-01

Date du rapport: 2013/09/27
Rapport: NM-456078

Ce rapport a préséance sur tous les rapports précédents pour le même numéro de dossier Maxxam

CERTIFICAT D'ANALYSES

-2-

clé de cryptage

Veillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

Séverine Planté,
Email: SPlante@maxxam.ca
Phone# (514) 448-9001

=====
Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Dossier Maxxam: B355654
Date du rapport: 2013/09/27

GRUPE HÉMISPÈRES INC.
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # de commande: 93874
Initiales du préleveur: SB

MÉTAUX EXTRACTIBLES TOTAUX (SÉDIMENT)

Identification Maxxam					V82011	V82011	V82011		
Date d'échantillonnage					2013/09/02 13:52	2013/09/02 13:52	2013/09/02 13:52		
# Bordereau					c#93874-01-01	c#93874-01-01	c#93874-01-01		
	UNITÉS	A	B	C	TRIANGLE	TRIANGLE Dup. de Lab.	TRIANGLE Dup. de Lab. 2	LDR	Lot CQ

MÉTAUX									
Aluminium (Al)	mg/kg	-	-	-	12000	12000	12000	20	1205756
Arsenic (As)	mg/kg	10	30	50	15	15	15	2	1205756
Cadmium (Cd)	mg/kg	1.5	5	20	0.8	0.8	0.8	0.2	1205756
Calcium (Ca)	mg/kg	-	-	-	1200	1200	1200	30	1205756
Cuivre (Cu)	mg/kg	100	100	500	27	27	28	1	1205756
Fer (Fe)	mg/kg	-	-	-	95000	93000	95000	10	1205756
Magnésium (Mg)	mg/kg	-	-	-	4000	3800	3900	10	1205756
Manganèse (Mn)	mg/kg	1000	1000	2200	3400	3300	3400	2	1205756
Molybdène (Mo)	mg/kg	6	10	40	<2	<2	<2	2	1205756
Nickel (Ni)	mg/kg	100	100	500	31	31	32	1	1205756
Mercure (Hg)	mg/kg	0.3	2	10	0.13	0.13	0.14	0.05	1205756
Potassium (K)	mg/kg	-	-	-	980	960	990	20	1205756
Plomb (Pb)	mg/kg	30	500	1000	16	16	17	5	1205756
Sélénium (Se)	mg/kg	1	3	10	<10	<10	<10	10	1205756
Sodium (Na)	mg/kg	-	-	-	41	39	42	10	1205756
Zinc (Zn)	mg/kg	230	500	1500	150	140	150	5	1205756

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B355654
Date du rapport: 2013/09/27

GRUPE HÉMISPÈRES INC.
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # de commande: 93874
Initiales du préleveur: SB

MÉTAUX EXTRACTIBLES TOTAUX (SÉDIMENT)

Identification Maxxam					V82013		
Date d'échantillonnage					2013/09/03 13:30		
# Bordereau					c#93874-01-01		
	UNITÉS	A	B	C	BURNETTA	LDR	Lot CQ

MÉTAUX							
Aluminium (Al)	mg/kg	-	-	-	9100	20	1205756
Arsenic (As)	mg/kg	10	30	50	15	2	1205756
Cadmium (Cd)	mg/kg	1.5	5	20	0.3	0.2	1205756
Calcium (Ca)	mg/kg	-	-	-	350	30	1205756
Cuivre (Cu)	mg/kg	100	100	500	22	1	1205756
Fer (Fe)	mg/kg	-	-	-	91000	10	1205756
Magnésium (Mg)	mg/kg	-	-	-	4200	10	1205756
Manganèse (Mn)	mg/kg	1000	1000	2200	1700	2	1205756
Molybdène (Mo)	mg/kg	6	10	40	3	2	1205756
Nickel (Ni)	mg/kg	100	100	500	23	1	1205756
Mercure (Hg)	mg/kg	0.3	2	10	0.06	0.05	1205756
Potassium (K)	mg/kg	-	-	-	630	20	1205756
Plomb (Pb)	mg/kg	30	500	1000	14	5	1205756
Sélénium (Se)	mg/kg	1	3	10	<10	10	1205756
Sodium (Na)	mg/kg	-	-	-	28	10	1205756
Zinc (Zn)	mg/kg	230	500	1500	69	5	1205756

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B355654
Date du rapport: 2013/09/27

GRUPE HÉMISPHERES INC.
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # de commande: 93874
Initiales du préleveur: SB

PARAMÈTRES CONVENTIONNELS (SÉDIMENT)

Identification Maxxam		V82011	V82013		
Date d'échantillonnage		2013/09/02 13:52	2013/09/03 13:30		
# Bordereau		c#93874-01-01	c#93874-01-01		
	UNITÉS	TRIANGLE	BURNETTA	LDR	Lot CQ

CONVENTIONNELS					
Carbone organique total	% g/g	2.9	1.0	0.5	1206627

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B355654
Date du rapport: 2013/09/27

GRUPE HÉMISPHERES INC.
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # de commande: 93874
Initiales du préleveur: SB

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Identification Maxxam		V82014	V82015		
Date d'échantillonnage		2013/09/03	2013/09/03		
# Bordereau		c#93874-01-01	c#93874-01-01		
	UNITÉS	BLANC TRANSPORT LOT:13JN27-B	BLANC TERRAIN LOT:13JN27-B	LDR	Lot CQ

MÉTAUX ICP-MS					
Aluminium (Al)	ug/L	<10	<10	10	1204469
Arsenic (As)	ug/L	<1.0	<1.0	1.0	1204469
Cadmium (Cd)	ug/L	<0.20	<0.20	0.20	1204469
Calcium (Ca)	ug/L	<500	<500	500	1204469
Cuivre (Cu)	ug/L	<1.0	<1.0	1.0	1204469
Fer (Fe)	ug/L	<60	<60	60	1204469
Magnésium (Mg)	ug/L	<100	<100	100	1204469
Manganèse (Mn)	ug/L	<1.0	<1.0	1.0	1204469
Molybdène (Mo)	ug/L	<1.0	<1.0	1.0	1204469
Nickel (Ni)	ug/L	<2.0	<2.0	2.0	1204469
Plomb (Pb)	ug/L	<0.50	<0.50	0.50	1204469
Potassium (K)	ug/L	<500	<500	500	1204469
Sélénium (Se)	ug/L	<3.0	<3.0	3.0	1204469
Sodium (Na)	ug/L	<500	<500	500	1204469
Zinc (Zn)	ug/L	<7.0	<7.0	7.0	1204469

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B355654
Date du rapport: 2013/09/27

GRUPE HÉMISPÈRES INC.
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # de commande: 93874
Initiales du préleveur: SB

MÉTAUX EXTRACTIBLES TOTAUX (EAU DE SURFACE)

Identification Maxxam		V82010	V82012		
Date d'échantillonnage		2013/09/02 13:52	2013/09/03 13:30		
# Bordereau		c#93874-01-01	c#93874-01-01		
	UNITÉS	TRIANGLE	BURNETTA	LDR	Lot CQ

MÉTAUX ICP-MS					
Aluminium (Al)	ug/L	18	130	10	1204469
Arsenic (As)	ug/L	<1.0	<1.0	1.0	1204469
Cadmium (Cd)	ug/L	<0.20	<0.20	0.20	1204469
Calcium (Ca)	ug/L	2700	<500	500	1204469
Cuivre (Cu)	ug/L	<1.0	<1.0	1.0	1204469
Dureté totale (CaCO3)	ug/L	16000	1200	1000	1204469
Fer (Fe)	ug/L	75	220	60	1204469
Magnésium (Mg)	ug/L	2300	290	100	1204469
Manganèse (Mn)	ug/L	6.5	23	1.0	1204469
Molybdène (Mo)	ug/L	<1.0	<1.0	1.0	1204469
Mercure (Hg)	ug/L	<0.10	<0.10	0.10	1204469
Nickel (Ni)	ug/L	<2.0	<2.0	2.0	1204469
Phosphore total	ug/L	<10	<10	10	1204469
Plomb (Pb)	ug/L	<0.50	<0.50	0.50	1204469
Potassium (K)	ug/L	<500	<500	500	1204469
Sélénium (Se)	ug/L	<3.0	<3.0	3.0	1204469
Sodium (Na)	ug/L	580	<500	500	1204469
Uranium (U)	ug/L	<1.0	<1.0	1.0	1204469
Zinc (Zn)	ug/L	<7.0	<7.0	7.0	1204469
LDR = Limite de détection rapportée Lot CQ = Lot Contrôle Qualité					

Dossier Maxxam: B355654
Date du rapport: 2013/09/27

GRUPE HÉMISPÈRES INC.
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # de commande: 93874
Initiales du préleveur: SB

PARAMÈTRES CONVENTIONNELS (EAU DE SURFACE)

Identification Maxxam		V82010	V82012		
Date d'échantillonnage		2013/09/02 13:52	2013/09/03 13:30		
# Bordereau		c#93874-01-01	c#93874-01-01		
	UNITÉS	TRIANGLE	BURNETTA	LDR	Lot CQ

CONVENTIONNELS					
Acidité en CaCO ₃	mg/L	10	<10	10	1204450
Azote ammoniacal (N-NH ₃)	mg/L	0.02	<0.02	0.02	1204007
Conductivité	mS/cm	0.037	0.005	0.001	1204014
Fluorure (F)	mg/L	<0.1	<0.1	0.1	1204016
Alcalinité Totale (en CaCO ₃) pH 4.5	mg/L	15	2	1	1204009
Bicarbonates (HCO ₃ comme CaCO ₃)	mg/L	15	2	1	1204009
Chlorures (Cl)	mg/L	0.22	0.11	0.05	1205296
Nitrate(N) et Nitrite(N)	mg/L	0.11	<0.02	0.02	1205296
Sulfates (SO ₄)	mg/L	2.2	<0.5	0.5	1205296
Matières en suspension (MES)	mg/L	3	5	2	1203807
LDR = Limite de détection rapportée Lot CQ = Lot Contrôle Qualité					

Dossier Maxxam: B355654
Date du rapport: 2013/09/27

GROUPE HÉMISPHERES INC.
Votre # du projet: PR185-HOWSE
Adresse du site: HOWSE
Votre # de commande: 93874
Initiales du préleveur: SB

REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON excepté pour

Métaux extractibles totaux: Afin de respecter le délai de conservation, l'échantillon a été congelé dès sa réception: V82011, V82013

Carbone organique total: Afin de respecter le délai de conservation, l'échantillon a été congelé dès sa réception: V82011, V82013

Tous les résultats sont calculés sur une base sèche excepté lorsque non-applicable.

A,B,C: Selon l'Annexe 2 du "Politique de protection des sols et de réhabilitation des terrains contaminés" intitulée "Les critères génériques pour les sols et pour les eaux souterraines (eau de surface et égouts)". Pour toutes les analyses organiques, le critère A désigne toute concentration inférieure à la valeur indiquée. Pour toutes les analyses de métaux dans les sols, le Critère A désigne la " Teneur de fond Secteur Fosse du Labrador ".

A,B-eau souterraine: A=Critère pour fin de consommation; B=Critère pour la résurgence dans les eaux de surface ou infiltration dans les égouts.

Ces références ne sont rapportées qu'à titre indicatif et ne doivent pas être interprétées dans aucun autre contexte.

- = Ce composé ne fait pas parti de la réglementation.

PARAMÈTRES CONVENTIONNELS (SÉDIMENT)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode. Veillez noter que le résultat de TOC inclut le carbone graphitique.

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

MÉTAUX EXTRACTIBLES TOTAUX (EAU DE SURFACE)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

PARAMÈTRES CONVENTIONNELS (EAU DE SURFACE)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse

GROUPE HÉMISPHERES INC.
 Attention: Simon Barette
 Votre # du projet: PR185-HOWSE
 P.O. #: 93874
 Adresse du site: HOWSE

Rapport Assurance Qualité

Dossier Maxxam: B355654

Lot Lot Num Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	UNITÉS
1203807 FSI	Blanc fortifié	Matières en suspension (MES)	2013/09/10		95	%
	Blanc fortifié DUP	Matières en suspension (MES)	2013/09/10		97	%
	Blanc de méthode	Matières en suspension (MES)	2013/09/10	<2		mg/L
1204007 DKH	MRC	Azote ammoniacal (N-NH3)	2013/09/11		92	%
	Blanc fortifié	Azote ammoniacal (N-NH3)	2013/09/11		100	%
	Blanc de méthode	Azote ammoniacal (N-NH3)	2013/09/11	<0.02		mg/L
1204009 MR4	Blanc fortifié	Alcalinité Totale (en CaCO3) pH 4.5	2013/09/12		101	%
	Blanc de méthode	Alcalinité Totale (en CaCO3) pH 4.5	2013/09/12	<1		mg/L
		Bicarbonates (HCO3 comme CaCO3)	2013/09/12	<1		mg/L
1204014 MR4	Blanc fortifié	Conductivité	2013/09/12		102	%
	Blanc de méthode	Conductivité	2013/09/12	<0.001		mS/cm
1204016 MR4	Blanc fortifié	Fluorure (F)	2013/09/12		96	%
	Blanc de méthode	Fluorure (F)	2013/09/12	<0.1		mg/L
1204450 JE1	Vérification étalonnage	Acidité en CaCO3	2013/09/11		100	%
	MRC	Acidité en CaCO3	2013/09/11		99	%
	Blanc fortifié	Acidité en CaCO3	2013/09/11		99	%
1204469 JF1	MRC	Aluminium (Al)	2013/09/12		105	%
		Arsenic (As)	2013/09/12		105	%
		Cadmium (Cd)	2013/09/12		102	%
		Cuivre (Cu)	2013/09/12		100	%
		Fer (Fe)	2013/09/12		112	%
		Manganèse (Mn)	2013/09/12		105	%
		Molybdène (Mo)	2013/09/12		106	%
		Nickel (Ni)	2013/09/12		102	%
		Plomb (Pb)	2013/09/12		101	%
		Sélénium (Se)	2013/09/12		101	%
		Zinc (Zn)	2013/09/12		101	%
	Blanc fortifié	Aluminium (Al)	2013/09/12		91	%
		Arsenic (As)	2013/09/12		107	%
		Cadmium (Cd)	2013/09/12		95	%
		Calcium (Ca)	2013/09/12		91	%
		Cuivre (Cu)	2013/09/12		100	%
		Fer (Fe)	2013/09/12		105	%
		Magnésium (Mg)	2013/09/12		104	%
		Manganèse (Mn)	2013/09/12		108	%
		Molybdène (Mo)	2013/09/12		100	%
		Mercuré (Hg)	2013/09/12		117	%
		Nickel (Ni)	2013/09/12		101	%
		Phosphore total	2013/09/12		101	%
		Plomb (Pb)	2013/09/12		93	%
		Potassium (K)	2013/09/12		103	%
		Sélénium (Se)	2013/09/12		98	%
		Sodium (Na)	2013/09/12		108	%
		Uranium (U)	2013/09/12		94	%
		Zinc (Zn)	2013/09/12		99	%
	Blanc de méthode	Aluminium (Al)	2013/09/12	<10		ug/L
		Arsenic (As)	2013/09/12	1.0, LDR=1.0		ug/L
		Cadmium (Cd)	2013/09/12	<0.20		ug/L
		Calcium (Ca)	2013/09/12	<500		ug/L
		Cuivre (Cu)	2013/09/12	<1.0		ug/L
		Dureté totale (CaCO3)	2013/09/12	<1000		ug/L
		Fer (Fe)	2013/09/12	<60		ug/L
		Magnésium (Mg)	2013/09/12	<100		ug/L
		Manganèse (Mn)	2013/09/12	<1.0		ug/L

GROUPE HÉMISPHERES INC.
 Attention: Simon Barette
 Votre # du projet: PR185-HOWSE
 P.O. #: 93874
 Adresse du site: HOWSE

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B355654

Lot Lot Num Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	UNITÉS	
1204469 JF1	Blanc de méthode	Molybdène (Mo)	2013/09/12	<1.0		ug/L	
		Mercuré (Hg)	2013/09/12	<0.10		ug/L	
		Nickel (Ni)	2013/09/12	<2.0		ug/L	
		Phosphore total	2013/09/12	<10		ug/L	
		Plomb (Pb)	2013/09/12	<0.50		ug/L	
		Potassium (K)	2013/09/12	<500		ug/L	
		Sélénium (Se)	2013/09/12	<3.0		ug/L	
		Sodium (Na)	2013/09/12	<500		ug/L	
		Uranium (U)	2013/09/12	<1.0		ug/L	
		Zinc (Zn)	2013/09/12	<7.0		ug/L	
1205296 MR4	Blanc fortifié	Chlorures (Cl)	2013/09/14		102	%	
		Nitrate(N) et Nitrite(N)	2013/09/14		104	%	
		Sulfates (SO4)	2013/09/14		105	%	
	Blanc de méthode	Chlorures (Cl)	2013/09/14	<0.05			mg/L
		Nitrate(N) et Nitrite(N)	2013/09/14	<0.02			mg/L
		Sulfates (SO4)	2013/09/14	<0.5			mg/L
1205756 AL5	Échantillon fortifié [V82011-01]	Aluminium (Al)	2013/09/14		NC	%	
		Arsenic (As)	2013/09/14		102	%	
		Cadmium (Cd)	2013/09/14		96	%	
		Calcium (Ca)	2013/09/14		NC	%	
		Cuivre (Cu)	2013/09/14		NC	%	
		Fer (Fe)	2013/09/14		NC	%	
		Magnésium (Mg)	2013/09/14		NC	%	
		Manganèse (Mn)	2013/09/14		NC	%	
		Molybdène (Mo)	2013/09/14		100	%	
		Nickel (Ni)	2013/09/14		NC	%	
		Mercuré (Hg)	2013/09/14		97	%	
		Potassium (K)	2013/09/14		NC	%	
		Plomb (Pb)	2013/09/14		105	%	
		Sélénium (Se)	2013/09/14		103	%	
		Sodium (Na)	2013/09/14		104	%	
	Zinc (Zn)	2013/09/14		NC	%		
	MRC	Arsenic (As)	2013/09/14		117	%	
		Cadmium (Cd)	2013/09/14		106	%	
		Cuivre (Cu)	2013/09/14		91	%	
		Fer (Fe)	2013/09/14		101	%	
		Manganèse (Mn)	2013/09/14		99	%	
		Molybdène (Mo)	2013/09/14		82	%	
		Nickel (Ni)	2013/09/14		115	%	
		Mercuré (Hg)	2013/09/14		109	%	
		Plomb (Pb)	2013/09/14		105	%	
		Zinc (Zn)	2013/09/14		98	%	
	Blanc fortifié	Aluminium (Al)	2013/09/14		99	%	
		Arsenic (As)	2013/09/14		105	%	
		Cadmium (Cd)	2013/09/14		98	%	
		Calcium (Ca)	2013/09/14		103	%	
		Cuivre (Cu)	2013/09/14		100	%	
		Fer (Fe)	2013/09/14		108	%	
		Magnésium (Mg)	2013/09/14		99	%	
		Manganèse (Mn)	2013/09/14		102	%	
		Molybdène (Mo)	2013/09/14		102	%	
		Nickel (Ni)	2013/09/14		108	%	
		Mercuré (Hg)	2013/09/14		94	%	
		Potassium (K)	2013/09/14		101	%	

GROUPE HÉMISPÈRES INC.
 Attention: Simon Barette
 Votre # du projet: PR185-HOWSE
 P.O. #: 93874
 Adresse du site: HOWSE

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B355654

Lot Lot Num Init	Type CQ	Groupe	Date Date Analyse aaaa/mm/jj	Valeur	Réc	UNITÉS	
1205756 AL5	Blanc fortifié	Plomb (Pb)	2013/09/14		103	%	
		Sélénium (Se)	2013/09/14		102	%	
		Sodium (Na)	2013/09/14		105	%	
		Zinc (Zn)	2013/09/14		107	%	
	Blanc de méthode	Aluminium (Al)	2013/09/14	<20			mg/kg
		Arsenic (As)	2013/09/14	<2			mg/kg
		Cadmium (Cd)	2013/09/14	<0.2			mg/kg
		Calcium (Ca)	2013/09/14	<30			mg/kg
		Cuivre (Cu)	2013/09/14	<1			mg/kg
		Fer (Fe)	2013/09/14	<10			mg/kg
		Magnésium (Mg)	2013/09/14	<10			mg/kg
		Manganèse (Mn)	2013/09/14	<2			mg/kg
		Molybdène (Mo)	2013/09/14	<2			mg/kg
		Nickel (Ni)	2013/09/14	<1			mg/kg
		Mercurie (Hg)	2013/09/14	<0.05			mg/kg
		Potassium (K)	2013/09/14	<20			mg/kg
		Plomb (Pb)	2013/09/14	<5			mg/kg
Sélénium (Se)	2013/09/14	<10			mg/kg		
Sodium (Na)	2013/09/14	<10			mg/kg		
Zinc (Zn)	2013/09/14	<5			mg/kg		
1206627 VB	MRC	Carbone organique total	2013/09/17		96	%	
	Blanc de méthode	Carbone organique total	2013/09/17	<0.5		% g/g	

Vérification d'étalonnage: Sert à confirmer que l'étalonnage est en contrôle tout au long de la séquence instrumentale.
 Échantillon fortifié: Échantillon auquel a été ajouté une quantité connue d'un ou de plusieurs composés chimiques d'intérêt. Sert à évaluer les interférences dues à la matrice.
 MRC: Un échantillon de concentration connue préparé dans des conditions rigoureuses par un organisme externe. Utilisé pour vérifier la justesse de la méthode.
 Blanc fortifié: Un blanc, d'une matrice exempte de contaminants, auquel a été ajouté une quantité connue d'analyte provenant généralement d'une deuxième source. Utilisé pour évaluer la précision de la méthode.
 Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.
 NC (Matrice d'échantillon fortifié): Le pourcentage de récupération de l'échantillon fortifié n'a pas pu être calculé. La différence entre la concentration de l'ajout dosé et de la concentration initiale de l'échantillon n'était pas suffisamment élevée pour permettre un calcul fiable
 LDR = Limite de détection rapportée
 Réc = Récupération

Page des signatures de validation

Dossier Maxxam: B355654

Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:




Delia Barbul, B.Sc., Chimiste




Kathie Quevillon, B.Sc., Chimiste




Miryam Assayag




Madina Hamrouni, B.Sc., Chimiste




Steliana Calestru, B.Sc. Chimiste




Veronic Beausejour, B.Sc., Chimiste, Superviseur

=====

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

INFORMATION FACTURATION:		INFORMATION RAPPORT (si différente de facturation):		INFORMATION PROJET:	
Compagnie: #3990 GROUPE HÉMISPHERES INC.	Compagnie: #1953 GROUPE HÉMISPHERES INC.	N° de cotation: B20511	re seulement:		
Attention de: COMPTES PAYABLES	Attention de: Simon BARETTE	N° de commande: 93874	# COMMANDE BOUTEILLES:		
Adresse: 13, rue St. Louis bureau 201	Adresse: 1453, RUE BEAUBIEN EST BUREAU 301	N° de projet: PR185-Howse	SBA MTL-0075		
Lévis PQ G6V4E2	MONTRÉAL PQ H2G 3C6	Nom du projet: HOWSE	CARGÉ(E) DE PROJETS:		
Téléphone: (418)903-9678 Téléc: (418)838-1855	Téléphone: (514)509-6572 Téléc: (514)509-6573	# de site:	Lorena Di Benedetto		
Courriel: cybel@hemis.ca; info@hemis.ca	Courriel: sbarrette@hemis.ca	Echantillonneur: SIMON BARRETTE	C#93874-01-01		

CRITÈRES ET RÉGLEMENTS:	INSTRUCTIONS SPÉCIALES	ANALYSES REQUISES (S.V.P. soyez précis):	DÉLAIS REQUIS:
<input type="checkbox"/> Pointique <input type="checkbox"/> RDS <input type="checkbox"/> RMD <input type="checkbox"/> REIMR Autre (spécifier) REMM	Métaux extractible total.	Essai de pompage <input type="checkbox"/> 24h (Art. 6.1.66.2) <input type="checkbox"/> 48h (Art. 6.2) <input type="checkbox"/> 72h (Art. 6.1.66.2) Rég. CUM <input type="checkbox"/> Égout sanitaire Art. 10 <input type="checkbox"/> Égout pluvial Art. 11 Qualité Eau Potable <input type="checkbox"/> Rég. Pâtes & Papiers (Art. 104) <input type="checkbox"/> Rég. Pâtes & Papiers (Art. 112) <input type="checkbox"/> Municipal <input type="checkbox"/> Non-municipal	S.V.P NOTIFIER À L'AVANCE EN CAS DE PROJET URGENT Délai Régulier: <input type="checkbox"/> (Sera applicable si le délai de l'urgence n'est pas précisé) Délai Régulier = 5 Jours ouvrables pour la plupart des analyses. S.V.P. Veuillez noter que le délai pour certaines analyses telles que la DBO5 et les Dioxines/Furannes est > 5 jours - Contactez votre chargé de projets pour les détails. Délai rapide (Si applicable à tous les échantillons) Date Requis: _____ Heure requise: _____ <input type="checkbox"/>

Remarque: Pour les échantillons d'eau potable soumis à la réglementation - S.V.P utiliser le formulaire client rattaché à l'eau potable

CONSERVER LES ÉCHANTILLONS EN MILIEU FROID (< 10 OC) DE L'ÉCHANTILLONNAGE À LA LIVRAISON CHEZ MAXXAM

Étiquette Codebar	Identification de l'échantillon	Date Prélevé	Heure	Matrice	Eau potable réglementée ? (O/N)	métaux à filtrer au labo ? (O/N)	Métaux (As, Cu, Pb, Ni, Zn, Al, Cd, Fe, Mn, Mo, Se, Ca, Mg, K, Na)	Mercuré par ICP-MS	Uranium par ICP-MS	Dureté	Matières en suspension	Azote ammoniacal	Anions (NO2+NO3)	Phosphore total	Anions (Cl, SO4, NO2+NO3)	# de Contenants	Commentaires
1	TRIANGLE	02/09 2013	13h52	SURF	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	
2	TRIANGLE	02/09 2013	13h52	SED SURF			✓	✓	✓							3	SÉDIMENT
3	BURNETTA	03/09 2013	13h30	SURF	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	
4	BURNETTA	03/09 2013	13h30	SED			✓	✓	✓							3	SÉDIMENT
5																	
6																	
7																	
8																	
9																	
10																	

Maxxam
FREEZE

16-YES
SEM MU

*DÉSSAISI PAR: (Signature)	Date: (AAAA/MM/JJ)	Heure:	RECU PAR: (Signature)	Date: (AAAA/MM/JJ)	Heure:	# de pots utilisés	À l'usage du laboratoire seulement		
<i>Julia B.</i>	2013/09/09	14h45	<i>L. de B.</i>	2013/09/09	14:50	et non retournés	Court Délai de Conservation	Température (°C) de Réception	Sceau légal intact sur la glacière
							<input type="checkbox"/>	10' 10.10	<input type="checkbox"/> Oui <input checked="" type="checkbox"/> Non

INFORMATION FACTURATION:		INFORMATION RAPPORT (si différente de facturation):		INFORMATION PROJET:		À l'usage du laboratoire seulement:	
Compagnie: #3990 GROUPE HÉMISPHERES INC.	Compagnie: #1953 GROUPE HÉMISPHERES INC.	N° de cotation: B20511	# DOSSIER MAXXAM:		# COMMANDE BOUTEILLES:		
Attention de: COMPTES PAYABLES	Attention de: Simon BARETTE	N° de commande: 93874					
Adresse: 13, rue St. Louis bureau 201	Adresse: 1453, RUE BEAUBIEN EST BUREAU 301	N° de projet: PR185-Howse					
Lévis PQ G6V4E2	MONTRÉAL PQ H2G 3C6	Nom du projet: HOWSE					
Téléphone: (418)903-9678 Téléc.: (418)838-1855	Téléphone: (514)509-6572 Téléc.: (514)509-6573	# de site:					
Courriel: cybel@hemis.ca; info@hemis.ca	Courriel: sbarrette@hemis.ca	Échantillonneur: SIMON BARETTE					

CRITÈRES ET RÉGLEMENTS:		INSTRUCTIONS SPÉCIALES		ANALYSES REQUISES (S.V.P soyez précis)						DÉLAIS REQUIS:			
<input type="checkbox"/> Politique <input type="checkbox"/> RDS <input type="checkbox"/> RMD <input type="checkbox"/> REIMR Autre (spécifier) _____		Essai de pompage <input type="checkbox"/> 24h (Art. 6.166.2) <input type="checkbox"/> 48h (Art. 6.2) <input type="checkbox"/> 72h (Art. 6.166.2)		Eau potable réglementée ? (O / N) métaux à filtrer au labo ? (O / N)		Conductivité Alcalinité totale (pH final 4.5) Acidité Fluorures Granulométrie Carbone organique Total						S.V.P NOTIFIER À L'AVANCE EN CAS DE PROJET URGENT Délai Régulier: (Sera applicable si le délai de l'urgence n'est pas précisé) Délai Régulier = 5 Jours ouvrables pour la plupart des analyses. S.V.P Veuillez noter que le délai pour certaines analyses telles que la DBO5 et les Dioxines/Furannes est > 5 jours - Contactez votre chargé de projets pour les détails Délai rapide (Si applicable à tous les échantillons) Date Requis: _____ Heure requise: _____	

Remarque: Pour les échantillons d'eau potable soumis à la réglementation - S.V.P utiliser le formulaire client rattaché à l'eau potable

CONSERVER LES ÉCHANTILLONS EN MILIEU FROID (< 10 OC) DE L'ÉCHANTILLONNAGE À LA LIVRAISON CHEZ MAXXAM

Étiquette Codebar	Identification de l'échantillon	Date Prélevé	Heure	Matrice	Eau potable réglementée ? (O / N)	Conductivité	Alcalinité totale (pH final 4.5)	Acidité	Fluorures	Granulométrie	Carbone organique Total	# de Conteneurs	Commentaires
1	TRIANGLE	02/09 2013	13452	SURF	N N	✓	✓	✓	✓			7	
2	TRIANGLE	02/09 2013	13452	SED SURF						✓	✓	3	SÉDIMENT
3	BURNETTA	03/09 2013	13430	SURF	N N	✓	✓	✓	✓			7	
4	BURNETTA	03/09 2013	13430	SED						✓	✓	3	SÉDIMENT
5													
6													
7													
8													
9													
10													

1 CE - YES
SEAL - NO

*DÉSSAISI PAR: (Signature) J. BTT.	Date: (AAAA/MM/JJ) 2013/09/09	Heure: 14:45	RECU PAR: (Signature) L. B.	Date: (AAAA/MM/JJ) 2013/09/09	Heure: 14:50	# de pots utilisés et non retournés:	À l'usage du laboratoire seulement		
							Court Délai de Conservation <input type="checkbox"/>	Température (°C) de Réception 10.10.10	Sceau légal intact sur la glacière <input type="checkbox"/>

Your Project #: B355654
 Your C.O.C. #: N/A

Attention: Severine Plante

Maxxam Analytique
 Saint Laurent PQ to Bedford
 889 Montee de Liesse
 Saint Laurent, QC
 H4T 1P5

Report Date: 2013/09/23

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3F2794

Received: 2013/09/12, 10:19

Sample Matrix: Soil
 # Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Particle size in solids (pipette&sieve) (1)	2	N/A	2013/09/21	ATL SOP 00012	based on MSAMS-1978
Particle size retained (Calculated) (1)	2	N/A	2013/09/22	ATL SOP 00012	based on MSAMS-1978

Remarks:

Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Note: Graphical representation of larger fractions (PHI-4, PHI -3 and PHI -2) not applicable unless these optional parameters are specifically requested.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Katie Cohoon, Bedford Client Services
 Email: KCohoon@maxxam.ca
 Phone# (902) 420-0203 Ext:226

=====
 Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B3F2794
 Report Date: 2013/09/23

Maxxam Analytique
 Client Project #: B355654

RESULTS OF ANALYSES OF SOIL

Maxxam ID		TA2799	TA2800		
Sampling Date		2013/09/02	2013/09/03		
		13:52	13:30		
COC Number		N/A	N/A		
	Units	V82011-03R \ TRIANGLE	V82013-03R \ BURNETTA	RDL	QC Batch

< -1 Phi (2 mm)	%	100	25 (1)	0.10	3354225
< 0 Phi (1 mm)	%	100	12	0.10	3354225
< +1 Phi (0.5 mm)	%	99	8.4	0.10	3354225
< +2 Phi (0.25 mm)	%	98	7.1	0.10	3354225
< +3 Phi (0.12 mm)	%	97	6.8	0.10	3354225
< +4 Phi (0.062 mm)	%	91	6.7	0.10	3354225
< +5 Phi (0.031 mm)	%	88	6.6	0.10	3354225
< +6 Phi (0.016 mm)	%	73	6.4	0.10	3354225
< +7 Phi (0.0078 mm)	%	47	5.8	0.10	3354225
< +8 Phi (0.0039 mm)	%	40	5.4	0.10	3354225
< +9 Phi (0.0020 mm)	%	27	4.2	0.10	3354225
Gravel	%	0.15	75	0.10	3354225
Sand	%	8.5	18	0.10	3354225
Silt	%	52	1.3	0.10	3354225
Clay	%	40	5.4	0.10	3354225

N/A = Not Applicable
 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 (1) Sample observation comment: fraction contained many rocks

Maxxam Job #: B3F2794
 Report Date: 2013/09/23

Maxxam Analytique
 Client Project #: B355654

CALCULATED PARAMETERS (SOIL)

Maxxam ID		TA2799	TA2800		
Sampling Date		2013/09/02 13:52	2013/09/03 13:30		
COC Number		N/A	N/A		
	Units	V82011-03R \\ TRIANGLE	V82013-03R \\ BURNETTA	RDL	QC Batch
2-4 mm	%	0.15	75	0.10	3346832
1-2 mm	%	0.23	13	0.10	3346832
0.5-1 mm	%	0.83	3.8	0.10	3346832
0.25-0.5 mm	%	0.79	1.3	0.10	3346832
0.125-0.25 mm	%	1.4	0.26	0.10	3346832
0.0625-0.125 mm	%	5.2	0.13	0.10	3346832
0.031-0.062 mm	%	3.2	<0.10	0.10	3346832
0.016-0.031 mm	%	15	0.26	0.10	3346832
0.0078-0.016 mm	%	26	0.62	0.10	3346832
0.0039-0.0078 mm	%	7.8	0.36	0.10	3346832
0.0020-0.0039 mm	%	13	1.2	0.10	3346832
N/A = Not Applicable RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

Maxxam Job #: B3F2794
Report Date: 2013/09/23

Maxxam Analytique
Client Project #: B355654

Package 1	3.7°C
-----------	-------

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytique
 Attention: Severine Plante
 Client Project #: B355654
 P.O. #:
 Site Location:

Quality Assurance Report
 Maxxam Job Number: DB3F2794

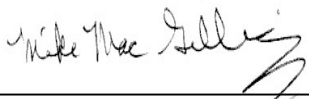
QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3354225 KLA	RPD	Gravel	2013/09/21	6.6		%	35
		Sand	2013/09/21	5.0		%	35
		Silt	2013/09/21	3.5		%	35
		Clay	2013/09/21	2.0		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Validation Signature Page

Maxxam Job #: B3F2794

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

A handwritten signature in black ink, appearing to read "Mike MacGillivray". The signature is written in a cursive style and is positioned above a horizontal line.

Mike MacGillivray, Scientific Specialist (Inorganics)

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Attention: LOIC DIDILLON

TATA STEEL MINERALS CANADA
 1000, RUE SHERBROOKE OUEST
 BUREAU 1120
 MONTRÉAL, PQ
 CANADA H3A 3G4

Your P.O. #: 2200000001
 Your Project #: QUARTERLY SURFACE WATER
 Site Location: DSO-TIMM
 Your C.O.C. #: c#792760, c#79276-04-01

Report Date: 2013/06/18

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B332609

Received: 2013/06/11, 14:00

Sample Matrix: WATER

Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Primary reference
Total Alkalinity (pH end point 4.5)	6	N/A	2013/06/12	STL SOP-00038	SM 2320B
Anions	6	N/A	2013/06/14	STL SOP-00014	MA. 300 - Ions 1.3
Real Color	6	N/A	2013/06/11	STL SOP-00046	MA. 103 - Col. 2.0
Total Suspended Solids	6	2013/06/13	2013/06/13	STL SOP-00015	MA. 104 - S.S. 1.1
Acid Soluble Metals by ICP-MS	2	2013/06/17	2013/06/17	STL SOP-00006	MA.200- Mét 1.2
Dissolved Metals by ICP-MS (Low Level)	4	2013/06/14	2013/06/14	STL SOP-00006	MA.200- Mét 1.2
Ammonia Nitrogen	6	N/A	2013/06/14	STL SOP-00040	MA. 300 - N 1.1
pH	6	N/A	2013/06/12	STL SOP-00038	MA.100- pH1.1
Sulfides (S2-)	6	2013/06/17	2013/06/17	STL SOP-00005	MA. 300-S 1.1
Total Petroleum Hydrocarbons	2	2013/06/13	2013/06/14	STL SOP-00125	MA. 408 - IdePet 1.0

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Lorena Di Benedetto, B.Sc., Chemist, Project Manager Supervisor
 Email: LDibenedetto@maxxam.ca
 Phone# (514) 448-9001 Ext:4262

=====
 Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B332609
 Report Date: 2013/06/18

TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY SURFACE WATER
 Site Location: DSO-TIMM
 Your P.O. #: 2200000001

HYDROCARBONS BY GCFID (WATER)

Maxxam ID		U77062	U77063		
Sampling Date		2013/06/09	2013/06/09		
COC Number		c#79276-04-01	c#79276-04-01		
	Units	COA-SW3	COA-SW10	RDL	QC Batch

PETROLEUM HYDROCARBONS					
Tot Petroleum Hydrocarbons(C6-C36)	ug/L	<100	<100	100	1164083
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

Maxxam Job #: B332609
Report Date: 2013/06/18

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY SURFACE WATER
Site Location: DSO-TIMM
Your P.O. #: 2200000001

DISSOLVED METALS (WATER)

Maxxam ID		U77061	U77061	U77062	U77064	U77066		
Sampling Date		2013/06/09	2013/06/09	2013/06/09	2013/06/09	2013/06/09		
COC Number		c#79276-04-01	c#79276-04-01	c#79276-04-01	c#79276-04-01	c#79276-04-01		
	Units	COA-SW4	COA-SW4 Lab-Dup	COA-SW3	COA-SW9	COA-SW13	RDL	QC Batch

METALS ICP-MS								
Aluminum (Al)	ug/L	<10	39	36	75	17	10	1164247
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1164247
Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	1164247
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1164247
Barium (Ba)	ug/L	<2.0	<2.0	7.0	<2.0	<2.0	2.0	1164247
Beryllium (Be)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	1164247
Bismuth (Bi)	ug/L	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	1164247
Boron (B)	ug/L	<20	<20	<20	<20	<20	20	1164247
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	1164247
Calcium (Ca)	ug/L	1800	1700	1700	<300	<300	300	1164247
Chromium (Cr)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	1164247
Cobalt (Co)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	1164247
Copper (Cu)	ug/L	1.5	<0.50	<0.50	<0.50	<0.50	0.50	1164247
Tin (Sn)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1164247
Iron (Fe)	ug/L	<100	<100	<100	130	140	100	1164247
Magnesium (Mg)	ug/L	1200	1200	1300	<100	200	100	1164247
Manganese (Mn)	ug/L	12	12	15	20	22	0.40	1164247
Molybdenum (Mo)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	1164247
Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1164247
Lead (Pb)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	1164247
Potassium (K)	ug/L	<100	<100	300	<100	<100	100	1164247
Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1164247
Strontium (Sr)	ug/L	6.2	6.1	5.5	<2.0	2.1	2.0	1164247
Sodium (Na)	ug/L	750	740	490	<100	390	100	1164247
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1164247
Titanium (Ti)	ug/L	<10	<10	<10	<10	<10	10	1164247
Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1164247
Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	1164247

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B332609
 Report Date: 2013/06/18

TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY SURFACE WATER
 Site Location: DSO-TIMM
 Your P.O. #: 2200000001

ACID SOLUBLE METALS (WATER)

Maxxam ID		U77063	U77065		
Sampling Date		2013/06/09	2013/06/09		
COC Number		c#79276-04-01	c#79276-04-01		
	Units	COA-SW10	COA-SW11	RDL	QC Batch

METALS					
Antimony (Sb)	ug/L	<1.0	<1.0	1.0	1164916
Arsenic (As)	ug/L	<1.0	<1.0	1.0	1164916
Barium (Ba)	ug/L	15	10	2.0	1164916
Boron (B)	ug/L	<20	<20	20	1164916
Cadmium (Cd)	ug/L	<0.20	<0.20	0.20	1164916
Chromium (Cr)	ug/L	1.3	<0.50	0.50	1164916
Copper (Cu)	ug/L	3.7	0.55	0.50	1164916
Iron (Fe)	ug/L	770	<100	100	1164916
Lead (Pb)	ug/L	1.3	0.14	0.10	1164916
Selenium (Se)	ug/L	<1.0	<1.0	1.0	1164916

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B332609
Report Date: 2013/06/18

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY SURFACE WATER
Site Location: DSO-TIMM
Your P.O. #: 2200000001

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		U77061	U77062		U77063		U77064		
Sampling Date		2013/06/09	2013/06/09		2013/06/09		2013/06/09		
COC Number		c#79276-04-01	c#79276-04-01		c#79276-04-01		c#79276-04-01		
	Units	COA-SW4	COA-SW3	RDL	COA-SW10	RDL	COA-SW9	RDL	QC Batch

CONVENTIONALS									
Nitrogen ammonia (N-NH3)	mg/L	<0.02	<0.02	0.02	0.04	0.02	0.02	0.02	1164241
pH	pH	6.56	6.85	N/A	6.13	N/A	5.75	N/A	1162363
Real Color	UCV	4	8	2	330	10	20	2	1162353
Sulfides (S2-)	mg/L	<0.02	<0.02	0.02	<0.1	0.1	<0.02	0.02	1164966
Alkalinity Total (as CaCO3) pH 4.5	mg/L	5	8	1	1	1	<1	1	1162367
Bicarbonates (HCO3 as CaCO3)	mg/L	5	8	1	1	1	<1	1	1162367
Carbonate (CO3 as CaCO3)	mg/L	<1	<1	1	<1	1	<1	1	1162367
Chloride (Cl)	mg/L	1.1	0.32	0.05	0.17	0.05	0.06	0.05	1164313
Nitrate (N) and Nitrite(N)	mg/L	0.84	0.21	0.02	0.09	0.02	<0.02	0.02	1164313
Sulfates (SO4)	mg/L	1.3	1.6	0.5	0.7	0.5	<0.5	0.5	1164313
Total suspended solids (TSS)	mg/L	3	<2	2	23	10	2	2	1163781

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B332609
Report Date: 2013/06/18

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY SURFACE WATER
Site Location: DSO-TIMM
Your P.O. #: 2200000001

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		U77064	U77065	U77066		
Sampling Date		2013/06/09	2013/06/09	2013/06/09		
COC Number		c#79276-04-01	c#79276-04-01	c#79276-04-01		
	Units	COA-SW9 Lab-Dup	COA-SW11	COA-SW13	RDL	QC Batch

CONVENTIONALS						
Nitrogen ammonia (N-NH3)	mg/L	N/A	<0.02	<0.02	0.02	1164241
pH	pH	N/A	6.89	6.38	N/A	1162363
Real Color	UCV	N/A	8	6	2	1162353
Sulfides (S2-)	mg/L	<0.02	<0.02	<0.02	0.02	1164966
Alkalinity Total (as CaCO3) pH 4.5	mg/L	N/A	7	2	1	1162367
Bicarbonates (HCO3 as CaCO3)	mg/L	N/A	7	2	1	1162367
Carbonate (CO3 as CaCO3)	mg/L	N/A	<1	<1	1	1162367
Chloride (Cl)	mg/L	N/A	0.39	0.07	0.05	1164313
Nitrate (N) and Nitrite(N)	mg/L	N/A	0.25	<0.02	0.02	1164313
Sulfates (SO4)	mg/L	N/A	2.1	<0.5	0.5	1164313
Total suspended solids (TSS)	mg/L	N/A	18	<2	2	1163781

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B332609
Report Date: 2013/06/18

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY SURFACE WATER
Site Location: DSO-TIMM
Your P.O. #: 2200000001

Qualitative Interpretation for
Tot Petroleum Hydrocarbons(C6-C36)

Sample	Qualitative Interpretation
COA-SW3	No chromatographic hydrocarbon profile is present.
COA-SW10	No chromatographic hydrocarbon profile is present.

Maxxam Job #: B332609
Report Date: 2013/06/18

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY SURFACE WATER
Site Location: DSO-TIMM
Your P.O. #: 2200000001

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD except for the following:

pH: Holding time already past.: U77061, U77062, U77063, U77064, U77065, U77066

HYDROCARBONS BY GCFID (WATER)

Please note that the results have not been corrected for QC recoveries (spiked blank). Please note that the results have been corrected for the instrument blank.

DISSOLVED METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

ACID SOLUBLE METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

Holding time not respected for pH analysis.

Reported detection limits are multiplied by dilution factors used for sample analysis.

Results relate only to the items tested.

TATA STEEL MINERALS CANADA
 Attention: LOIC DIDILLON
 Client Project #: QUARTERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: DSO-TIMM

Quality Assurance Report

Maxxam Job Number: B332609

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units
1162353 VK1	QC Standard	Real Color	2013/06/11		106	%
	Method Blank	Real Color	2013/06/11	<2		UCV
1162363 AL8	Spiked Blank	pH	2013/06/12		102	%
1162367 AL8	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2013/06/12		99	%
	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2013/06/12	<1		mg/L
		Bicarbonates (HCO3 as CaCO3)	2013/06/12	<1		mg/L
		Carbonate (CO3 as CaCO3)	2013/06/12	<1		mg/L
1163781 RD2	Spiked Blank	Total suspended solids (TSS)	2013/06/13		96	%
	Spiked Blank DUP	Total suspended solids (TSS)	2013/06/13		95	%
	Method Blank	Total suspended solids (TSS)	2013/06/13	<2		mg/L
1164083 AS2	Spiked Blank	Tot Petroleum Hydrocarbons(C6-C36)	2013/06/14		92	%
	Method Blank	Tot Petroleum Hydrocarbons(C6-C36)	2013/06/14	<100		ug/L
1164241 DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2013/06/14		104	%
	Method Blank	Nitrogen ammonia (N-NH3)	2013/06/14	<0.02		mg/L
1164247 KQ	Spiked Blank	Aluminum (Al)	2013/06/14		105	%
		Antimony (Sb)	2013/06/14		110	%
		Silver (Ag)	2013/06/14		97	%
		Arsenic (As)	2013/06/14		100	%
		Barium (Ba)	2013/06/14		98	%
		Beryllium (Be)	2013/06/14		92	%
		Bismuth (Bi)	2013/06/14		101	%
		Boron (B)	2013/06/14		94	%
		Cadmium (Cd)	2013/06/14		101	%
		Calcium (Ca)	2013/06/14		98	%
		Chromium (Cr)	2013/06/14		95	%
		Cobalt (Co)	2013/06/14		93	%
		Copper (Cu)	2013/06/14		96	%
		Tin (Sn)	2013/06/14		109	%
		Iron (Fe)	2013/06/14		99	%
		Magnesium (Mg)	2013/06/14		98	%
		Manganese (Mn)	2013/06/14		99	%
		Molybdenum (Mo)	2013/06/14		102	%
		Nickel (Ni)	2013/06/14		95	%
		Lead (Pb)	2013/06/14		99	%
		Potassium (K)	2013/06/14		97	%
		Selenium (Se)	2013/06/14		95	%
		Strontium (Sr)	2013/06/14		100	%
		Sodium (Na)	2013/06/14		98	%
		Thallium (Tl)	2013/06/14		101	%
		Titanium (Ti)	2013/06/14		97	%
		Vanadium (V)	2013/06/14		94	%
		Zinc (Zn)	2013/06/14		97	%
	Method Blank	Aluminum (Al)	2013/06/14	<10		ug/L
		Antimony (Sb)	2013/06/14	<1.0		ug/L
		Silver (Ag)	2013/06/14	0.19, RDL=0.10		ug/L
		Arsenic (As)	2013/06/14	<1.0		ug/L
		Barium (Ba)	2013/06/14	<2.0		ug/L
		Beryllium (Be)	2013/06/14	<0.50		ug/L
		Bismuth (Bi)	2013/06/14	<0.25		ug/L
		Boron (B)	2013/06/14	<20		ug/L
		Cadmium (Cd)	2013/06/14	<0.20		ug/L
		Calcium (Ca)	2013/06/14	<300		ug/L
		Chromium (Cr)	2013/06/14	<0.50		ug/L
		Cobalt (Co)	2013/06/14	<0.50		ug/L
		Copper (Cu)	2013/06/14	<0.50		ug/L

TATA STEEL MINERALS CANADA
 Attention: LOIC DIDILLON
 Client Project #: QUARTERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: DSO-TIMM

Quality Assurance Report (Continued)

Maxxam Job Number: B332609

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units
1164247 KQ	Method Blank	Tin (Sn)	2013/06/14	<1.0		ug/L
		Iron (Fe)	2013/06/14	<100		ug/L
		Magnesium (Mg)	2013/06/14	<100		ug/L
		Manganese (Mn)	2013/06/14	<0.40		ug/L
		Molybdenum (Mo)	2013/06/14	<0.50		ug/L
		Nickel (Ni)	2013/06/14	<1.0		ug/L
		Lead (Pb)	2013/06/14	<0.10		ug/L
		Potassium (K)	2013/06/14	<100		ug/L
		Selenium (Se)	2013/06/14	<1.0		ug/L
		Strontium (Sr)	2013/06/14	<2.0		ug/L
		Sodium (Na)	2013/06/14	<100		ug/L
		Thallium (Tl)	2013/06/14	<2.0		ug/L
		Titanium (Ti)	2013/06/14	<10		ug/L
		Vanadium (V)	2013/06/14	<2.0		ug/L
Zinc (Zn)	2013/06/14	<5.0		ug/L		
1164313 AL8	Spiked Blank	Chloride (Cl)	2013/06/14		99	%
		Nitrate (N) and Nitrite(N)	2013/06/14		98	%
		Sulfates (SO4)	2013/06/14		98	%
	Method Blank	Chloride (Cl)	2013/06/14	<0.05		mg/L
		Nitrate (N) and Nitrite(N)	2013/06/14	<0.02		mg/L
		Sulfates (SO4)	2013/06/14	<0.5		mg/L
1164916 MCA	Spiked Blank	Antimony (Sb)	2013/06/17		110	%
		Arsenic (As)	2013/06/17		102	%
		Barium (Ba)	2013/06/17		98	%
		Boron (B)	2013/06/17		99	%
		Cadmium (Cd)	2013/06/17		102	%
		Chromium (Cr)	2013/06/17		100	%
		Copper (Cu)	2013/06/17		98	%
		Iron (Fe)	2013/06/17		104	%
		Lead (Pb)	2013/06/17		103	%
		Selenium (Se)	2013/06/17		102	%
	Method Blank	Antimony (Sb)	2013/06/17	<1.0		ug/L
		Arsenic (As)	2013/06/17	<1.0		ug/L
		Barium (Ba)	2013/06/17	<2.0		ug/L
		Boron (B)	2013/06/17	<20		ug/L
		Cadmium (Cd)	2013/06/17	<0.20		ug/L
		Chromium (Cr)	2013/06/17	<0.50		ug/L
		Copper (Cu)	2013/06/17	<0.50		ug/L
		Iron (Fe)	2013/06/17	<100		ug/L
		Lead (Pb)	2013/06/17	<0.10		ug/L
		Selenium (Se)	2013/06/17	<1.0		ug/L
1164966 LI	Spiked Blank	Sulfides (S2-)	2013/06/17		99	%
	Method Blank	Sulfides (S2-)	2013/06/17	<0.02		mg/L

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

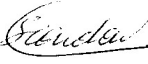

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.



Validation Signature Page

Maxxam Job #: B332609

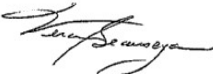

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

 
Abdeslam Siida, Analyst II

 
Delia Barbul, B.Sc., Chemist

 
Kathie Quevillon, B.Sc., Chemist

 
Madina Hamrouni, B.Sc., Chemist

 
Veronic Beausejour, B.Sc., Chemist, Supervisor

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Attention: Natasha Poole

TATA STEEL MINERALS CANADA
 1000, RUE SHERBROOKE OUEST
 BUREAU 1120
 MONTRÉAL, PQ
 CANADA H3A 3G4

Your P.O. #: 2100-00-0001
 Your Project #: Quarterly Surface Water
 Site#: DSO-TIMMINS
 Site Location: TSMC
 Your C.O.C. #: C#792760, C#79276-04-02

Report Date: 2013/06/19

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B332981
Received: 2013/06/12, 14:00

Sample Matrix: SURFACE WATER
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Primary reference
Total Alkalinity (pH end point 4.5)	1	N/A	2013/06/13	STL SOP-00038	SM 2320B
Anions	1	N/A	2013/06/12	STL SOP-00014	MA. 300 - Ions 1.3
Real Color	1	N/A	2013/06/12	STL SOP-00046	MA. 103 - Col. 2.0
Total Suspended Solids	1	2013/06/17	2013/06/17	STL SOP-00015	MA. 104 - S.S. 1.1
Dissolved Metals by ICP-MS (Low Level)	1	2013/06/17	2013/06/18	STL SOP-00006	MA.200- Mét 1.2
Ammonia Nitrogen	1	N/A	2013/06/14	STL SOP-00040	MA. 300 - N 1.1
Nitrate and/or Nitrite	1	N/A	2013/06/12	STL SOP-00014	MA. 300 - Ions 1.3
Dissolved Oxygen	1	N/A	2013/06/13	STL SOP-00008	MA. 315 - DBO 1.1
pH	1	N/A	2013/06/12	STL SOP-00038	MA.100- pH1.1
Sulfides (S2-)	1	2013/06/17	2013/06/17	STL SOP-00005	MA. 300-S 1.1

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Lorena Di Benedetto, B.Sc., Chemist, Project Manager Supervisor
 Email: LDibenedetto@maxxam.ca
 Phone# (514) 448-9001 Ext:4262

=====
 This report has been generated and distributed using a secure automated process.
 Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B332981
Report Date: 2013/06/19

TATA STEEL MINERALS CANADA
Client Project #: Quarterly Surface Water
Site Location: TSMC
Your P.O. #: 2100-00-0001
Sampler Initials: AM

DISSOLVED METALS (SURFACE WATER)

Maxxam ID		U78780		
Sampling Date		2013/06/10		
COC Number		C#79276-04-02		
	Units	COA-SW8	RDL	QC Batch

METALS ICP-MS				
Aluminum (Al)	ug/L	53	10	1165192
Antimony (Sb)	ug/L	<1.0	1.0	1165192
Silver (Ag)	ug/L	<0.10	0.10	1165192
Arsenic (As)	ug/L	<1.0	1.0	1165192
Barium (Ba)	ug/L	<2.0	2.0	1165192
Beryllium (Be)	ug/L	<0.50	0.50	1165192
Bismuth (Bi)	ug/L	<0.25	0.25	1165192
Boron (B)	ug/L	<20	20	1165192
Cadmium (Cd)	ug/L	<0.20	0.20	1165192
Calcium (Ca)	ug/L	<300	300	1165192
Chromium (Cr)	ug/L	0.63	0.50	1165192
Cobalt (Co)	ug/L	<0.50	0.50	1165192
Copper (Cu)	ug/L	<0.50	0.50	1165192
Tin (Sn)	ug/L	<1.0	1.0	1165192
Iron (Fe)	ug/L	<100	100	1165192
Magnesium (Mg)	ug/L	170	100	1165192
Manganese (Mn)	ug/L	4.7	0.40	1165192
Molybdenum (Mo)	ug/L	<0.50	0.50	1165192
Nickel (Ni)	ug/L	<1.0	1.0	1165192
Lead (Pb)	ug/L	<0.10	0.10	1165192
Potassium (K)	ug/L	<100	100	1165192
Selenium (Se)	ug/L	<1.0	1.0	1165192
Strontium (Sr)	ug/L	<2.0	2.0	1165192
Sodium (Na)	ug/L	390	100	1165192
Thallium (Tl)	ug/L	<2.0	2.0	1165192
Titanium (Ti)	ug/L	<10	10	1165192
Vanadium (V)	ug/L	<2.0	2.0	1165192
Zinc (Zn)	ug/L	<5.0	5.0	1165192

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B332981
 Report Date: 2013/06/19

TATA STEEL MINERALS CANADA
 Client Project #: Quarterly Surface Water
 Site Location: TSMC
 Your P.O. #: 2100-00-0001
 Sampler Initials: AM

CONVENTIONAL PARAMETERS (SURFACE WATER)

Maxxam ID		U78780		
Sampling Date		2013/06/10		
COC Number		C#79276-04-02		
	Units	COA-SW8	RDL	QC Batch

CONVENTIONALS				
Dissolved oxygen	mg/L	9.6	1.0	1163944
Nitrate (N) and Nitrite(N)	mg/L	<0.02	0.02	1163058
Nitrates (N-NO3-)	mg/L	<0.02	0.02	1163058
Nitrites (N-NO2-)	mg/L	<0.02	0.02	1163058
Nitrogen ammonia (N-NH3)	mg/L	<0.02	0.02	1164250
pH	pH	7.25	N/A	1163061
Real Color	UCV	15	2	1163069
Sulfides (S2-)	mg/L	<0.02	0.02	1165314
Alkalinity Total (as CaCO3) pH 4.5	mg/L	1	1	1163354
Bicarbonates (HCO3 as CaCO3)	mg/L	1	1	1163354
Carbonate (CO3 as CaCO3)	mg/L	<1	1	1163354
Chloride (Cl)	mg/L	<0.05	0.05	1163059
Sulfates (SO4)	mg/L	<0.5	0.5	1163059
Total suspended solids (TSS)	mg/L	2	2	1164872
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

Maxxam Job #: B332981
Report Date: 2013/06/19

TATA STEEL MINERALS CANADA
Client Project #: Quarterly Surface Water
Site Location: TSMC
Your P.O. #: 2100-00-0001
Sampler Initials: AM

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD except for the following:
pH: Holding time already past.: U78780

DISSOLVED METALS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.
Holding time not respected for pH analysis.

Results relate only to the items tested.

TATA STEEL MINERALS CANADA
 Attention: Natasha Poole
 Client Project #: Quarterly Surface Water
 P.O. #: 2100-00-0001
 Site Location: TSMC

Quality Assurance Report

Maxxam Job Number: B332981

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units		
1163058 AL8	Spiked Blank	Nitrate (N) and Nitrite(N)	2013/06/12		104	%		
		Nitrates (N-NO3-)	2013/06/12		107	%		
		Nitrites (N-NO2-)	2013/06/12		100	%		
	Method Blank	Nitrate (N) and Nitrite(N)	2013/06/12	<0.02			mg/L	
		Nitrates (N-NO3-)	2013/06/12	<0.02			mg/L	
		Nitrites (N-NO2-)	2013/06/12	<0.02			mg/L	
1163059 AL8	Spiked Blank	Chloride (Cl)	2013/06/12		104	%		
		Sulfates (SO4)	2013/06/12		105	%		
	Method Blank	Chloride (Cl)	2013/06/12	<0.05			mg/L	
		Sulfates (SO4)	2013/06/12	<0.5			mg/L	
1163061 AL8	Spiked Blank	pH	2013/06/12		102	%		
1163069 LI	QC Standard	Real Color	2013/06/12		103	%		
	Method Blank	Real Color	2013/06/12	<2			UCV	
1163354 MR4	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2013/06/13		99	%		
		Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2013/06/13	<1			mg/L
			Bicarbonates (HCO3 as CaCO3)	2013/06/13	<1			mg/L
			Carbonate (CO3 as CaCO3)	2013/06/13	<1			mg/L
1164250 DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2013/06/14		100	%		
	Method Blank	Nitrogen ammonia (N-NH3)	2013/06/14	<0.02			mg/L	
1164872 RD2	Spiked Blank	Total suspended solids (TSS)	2013/06/17		95	%		
	Spiked Blank DUP	Total suspended solids (TSS)	2013/06/17		95	%		
	Method Blank	Total suspended solids (TSS)	2013/06/17	<2			mg/L	
1165192 MCA	Spiked Blank	Aluminum (Al)	2013/06/18		105	%		
		Antimony (Sb)	2013/06/18		110	%		
		Silver (Ag)	2013/06/18		97	%		
		Arsenic (As)	2013/06/18		103	%		
		Barium (Ba)	2013/06/18		104	%		
		Beryllium (Be)	2013/06/18		99	%		
		Bismuth (Bi)	2013/06/18		104	%		
		Boron (B)	2013/06/18		106	%		
		Cadmium (Cd)	2013/06/18		102	%		
		Calcium (Ca)	2013/06/18		105	%		
		Chromium (Cr)	2013/06/18		103	%		
		Cobalt (Co)	2013/06/18		101	%		
		Copper (Cu)	2013/06/18		99	%		
		Tin (Sn)	2013/06/18		111	%		
		Iron (Fe)	2013/06/18		105	%		
		Magnesium (Mg)	2013/06/18		108	%		
		Manganese (Mn)	2013/06/18		106	%		
		Molybdenum (Mo)	2013/06/18		106	%		
		Nickel (Ni)	2013/06/18		99	%		
		Lead (Pb)	2013/06/18		103	%		
		Potassium (K)	2013/06/18		107	%		
		Selenium (Se)	2013/06/18		101	%		
		Strontium (Sr)	2013/06/18		103	%		
		Sodium (Na)	2013/06/18		112	%		
		Thallium (Tl)	2013/06/18		104	%		
		Titanium (Ti)	2013/06/18		104	%		
		Vanadium (V)	2013/06/18		104	%		
		Zinc (Zn)	2013/06/18		100	%		
		Method Blank	Aluminum (Al)	2013/06/18	<10			ug/L
			Antimony (Sb)	2013/06/18	<1.0			ug/L
			Silver (Ag)	2013/06/18	<0.10			ug/L
			Arsenic (As)	2013/06/18	<1.0			ug/L
			Barium (Ba)	2013/06/18	<2.0			ug/L

TATA STEEL MINERALS CANADA
 Attention: Natasha Poole
 Client Project #: Quarterly Surface Water
 P.O. #: 2100-00-0001
 Site Location: TSMC

Quality Assurance Report (Continued)

Maxxam Job Number: B332981

QA/QC Batch			Date Analyzed			
Num Init	QC Type	Parameter	yyyy/mm/dd	Value	Recovery	Units
1165192 MCA	Method Blank	Beryllium (Be)	2013/06/18	<0.50		ug/L
		Bismuth (Bi)	2013/06/18	<0.25		ug/L
		Boron (B)	2013/06/18	<20		ug/L
		Cadmium (Cd)	2013/06/18	<0.20		ug/L
		Calcium (Ca)	2013/06/18	<300		ug/L
		Chromium (Cr)	2013/06/18	<0.50		ug/L
		Cobalt (Co)	2013/06/18	<0.50		ug/L
		Copper (Cu)	2013/06/18	<0.50		ug/L
		Tin (Sn)	2013/06/18	<1.0		ug/L
		Iron (Fe)	2013/06/18	<100		ug/L
		Magnesium (Mg)	2013/06/18	<100		ug/L
		Manganese (Mn)	2013/06/18	<0.40		ug/L
		Molybdenum (Mo)	2013/06/18	<0.50		ug/L
		Nickel (Ni)	2013/06/18	<1.0		ug/L
		Lead (Pb)	2013/06/18	<0.10		ug/L
		Potassium (K)	2013/06/18	<100		ug/L
		Selenium (Se)	2013/06/18	<1.0		ug/L
		Strontium (Sr)	2013/06/18	<2.0		ug/L
		Sodium (Na)	2013/06/18	<100		ug/L
		Thallium (Tl)	2013/06/18	<2.0		ug/L
Titanium (Ti)	2013/06/18	<10		ug/L		
Vanadium (V)	2013/06/18	<2.0		ug/L		
Zinc (Zn)	2013/06/18	<5.0		ug/L		
1165314 LI	Spiked Blank	Sulfides (S2-)	2013/06/17		98	%
	Method Blank	Sulfides (S2-)	2013/06/17	<0.02		mg/L

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
 Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
 Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.


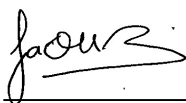
Validation Signature Page

Maxxam Job #: B332981


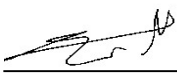
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).




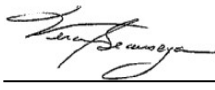
Delia Barbul, B.Sc., Chemist



Faouzi Sarsi, B.Sc. Chemist



Maria Chrifi Alaoui, B.Sc., Chemist



Veronic Beausejour, B.Sc., Chemist, Supervisor

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Attention: LOIC DIDILLON

TATA STEEL MINERALS CANADA
 1000, RUE SHERBROOKE OUEST
 BUREAU 1120
 MONTRÉAL, PQ
 CANADA H3A 3G4

Your P.O. #: 2200000001
 Your Project #: QUATERLY SURFACE WATER
 Site Location: DSO-TIMMINS
 Your C.O.C. #: C#948050, C#94805-01-01

Report Date: 2013/09/17
CERTIFICATE OF ANALYSIS
MAXXAM JOB #: B349869
Received: 2013/08/16, 13:40

Sample Matrix: WATER

Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Primary reference
Total Alkalinity (pH end point 4.5)	8	N/A	2013/08/16	STL SOP-00038	SM 2320B
Anions	8	N/A	2013/08/19	STL SOP-00014	MA. 300 - Ions 1.3
Real Color	8	N/A	2013/08/16	STL SOP-00046	MA. 103 - Col. 2.0
Conductivity	8	N/A	2013/08/16	STL SOP-00038	SM 2510
Dissolved Organic Carbon	3	2013/08/16	2013/08/16	STL SOP-00243	SM 5310B
Total Suspended Solids	8	2013/08/21	2013/08/21	STL SOP-00015	MA. 104 - S.S. 1.1
Total Extractable Metals (Low Level)	8	2013/08/21	2013/08/21	STL SOP-00006	MA.200- Mét 1.2
Ammonia Nitrogen	8	N/A	2013/08/19	STL SOP-00040	MA. 300 - N 1.1
Nitrate and/or Nitrite	8	N/A	2013/08/19	STL SOP-00014	MA. 300 - Ions 1.3
Dissolved Oxygen	8	N/A	2013/08/19	STL SOP-00008	MA. 315 - DBO 1.1
pH	8	N/A	2013/08/16	STL SOP-00038	MA.100- pH1.1
Total Phenols by 4-AAP	8	2013/08/19	2013/08/19	STL SOP-00033	MA.404-I.Phé 2.2
Ortho Phosphate	8	N/A	2013/08/16	STL SOP-00003	SM 4500-P E
Radium 226 (1)	1	N/A	N/A		
Sulfides (S ₂ ⁻)	5	2013/08/21	2013/08/21	STL SOP-00005	MA. 300-S 1.1
Reactive Silica (SiO ₂) (2)	8	N/A	2013/08/20	QUE SOP-00132	HACH, Method 8186
Total Dissolved Solids	8	2013/08/21	2013/08/21	STL SOP-00050	MA. 103 - S.T. 1.0
Turbidity	8	N/A	2013/08/16	STL SOP-00022	MA. 103 - Tur. 1.0

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Multilab Val d'Or

(2) This test was performed by Maxxam - Québec

Attention: LOIC DIDILLON

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Your P.O. #: 2200000001
Your Project #: QUATERLY SURFACE WATER
Site Location: DSO-TIMMINS
Your C.O.C. #: C#948050, C#94805-01-01

Report Date: 2013/09/17

CERTIFICATE OF ANALYSIS

-2-

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Lorena Di Benedetto, B.Sc., Chemist, Project Manager Supervisor
Email: LDibenedetto@maxxam.ca
Phone# (514) 448-9001 Ext:4262

=====
This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B349869
Report Date: 2013/09/17

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY SURFACE WATER
Site Location: DSO-TIMMINS
Your P.O. #: 2200000001
Sampler Initials: JFD

TOTAL EXTRACTABLE METALS (WATER)

Maxxam ID		V54732	V54733	V54734	V54735	V54736		
Sampling Date		2013/08/14	2013/08/14	2013/08/14	2013/08/14	2013/08/14		
COC Number		C#94805-01-01	C#94805-01-01	C#94805-01-01	C#94805-01-01	C#94805-01-01		
	Units	COA-SW3	COA-SW4	COA-SW7	COA-SW8	COA-SW9	RDL	QC Batch

METALS ICP-MS								
Aluminum (Al)	ug/L	62	140	95	92	76	10	1194265
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1194265
Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1194265
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1194265
Barium (Ba)	ug/L	8.2	4.1	8.3	2.6	2.7	2.0	1194265
Beryllium (Be)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1194265
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1194265
Boron (B)	ug/L	<50	<50	<50	<50	<50	50	1194265
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	1194265
Calcium (Ca)	ug/L	1700	1800	1700	<500	<500	500	1194265
Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	1194265
Cobalt (Co)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1194265
Copper (Cu)	ug/L	<1.0	1.3	<1.0	<1.0	1.0	1.0	1194265
Total Hardness (CaCO3)	ug/L	9600	9900	9500	<1000	<1000	1000	1194265
Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1194265
Iron (Fe)	ug/L	160	510	390	220	160	60	1194265
Magnesium (Mg)	ug/L	1300	1300	1300	200	<100	100	1194265
Manganese (Mn)	ug/L	21	30	26	15	33	1.0	1194265
Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1194265
Mercury (Hg)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	1194265
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	3.5	2.0	1194265
Total phosphorous	ug/L	<10	<10	<10	<10	<10	10	1194265
Lead (Pb)	ug/L	<0.50	<0.50	<0.50	4.3	<0.50	0.50	1194265
Potassium (K)	ug/L	<500	<500	<500	<500	<500	500	1194265
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	1194265
Sodium (Na)	ug/L	610	860	660	<500	<500	500	1194265
Strontium (Sr)	ug/L	5.3	6.6	5.7	2.6	<2.0	2.0	1194265
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1194265
Titanium (Ti)	ug/L	<10	<10	<10	<10	<10	10	1194265
Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1194265
Zinc (Zn)	ug/L	<7.0	<7.0	<7.0	<7.0	<7.0	7.0	1194265

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B349869
Report Date: 2013/09/17

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY SURFACE WATER
Site Location: DSO-TIMMINS
Your P.O. #: 2200000001
Sampler Initials: JFD

TOTAL EXTRACTABLE METALS (WATER)

Maxxam ID		V54737	V54738	V54739		
Sampling Date		2013/08/14	2013/08/15	2013/08/14		
COC Number		C#94805-01-01	C#94805-01-01	C#94805-01-01		
	Units	COA-SW10	COA-SW11	COA-SW13	RDL	QC Batch

METALS ICP-MS						
Aluminum (Al)	ug/L	7900	3200	32	10	1194265
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	1.0	1194265
Silver (Ag)	ug/L	<1.0	<1.0	<1.0	1.0	1194265
Arsenic (As)	ug/L	7.1	3.3	<1.0	1.0	1194265
Barium (Ba)	ug/L	45	24	<2.0	2.0	1194265
Beryllium (Be)	ug/L	<2.0	<2.0	<2.0	2.0	1194265
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	1194265
Boron (B)	ug/L	<50	<50	<50	50	1194265
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	0.20	1194265
Calcium (Ca)	ug/L	1800	1500	<500	500	1194265
Chromium (Cr)	ug/L	18	6.2	<5.0	5.0	1194265
Cobalt (Co)	ug/L	5.3	2.0	<1.0	1.0	1194265
Copper (Cu)	ug/L	16	4.7	1.9	1.0	1194265
Total Hardness (CaCO3)	ug/L	16000	9700	<1000	1000	1194265
Tin (Sn)	ug/L	<2.0	<2.0	<2.0	2.0	1194265
Iron (Fe)	ug/L	25000	11000	140	60	1194265
Magnesium (Mg)	ug/L	2900	1400	220	100	1194265
Manganese (Mn)	ug/L	450	210	8.0	1.0	1194265
Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	1194265
Mercury (Hg)	ug/L	0.12	<0.10	<0.10	0.10	1194265
Nickel (Ni)	ug/L	13	3.8	<2.0	2.0	1194265
Total phosphorous	ug/L	200	55	<10	10	1194265
Lead (Pb)	ug/L	4.8	1.5	<0.50	0.50	1194265
Potassium (K)	ug/L	2200	1300	<500	500	1194265
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	3.0	1194265
Sodium (Na)	ug/L	840	1100	540	500	1194265
Strontium (Sr)	ug/L	10	7.8	2.1	2.0	1194265
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	2.0	1194265
Titanium (Ti)	ug/L	240	85	<10	10	1194265
Vanadium (V)	ug/L	17	7.6	2.3	2.0	1194265
Zinc (Zn)	ug/L	38	43	<7.0	7.0	1194265

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B349869
 Report Date: 2013/09/17

 TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY SURFACE WATER
 Site Location: DSO-TIMMINS
 Your P.O. #: 2200000001
 Sampler Initials: JFD

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		V54732	V54732		V54733		
Sampling Date		2013/08/14	2013/08/14		2013/08/14		
COC Number		C#94805-01-01	C#94805-01-01		C#94805-01-01		
	Units	COA-SW3	COA-SW3 Lab-Dup	QC Batch	COA-SW4	RDL	QC Batch

CONVENTIONALS							
Conductivity	mS/cm	0.023	N/A	1192820	0.025	0.001	1192820
Dissolved organic carbon	mg/L	0.7	N/A	1192816	N/A	0.2	N/A
Dissolved oxygen	mg/L	7.1	N/A	1193091	7.1	1.0	1193091
Nitrate (N) and Nitrite(N)	mg/L	0.22	N/A	1192737	0.89	0.02	1192737
Nitrates (N-NO3-)	mg/L	0.22	N/A	1192737	0.89	0.02	1192737
Nitrites (N-NO2-)	mg/L	<0.02	N/A	1192737	<0.02	0.02	1192737
Nitrogen ammonia (N-NH3)	mg/L	<0.02	<0.02	1193071	<0.02	0.02	1193071
Orthophosphate (P)	mg/L	<0.05	N/A	1192815	<0.05	0.05	1192815
pH	pH	7.95	N/A	1192819	7.27	N/A	1192819
Phenols-4AAP	mg/L	<0.002	<0.002	1192992	<0.002	0.002	1192992
Reactive silica (SiO2)	mg/L	2.5	N/A	1193945	3.7	0.1	1193945
Real Color	UCV	7	N/A	1192826	12	2	1192826
Sulfides (S2-)	mg/L	<0.02	N/A	1194576	<0.02	0.02	1194576
Turbidity	NTU	20	N/A	1192828	56	0.1	1192734
Alkalinity Total (as CaCO3) pH 4.5	mg/L	12	N/A	1192821	6	1	1192821
Bicarbonates (HCO3 as CaCO3)	mg/L	12	N/A	1192821	6	1	1192821
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	1192821	<1	1	1192821
Chloride (Cl)	mg/L	0.32	N/A	1192745	1.1	0.05	1192745
Sulfates (SO4)	mg/L	1.7	N/A	1192745	1.3	0.5	1192745
Total Dissolved Solids	mg/L	<10	N/A	1194361	12	10	1194361
Total suspended solids (TSS)	mg/L	9	N/A	1194351	15	2	1194351

N/A = Not Applicable
 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B349869
 Report Date: 2013/09/17

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY SURFACE WATER
 Site Location: DSO-TIMMINS
 Your P.O. #: 2200000001
 Sampler Initials: JFD

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		V54734		V54735	V54736	V54736		
Sampling Date		2013/08/14		2013/08/14	2013/08/14	2013/08/14		
COC Number		C#94805-01-01		C#94805-01-01	C#94805-01-01	C#94805-01-01		
	Units	COA-SW7	RDL	COA-SW8	COA-SW9	COA-SW9 Lab-Dup	RDL	QC Batch

CONVENTIONALS								
Conductivity	mS/cm	0.022	0.001	0.004	0.003	N/A	0.001	1192820
Dissolved organic carbon	mg/L	0.8	0.2	6	N/A	N/A	1	1192816
Dissolved oxygen	mg/L	6.4	1.0	6.7	6.3	N/A	1.0	1193091
Nitrate (N) and Nitrite(N)	mg/L	0.25	0.02	<0.02	<0.02	N/A	0.02	1192737
Nitrates (N-NO3-)	mg/L	0.25	0.02	<0.02	<0.02	N/A	0.02	1192737
Nitrites (N-NO2-)	mg/L	<0.02	0.02	<0.02	<0.02	N/A	0.02	1192737
Nitrogen ammonia (N-NH3)	mg/L	<0.02	0.02	<0.02	<0.02	<0.02	0.02	1193071
Orthophosphate (P)	mg/L	<0.05	0.05	<0.05	<0.05	N/A	0.05	1192815
pH	pH	7.11	N/A	6.25	5.87	N/A	N/A	1192819
Phenols-4AAP	mg/L	<0.002	0.002	<0.002	<0.002	N/A	0.002	1192992
Reactive silica (SiO2)	mg/L	2.7	0.1	2.7	0.7	N/A	0.1	1193945
Real Color	UCV	8	2	27	12	N/A	2	1192826
Sulfides (S2-)	mg/L	<0.02	0.02	<0.02	N/A	N/A	0.02	1194425
Turbidity	NTU	23	0.1	3.6	1.5	N/A	0.1	1192828
Alkalinity Total (as CaCO3) pH 4.5	mg/L	13	1	2	<1	N/A	1	1192821
Bicarbonates (HCO3 as CaCO3)	mg/L	13	1	2	<1	N/A	1	1192821
Carbonate (CO3 as CaCO3)	mg/L	<1	1	<1	<1	N/A	1	1192821
Chloride (Cl)	mg/L	0.36	0.05	0.10	<0.05	N/A	0.05	1192745
Sulfates (SO4)	mg/L	1.7	0.5	<0.5	0.9	N/A	0.5	1192745
Total Dissolved Solids	mg/L	<10	10	15	<10	N/A	10	1194361
Total suspended solids (TSS)	mg/L	26	2	5	7	N/A	2	1194351

N/A = Not Applicable
 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B349869
 Report Date: 2013/09/17

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY SURFACE WATER
 Site Location: DSO-TIMMINS
 Your P.O. #: 2200000001
 Sampler Initials: JFD

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		V54737			V54738		
Sampling Date		2013/08/14			2013/08/15		
COC Number		C#94805-01-01			C#94805-01-01		
	Units	COA-SW10	RDL	QC Batch	COA-SW11	RDL	QC Batch

CONVENTIONALS							
Conductivity	mS/cm	0.018	0.001	1192820	0.020	0.001	1192820
Dissolved oxygen	mg/L	5.9	1.0	1193091	6.9	1.0	1193091
Nitrate (N) and Nitrite(N)	mg/L	0.50	0.02	1192737	0.64	0.02	1192737
Nitrates (N-NO3-)	mg/L	0.50	0.02	1192737	0.64	0.02	1192737
Nitrites (N-NO2-)	mg/L	<0.02	0.02	1192737	<0.02	0.02	1192737
Nitrogen ammonia (N-NH3)	mg/L	0.04	0.02	1193071	0.02	0.02	1193071
Orthophosphate (P)	mg/L	<0.05	0.05	1192815	<0.05	0.05	1192815
pH	pH	6.66	N/A	1192819	6.83	N/A	1192819
Phenols-4AAP	mg/L	<0.002	0.002	1192992	<0.002	0.002	1192992
Reactive silica (SiO2)	mg/L	4.8	0.1	1193945	4.8	0.1	1193945
Real Color	UCV	240	2	1192826	120	10	1192826
Sulfides (S2-)	mg/L	<0.02	0.02	1194576	N/A	N/A	N/A
Turbidity	NTU	1200	0.1	1192828	510	0.1	1192734
Alkalinity Total (as CaCO3) pH 4.5	mg/L	5	1	1192821	6	1	1192821
Bicarbonates (HCO3 as CaCO3)	mg/L	5	1	1192821	6	1	1192821
Carbonate (CO3 as CaCO3)	mg/L	<1	1	1192821	<1	1	1192821
Chloride (Cl)	mg/L	0.17	0.05	1192745	0.60	0.05	1192745
Sulfates (SO4)	mg/L	1.3	0.5	1192745	1.0	0.5	1192745
Total Dissolved Solids	mg/L	310	10	1194361	76	10	1194361
Total suspended solids (TSS)	mg/L	51	2	1194351	30	2	1194351

N/A = Not Applicable
 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B349869
Report Date: 2013/09/17

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY SURFACE WATER
Site Location: DSO-TIMMINS
Your P.O. #: 2200000001
Sampler Initials: JFD

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		V54739	V54739		
Sampling Date		2013/08/14	2013/08/14		
COC Number		C#94805-01-01	C#94805-01-01		
	Units	COA-SW13	COA-SW13 Lab-Dup	RDL	QC Batch

CONVENTIONALS					
Conductivity	mS/cm	0.004	N/A	0.001	1192820
Dissolved oxygen	mg/L	6.3	N/A	1.0	1193091
Nitrate (N) and Nitrite(N)	mg/L	<0.02	N/A	0.02	1192737
Nitrates (N-NO3-)	mg/L	<0.02	N/A	0.02	1192737
Nitrites (N-NO2-)	mg/L	<0.02	N/A	0.02	1192737
Nitrogen ammonia (N-NH3)	mg/L	<0.02	N/A	0.02	1193071
Orthophosphate (P)	mg/L	<0.05	N/A	0.05	1192815
pH	pH	6.38	N/A	N/A	1192819
Phenols-4AAP	mg/L	<0.002	N/A	0.002	1192992
Reactive silica (SiO2)	mg/L	2.4	N/A	0.1	1193945
Real Color	UCV	11	N/A	2	1192826
Turbidity	NTU	1.3	N/A	0.1	1192828
Alkalinity Total (as CaCO3) pH 4.5	mg/L	2	N/A	1	1192821
Bicarbonates (HCO3 as CaCO3)	mg/L	2	N/A	1	1192821
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	1	1192821
Chloride (Cl)	mg/L	0.08	N/A	0.05	1192745
Sulfates (SO4)	mg/L	<0.5	N/A	0.5	1192745
Total Dissolved Solids	mg/L	11	<10	10	1194361
Total suspended solids (TSS)	mg/L	3	3	2	1194351
N/A = Not Applicable RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

Maxxam Job #: B349869
Report Date: 2013/09/17

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY SURFACE WATER
Site Location: DSO-TIMMINS
Your P.O. #: 2200000001
Sampler Initials: JFD

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD except for the following:

Dissolved Oxygen: Holding time already past.: V54732, V54733, V54734, V54735, V54736, V54737, V54739

pH: Holding time already past.: V54732, V54733, V54734, V54735, V54736, V54737, V54739

TOTAL EXTRACTABLE METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

Holding time not respected for pH analysis.

Reported detection limits are multiplied by dilution factors used for sample analysis.

Results relate only to the items tested.

TATA STEEL MINERALS CANADA
 Attention: LOIC DIDILLON
 Client Project #: QUATERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: DSO-TIMMINS

Quality Assurance Report

Maxxam Job Number: B349869

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units
1192734 WO1	QC Standard	Turbidity	2013/08/16		99	%
	Method Blank	Turbidity	2013/08/16	0.1, RDL=0.1		NTU
1192737 AL8	Spiked Blank	Nitrate (N) and Nitrite(N)	2013/08/16		99	%
		Nitrates (N-NO3-)	2013/08/16		104	%
		Nitrites (N-NO2-)	2013/08/16		94	%
	Method Blank	Nitrate (N) and Nitrite(N)	2013/08/16	<0.02		mg/L
		Nitrates (N-NO3-)	2013/08/16	<0.02		mg/L
		Nitrites (N-NO2-)	2013/08/16	<0.02		mg/L
1192745 AL8	Spiked Blank	Chloride (Cl)	2013/08/16		97	%
		Sulfates (SO4)	2013/08/16		101	%
	Method Blank	Chloride (Cl)	2013/08/16	<0.05		mg/L
		Sulfates (SO4)	2013/08/16	<0.5		mg/L
1192815 AL8	Spiked Blank	Orthophosphate (P)	2013/08/16		100	%
	Method Blank	Orthophosphate (P)	2013/08/16	<0.05		mg/L
1192816 AL8	QC Standard	Dissolved organic carbon	2013/08/16		106	%
	Spiked Blank	Dissolved organic carbon	2013/08/16		106	%
	Method Blank	Dissolved organic carbon	2013/08/16	<0.2		mg/L
1192819 AL8	Spiked Blank	pH	2013/08/16		102	%
1192820 AL8	Spiked Blank	Conductivity	2013/08/16		101	%
	Method Blank	Conductivity	2013/08/16	<0.001		mS/cm
1192821 AL8	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2013/08/16		103	%
	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2013/08/16	<1		mg/L
		Bicarbonates (HCO3 as CaCO3)	2013/08/16	<1		mg/L
		Carbonate (CO3 as CaCO3)	2013/08/16	<1		mg/L
1192826 JE1	QC Standard	Real Color	2013/08/16		104	%
	Method Blank	Real Color	2013/08/16	<2		UCV
1192828 LI	QC Standard	Turbidity	2013/08/16		100	%
	Method Blank	Turbidity	2013/08/16	<0.1		NTU
1192992 CC6	QC Standard	Phenols-4AAP	2013/08/19		86	%
	Spiked Blank	Phenols-4AAP	2013/08/19		98	%
	Method Blank	Phenols-4AAP	2013/08/19	<0.002		mg/L
1193071 DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2013/08/19		108	%
	Method Blank	Nitrogen ammonia (N-NH3)	2013/08/19	<0.02		mg/L
1193945 MT9	QC Standard	Reactive silica (SiO2)	2013/08/20		94	%
	Method Blank	Reactive silica (SiO2)	2013/08/20	<0.1		mg/L
1194265 JF1	Spiked Blank	Aluminum (Al)	2013/08/21		98	%
		Antimony (Sb)	2013/08/21		105	%
		Silver (Ag)	2013/08/21		96	%
		Arsenic (As)	2013/08/21		99	%
		Barium (Ba)	2013/08/21		97	%
		Beryllium (Be)	2013/08/21		100	%
		Bismuth (Bi)	2013/08/21		97	%
		Boron (B)	2013/08/21		105	%
		Cadmium (Cd)	2013/08/21		96	%
		Calcium (Ca)	2013/08/21		97	%
		Chromium (Cr)	2013/08/21		95	%
		Cobalt (Co)	2013/08/21		91	%
		Copper (Cu)	2013/08/21		90	%
		Tin (Sn)	2013/08/21		103	%
		Iron (Fe)	2013/08/21		98	%
		Magnesium (Mg)	2013/08/21		99	%
		Manganese (Mn)	2013/08/21		100	%
		Molybdenum (Mo)	2013/08/21		102	%
		Mercury (Hg)	2013/08/21		111	%
		Nickel (Ni)	2013/08/21		91	%

TATA STEEL MINERALS CANADA
 Attention: LOIC DIDILLON
 Client Project #: QUATERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: DSO-TIMMINS

Quality Assurance Report (Continued)

Maxxam Job Number: B349869

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units
1194265 JF1	Spiked Blank	Total phosphorous	2013/08/21		97	%
		Lead (Pb)	2013/08/21		96	%
		Potassium (K)	2013/08/21		99	%
		Selenium (Se)	2013/08/21		96	%
		Sodium (Na)	2013/08/21		106	%
		Strontium (Sr)	2013/08/21		98	%
		Thallium (Tl)	2013/08/21		96	%
		Titanium (Ti)	2013/08/21		99	%
		Vanadium (V)	2013/08/21		98	%
		Zinc (Zn)	2013/08/21		94	%
	Method Blank	Aluminum (Al)	2013/08/21	<10		ug/L
		Antimony (Sb)	2013/08/21	<1.0		ug/L
		Silver (Ag)	2013/08/21	<1.0		ug/L
		Arsenic (As)	2013/08/21	<1.0		ug/L
		Barium (Ba)	2013/08/21	<2.0		ug/L
		Beryllium (Be)	2013/08/21	<2.0		ug/L
		Bismuth (Bi)	2013/08/21	<1.0		ug/L
		Boron (B)	2013/08/21	<50		ug/L
		Cadmium (Cd)	2013/08/21	<0.20		ug/L
		Calcium (Ca)	2013/08/21	<500		ug/L
		Chromium (Cr)	2013/08/21	<5.0		ug/L
		Cobalt (Co)	2013/08/21	<1.0		ug/L
		Copper (Cu)	2013/08/21	<1.0		ug/L
		Total Hardness (CaCO ₃)	2013/08/21	<1000		ug/L
		Tin (Sn)	2013/08/21	<2.0		ug/L
		Iron (Fe)	2013/08/21	<60		ug/L
		Magnesium (Mg)	2013/08/21	<100		ug/L
		Manganese (Mn)	2013/08/21	<1.0		ug/L
		Molybdenum (Mo)	2013/08/21	<1.0		ug/L
		Mercury (Hg)	2013/08/21	<0.10		ug/L
		Nickel (Ni)	2013/08/21	<2.0		ug/L
		Total phosphorous	2013/08/21	<10		ug/L
		Lead (Pb)	2013/08/21	<0.50		ug/L
		Potassium (K)	2013/08/21	<500		ug/L
		Selenium (Se)	2013/08/21	<3.0		ug/L
		Sodium (Na)	2013/08/21	<500		ug/L
		Strontium (Sr)	2013/08/21	<2.0		ug/L
		Thallium (Tl)	2013/08/21	<2.0		ug/L
		Titanium (Ti)	2013/08/21	<10		ug/L
		Vanadium (V)	2013/08/21	2.3, RDL=2.0		ug/L
		Zinc (Zn)	2013/08/21	<7.0		ug/L
1194351 FSI	Spiked Blank	Total suspended solids (TSS)	2013/08/21		100	%
	Spiked Blank DUP	Total suspended solids (TSS)	2013/08/21		98	%
	Method Blank	Total suspended solids (TSS)	2013/08/21	<2		mg/L
1194361 FSI	Spiked Blank	Total Dissolved Solids	2013/08/21		99	%
	Spiked Blank DUP	Total Dissolved Solids	2013/08/21		99	%
	Method Blank	Total Dissolved Solids	2013/08/21	<10		mg/L
1194425 RC6	Spiked Blank	Sulfides (S ₂ -)	2013/08/21		90	%
	Method Blank	Sulfides (S ₂ -)	2013/08/21	<0.02		mg/L
1194576 RC6	Spiked Blank	Sulfides (S ₂ -)	2013/08/21		91	%
	Method Blank	Sulfides (S ₂ -)	2013/08/21	<0.02		mg/L

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to

TATA STEEL MINERALS CANADA
Attention: LOIC DIDILLON
Client Project #: QUATERLY SURFACE WATER
P.O. #: 2200000001
Site Location: DSO-TIMMINS

Quality Assurance Report (Continued)

Maxxam Job Number: B349869

evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.



Validation Signature Page

Maxxam Job #: B349869

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Delia Barbul, B.Sc., Chemist

Kathie Quevillon, B.Sc., Chemist

Miryam Assayag

Madina Hamrouni, B.Sc., Chemist

Mathieu Letourneau, B.Sc., chimist

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Attention: Natasha Poole

TATA STEEL MINERALS CANADA
Schefferville
85 Atlantic Street
Schefferville, PQ
CANADA G0G2T0

Your P.O. #: 2200000001
Your Project #: QUATERLY SURFACE WATER
Site#: DSO-TIMMINS
Site Location: TSMC
Your C.O.C. #: C#972130, C#97213-01-01

Report Date: 2013/10/18

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B364381
Received: 2013/10/10, 13:20

Sample Matrix: SURFACE WATER
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Primary Reference
Total Alkalinity (pH end point 4.5)	7	N/A	2013/10/11	STL SOP-00038	SM 2320B
Anions	7	N/A	2013/10/11	STL SOP-00014	MA. 300 - Ions 1.3
Real Color	7	N/A	2013/10/10	STL SOP-00046	MA. 103 - Col. 2.0
Conductivity	7	N/A	2013/10/11	STL SOP-00038	SM 2510
Dissolved Organic Carbon (2)	3	2013/10/10	2013/10/11	STL SOP-00243	SM 5310B
Dissolved Organic Carbon (2)	4	2013/10/11	2013/10/11	STL SOP-00243	SM 5310B
Total Extractable Metals (Low Level)	5	2013/10/15	2013/10/16	STL SOP-00006	MA.200- Mét 1.2
Total Extractable Metals (Low Level)	2	2013/10/17	2013/10/18	STL SOP-00006	MA.200- Mét 1.2
Ammonia Nitrogen	7	N/A	2013/10/15	STL SOP-00040	MA. 300 - N 2.0
Nitrate and/or Nitrite	7	N/A	2013/10/11	STL SOP-00014	MA. 300 - Ions 1.3
pH	7	N/A	2013/10/10	STL SOP-00038	MA.100- pH1.1
Total Phenols by 4-AAP	7	2013/10/16	2013/10/17	STL SOP-00033	MA.404-I.Phé 2.2
Ortho Phosphate	7	N/A	2013/10/10	STL SOP-00003	SM 4500-P E
Sulfides (S2-)	7	2013/10/12	2013/10/12	STL SOP-00005	MA. 300-S 1.1
Reactive Silica (SiO2) (1)	7	N/A	2013/10/15	QUE SOP-00132	HACH, Method 8186
Total Dissolved Solids	7	2013/10/15	2013/10/15	STL SOP-00050	MA. 103 - S.T. 1.0
Turbidity	7	N/A	2013/10/10	STL SOP-00022	MA. 103 - Tur. 1.0

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam - Québec
- (2) DOC present in the sample should be considered as non-purgeable DOC

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Séverine Planté,
Email: SPLante@maxxam.ca
Phone# (514) 448-9001

Attention: Natasha Poole

TATA STEEL MINERALS CANADA
Schefferville
85 Atlantic Street
Schefferville, PQ
CANADA G0G2T0

Your P.O. #: 2200000001
Your Project #: QUATERLY SURFACE WATER
Site#: DSO-TIMMINS
Site Location: TSMC
Your C.O.C. #: C#972130, C#97213-01-01

Report Date: 2013/10/18**CERTIFICATE OF ANALYSIS**

-2-

=====
This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B364381
 Report Date: 2013/10/18

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY SURFACE WATER
 Site Location: TSMC
 Your P.O. #: 2200000001
 Sampler Initials: NP

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Maxxam ID		W25727		W25728	W25729		W25730		
Sampling Date		2013/10/08		2013/10/08	2013/10/08		2013/10/09		
COC Number		C#97213-01-01		C#97213-01-01	C#97213-01-01		C#97213-01-01		
	Units	COA-SW7	QC Batch	COA-SW3	COA-SW9	QC Batch	COA-SW13	RDL	QC Batch

METALS ICP-MS									
Aluminum (Al)	ug/L	48	1221871	150	54	1220330	17	10	1221871
Antimony (Sb)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Silver (Ag)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Arsenic (As)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Barium (Ba)	ug/L	5.5	1221871	9.8	2.3	1220330	<2.0	2.0	1221871
Beryllium (Be)	ug/L	<2.0	1221871	<2.0	<2.0	1220330	<2.0	2.0	1221871
Bismuth (Bi)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Boron (B)	ug/L	<50	1221871	<50	<50	1220330	<50	50	1221871
Cadmium (Cd)	ug/L	<0.20	1221871	<0.20	<0.20	1220330	<0.20	0.20	1221871
Calcium (Ca)	ug/L	1600	1221871	1800	<500	1220330	<500	500	1221871
Chromium (Cr)	ug/L	<5.0	1221871	<5.0	<5.0	1220330	<5.0	5.0	1221871
Cobalt (Co)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Copper (Cu)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Total Hardness (CaCO3)	ug/L	8800	1221871	10000	<1000	1220330	1700	1000	1221871
Tin (Sn)	ug/L	<2.0	1221871	<2.0	<2.0	1220330	<2.0	2.0	1221871
Iron (Fe)	ug/L	110	1221871	600	330	1220330	200	60	1221871
Magnesium (Mg)	ug/L	1200	1221871	1500	<100	1220330	220	100	1221871
Manganese (Mn)	ug/L	15	1221871	55	22	1220330	12	1.0	1221871
Molybdenum (Mo)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Mercury (Hg)	ug/L	<0.10	1221871	0.12	<0.10	1220330	<0.10	0.10	1221871
Nickel (Ni)	ug/L	2.4	1221871	<2.0	<2.0	1220330	<2.0	2.0	1221871
Total phosphorous	ug/L	<10	1221871	22	25	1220330	12	10	1221871
Lead (Pb)	ug/L	<0.50	1221871	<0.50	<0.50	1220330	<0.50	0.50	1221871
Potassium (K)	ug/L	<500	1221871	500	<500	1220330	<500	500	1221871
Selenium (Se)	ug/L	<3.0	1221871	<3.0	<3.0	1220330	<3.0	3.0	1221871
Sodium (Na)	ug/L	840	1221871	650	<500	1220330	720	500	1221871
Strontium (Sr)	ug/L	5.8	1221871	6.0	2.0	1220330	<2.0	2.0	1221871
Thallium (Tl)	ug/L	<2.0	1221871	<2.0	<2.0	1220330	<2.0	2.0	1221871
Titanium (Ti)	ug/L	21	1221871	<10	<10	1220330	24	10	1221871
Uranium (U)	ug/L	<1.0	1221871	<1.0	<1.0	1220330	<1.0	1.0	1221871
Vanadium (V)	ug/L	<2.0	1221871	<2.0	<2.0	1220330	<2.0	2.0	1221871
Zinc (Zn)	ug/L	<7.0	1221871	<7.0	<7.0	1220330	<7.0	7.0	1221871

 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B364381
 Report Date: 2013/10/18

 TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY SURFACE WATER
 Site Location: TSMC
 Your P.O. #: 2200000001
 Sampler Initials: NP

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Maxxam ID		W25731	W25732	W25733	W25733		
Sampling Date		2013/10/09	2013/10/09	2013/10/09	2013/10/09		
COC Number		C#97213-01-01	C#97213-01-01	C#97213-01-01	C#97213-01-01		
	Units	COA-SW8	COA-SW4	COA-SW10	COA-SW10 Lab-Dup	RDL	QC Batch

METALS ICP-MS							
Aluminum (Al)	ug/L	<10	34	2400	2900	10	1220330
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1220330
Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1220330
Arsenic (As)	ug/L	<1.0	<1.0	2.6	2.9	1.0	1220330
Barium (Ba)	ug/L	<2.0	3.9	28	29	2.0	1220330
Beryllium (Be)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	1220330
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1220330
Boron (B)	ug/L	<50	<50	<50	<50	50	1220330
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	1220330
Calcium (Ca)	ug/L	2300	1800	3000	3100	500	1220330
Chromium (Cr)	ug/L	<5.0	<5.0	5.8	7.7	5.0	1220330
Cobalt (Co)	ug/L	<1.0	<1.0	2.2	2.5	1.0	1220330
Copper (Cu)	ug/L	<1.0	<1.0	6.8	7.5	1.0	1220330
Total Hardness (CaCO3)	ug/L	11000	10000	17000	18000	1000	1220330
Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	1220330
Iron (Fe)	ug/L	<60	<60	7700	9100	60	1220330
Magnesium (Mg)	ug/L	1300	1300	2400	2500	100	1220330
Manganese (Mn)	ug/L	3.2	23	210	230	1.0	1220330
Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1220330
Mercury (Hg)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	1220330
Nickel (Ni)	ug/L	<2.0	<2.0	4.7	5.3	2.0	1220330
Total phosphorous	ug/L	<10	17	100	120	10	1220330
Lead (Pb)	ug/L	<0.50	<0.50	2.0	2.1	0.50	1220330
Potassium (K)	ug/L	<500	<500	1100	1200	500	1220330
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	3.0	1220330
Sodium (Na)	ug/L	<500	880	1200	1200	500	1220330
Strontium (Sr)	ug/L	4.4	7.1	12	12	2.0	1220330
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	1220330
Titanium (Ti)	ug/L	<10	<10	77	90	10	1220330
Uranium (U)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1220330
Vanadium (V)	ug/L	<2.0	<2.0	5.2	6.0	2.0	1220330

 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B364381
 Report Date: 2013/10/18

TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY SURFACE WATER
 Site Location: TSMC
 Your P.O. #: 2200000001
 Sampler Initials: NP

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Maxxam ID		W25731	W25732	W25733	W25733		
Sampling Date		2013/10/09	2013/10/09	2013/10/09	2013/10/09		
COC Number		C#97213-01-01	C#97213-01-01	C#97213-01-01	C#97213-01-01		
	Units	COA-SW8	COA-SW4	COA-SW10	COA-SW10 Lab-Dup	RDL	QC Batch

Zinc (Zn)	ug/L	11	<7.0	22	25	7.0	1220330
-----------	------	----	------	----	----	-----	---------

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B364381
 Report Date: 2013/10/18

 TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY SURFACE WATER
 Site Location: TSMC
 Your P.O. #: 2200000001
 Sampler Initials: NP

CONVENTIONAL PARAMETERS (SURFACE WATER)

Maxxam ID		W25727	W25728	W25729		W25730		
Sampling Date		2013/10/08	2013/10/08	2013/10/08		2013/10/09		
COC Number		C#97213-01-01	C#97213-01-01	C#97213-01-01		C#97213-01-01		
	Units	COA-SW7	COA-SW3	COA-SW9	QC Batch	COA-SW13	RDL	QC Batch

CONVENTIONALS								
Conductivity	mS/cm	0.020	0.024	0.003	1219042	0.005	0.001	1219042
Dissolved organic carbon	mg/L	0.9	0.4	1.2	1219111	1.7	0.2	1219223
Nitrate (N) and Nitrite(N)	mg/L	0.26	0.29	0.04	1219027	0.19	0.02	1219027
Nitrates (N-NO3-)	mg/L	0.26	0.29	0.04	1219027	0.19	0.02	1219027
Nitrites (N-NO2-)	mg/L	<0.02	<0.02	<0.02	1219027	<0.02	0.02	1219027
Nitrogen ammonia (N-NH3)	mg/L	<0.02	<0.02	<0.02	1219485	<0.02	0.02	1219485
Orthophosphate (P)	mg/L	<0.05	<0.05	<0.05	1219146	<0.05	0.05	1219146
pH	pH	6.87	7.12	5.62	1219050	6.35	N/A	1219050
Phenols-4AAP	mg/L	<0.002	<0.002	<0.002	1220997	<0.002	0.002	1220997
Reactive silica (SiO2)	mg/L	3.2	3.0	0.1	1220481	1.9	0.1	1220481
Real Color	UCV	7	8	6	1219043	4	2	1219043
Sulfides (S2-)	mg/L	<0.02	<0.02	<0.02	1219988	<0.02	0.02	1219988
Turbidity	NTU	13	75	2.7	1219141	0.9	0.1	1219141
Alkalinity Total (as CaCO3) pH 4.5	mg/L	6	8	<1	1219040	2	1	1219040
Bicarbonates (HCO3 as CaCO3)	mg/L	6	8	<1	1219040	2	1	1219040
Carbonate (CO3 as CaCO3)	mg/L	<1	<1	<1	1219040	<1	1	1219040
Chloride (Cl)	mg/L	0.46	0.37	0.09	1219033	0.11	0.05	1219033
Sulfates (SO4)	mg/L	1.9	1.8	0.8	1219033	<0.5	0.5	1219033
Total Dissolved Solids	mg/L	<10	<10	11	1220241	<10	10	1220241

 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam Job #: B364381
 Report Date: 2013/10/18

 TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY SURFACE WATER
 Site Location: TSMC
 Your P.O. #: 2200000001
 Sampler Initials: NP

CONVENTIONAL PARAMETERS (SURFACE WATER)

Maxxam ID		W25731	W25731		W25732		W25733		
Sampling Date		2013/10/09	2013/10/09		2013/10/09		2013/10/09		
COC Number		C#97213-01-01	C#97213-01-01		C#97213-01-01		C#97213-01-01		
	Units	COA-SW8	COA-SW8 Lab-Dup	QC Batch	COA-SW4	RDL	COA-SW10	RDL	QC Batch

CONVENTIONALS									
Conductivity	mS/cm	0.025	N/A	1219042	0.027	0.001	0.034	0.001	1219042
Dissolved organic carbon	mg/L	1.4	N/A	1219223	0.2	0.2	1.0	0.4	1219223
Nitrate (N) and Nitrite(N)	mg/L	0.10	N/A	1219027	0.98	0.02	0.46	0.02	1219027
Nitrates (N-NO3-)	mg/L	0.10	N/A	1219027	0.98	0.02	0.46	0.02	1219027
Nitrites (N-NO2-)	mg/L	<0.02	N/A	1219027	<0.02	0.02	<0.02	0.02	1219027
Nitrogen ammonia (N-NH3)	mg/L	<0.02	<0.02	1219485	<0.02	0.02	<0.02	0.02	1219485
Orthophosphate (P)	mg/L	<0.05	N/A	1219146	<0.05	0.05	<0.05	0.05	1219146
pH	pH	7.15	N/A	1219050	6.91	N/A	7.32	N/A	1219050
Phenols-4AAP	mg/L	<0.002	N/A	1220997	<0.002	0.002	<0.002	0.002	1220997
Reactive silica (SiO2)	mg/L	1.1	N/A	1220481	5.5	0.1	5.9	0.1	1220481
Real Color	UCV	<2	N/A	1219043	3	2	120	2	1219043
Sulfides (S2-)	mg/L	<0.02	N/A	1219988	<0.02	0.02	<0.02	0.02	1220032
Turbidity	NTU	0.4	N/A	1219141	39	0.1	360	0.1	1219141
Alkalinity Total (as CaCO3) pH 4.5	mg/L	8	N/A	1219040	6	1	12	1	1219040
Bicarbonates (HCO3 as CaCO3)	mg/L	8	N/A	1219040	6	1	12	1	1219040
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	1219040	<1	1	<1	1	1219040
Chloride (Cl)	mg/L	0.11	N/A	1219033	1.1	0.05	0.26	0.05	1219033
Sulfates (SO4)	mg/L	2.9	N/A	1219033	1.6	0.5	2.2	0.5	1219033
Total Dissolved Solids	mg/L	10	N/A	1220241	13	10	78	10	1220241

N/A = Not Applicable
 RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch

Maxxam ID		W25733		
Sampling Date		2013/10/09		
COC Number		C#97213-01-01		
	Units	COA-SW10 Lab-Dup	RDL	QC Batch

CONVENTIONALS				
Total Dissolved Solids	mg/L	77	10	1220241
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

Maxxam Job #: B364381
Report Date: 2013/10/18

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY SURFACE WATER
Site Location: TSMC
Your P.O. #: 2200000001
Sampler Initials: NP

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD except for the following:
pH: Holding time already past.: W25727, W25728, W25729

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.
Reported detection limits are multiplied by dilution factors used for sample analysis.

Results relate only to the items tested.

TATA STEEL MINERALS CANADA
 Attention: Natasha Poole
 Client Project #: QUATERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: TSMC

Quality Assurance Report

Maxxam Job Number: B364381

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	
1219027 AL8	Spiked Blank	Nitrate (N) and Nitrite(N)	2013/10/11		100	%	
		Nitrates (N-NO3-)	2013/10/11		104	%	
		Nitrites (N-NO2-)	2013/10/11		96	%	
	Method Blank	Nitrate (N) and Nitrite(N)	2013/10/11	<0.02			mg/L
		Nitrates (N-NO3-)	2013/10/11	<0.02			mg/L
		Nitrites (N-NO2-)	2013/10/11	<0.02			mg/L
1219033 AL8	Spiked Blank	Chloride (Cl)	2013/10/11		97	%	
		Sulfates (SO4)	2013/10/11		103	%	
	Method Blank	Chloride (Cl)	2013/10/11	<0.05			mg/L
		Sulfates (SO4)	2013/10/11	<0.5			mg/L
1219040 MR4	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2013/10/11		101	%	
		Alkalinity Total (as CaCO3) pH 4.5	2013/10/11	<1			mg/L
	Method Blank	Bicarbonates (HCO3 as CaCO3)	2013/10/11	<1			mg/L
		Carbonate (CO3 as CaCO3)	2013/10/11	<1			mg/L
1219042 MR4	Spiked Blank	Conductivity	2013/10/11		103	%	
	Method Blank	Conductivity	2013/10/11	<0.001		mS/cm	
1219043 WO1	QC Standard	Real Color	2013/10/10		103	%	
	Method Blank	Real Color	2013/10/10	<2		UCV	
1219050 AL8	Spiked Blank	pH	2013/10/10		101	%	
1219111 AL8	QC Standard	Dissolved organic carbon	2013/10/11		105	%	
	Spiked Blank	Dissolved organic carbon	2013/10/11		100	%	
	Method Blank	Dissolved organic carbon	2013/10/11	<0.2		mg/L	
1219141 RC6	QC Standard	Turbidity	2013/10/10		98	%	
	Method Blank	Turbidity	2013/10/10	0.1, RDL=0.1		NTU	
1219146 AL8	Spiked Blank	Orthophosphate (P)	2013/10/10		102	%	
	Method Blank	Orthophosphate (P)	2013/10/10	<0.05		mg/L	
1219223 AL8	QC Standard	Dissolved organic carbon	2013/10/11		105	%	
	Spiked Blank	Dissolved organic carbon	2013/10/11		98	%	
	Method Blank	Dissolved organic carbon	2013/10/11	0.4, RDL=0.2		mg/L	
1219485 DKH	QC Standard	Nitrogen ammonia (N-NH3)	2013/10/15		91	%	
	Spiked Blank	Nitrogen ammonia (N-NH3)	2013/10/15		91	%	
	Method Blank	Nitrogen ammonia (N-NH3)	2013/10/15	<0.02		mg/L	
1219988 JE1	Spiked Blank	Sulfides (S2-)	2013/10/12		93	%	
	Method Blank	Sulfides (S2-)	2013/10/12	<0.02		mg/L	
1220032 JE1	Spiked Blank	Sulfides (S2-)	2013/10/12		93	%	
	Method Blank	Sulfides (S2-)	2013/10/12	<0.02		mg/L	
1220241 FSI	Spiked Blank	Total Dissolved Solids	2013/10/15		98	%	
	Spiked Blank DUP	Total Dissolved Solids	2013/10/15		101	%	
	Method Blank	Total Dissolved Solids	2013/10/15	<10		mg/L	
1220330 JS2	Spiked Blank	Aluminum (Al)	2013/10/15		104	%	
		Antimony (Sb)	2013/10/15		103	%	
		Silver (Ag)	2013/10/15		99	%	
		Arsenic (As)	2013/10/15		103	%	
		Barium (Ba)	2013/10/15		104	%	
		Beryllium (Be)	2013/10/15		107	%	
		Bismuth (Bi)	2013/10/15		101	%	
		Boron (B)	2013/10/15		107	%	
		Cadmium (Cd)	2013/10/15		102	%	
		Calcium (Ca)	2013/10/15		102	%	
		Chromium (Cr)	2013/10/15		102	%	
		Cobalt (Co)	2013/10/15		97	%	
		Copper (Cu)	2013/10/15		97	%	
		Tin (Sn)	2013/10/15		105	%	
		Iron (Fe)	2013/10/15		101	%	
		Magnesium (Mg)	2013/10/15		103	%	

TATA STEEL MINERALS CANADA
 Attention: Natasha Poole
 Client Project #: QUATERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: TSMC

Quality Assurance Report (Continued)

Maxxam Job Number: B364381

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units
1220330 JS2	Spiked Blank	Manganese (Mn)	2013/10/15		103	%
		Molybdenum (Mo)	2013/10/15		102	%
		Mercury (Hg)	2013/10/15		94	%
		Nickel (Ni)	2013/10/15		97	%
		Total phosphorous	2013/10/15		102	%
		Lead (Pb)	2013/10/15		101	%
		Potassium (K)	2013/10/15		105	%
		Selenium (Se)	2013/10/15		100	%
		Sodium (Na)	2013/10/15		105	%
		Strontium (Sr)	2013/10/15		101	%
		Thallium (Tl)	2013/10/15		102	%
		Titanium (Ti)	2013/10/15		105	%
		Uranium (U)	2013/10/15		98	%
		Vanadium (V)	2013/10/15		103	%
		Zinc (Zn)	2013/10/15		98	%
	Method Blank	Aluminum (Al)	2013/10/15	<10		ug/L
		Antimony (Sb)	2013/10/15	<1.0		ug/L
		Silver (Ag)	2013/10/15	<1.0		ug/L
		Arsenic (As)	2013/10/15	<1.0		ug/L
		Barium (Ba)	2013/10/15	<2.0		ug/L
		Beryllium (Be)	2013/10/15	<2.0		ug/L
		Bismuth (Bi)	2013/10/15	<1.0		ug/L
		Boron (B)	2013/10/15	<50		ug/L
		Cadmium (Cd)	2013/10/15	<0.20		ug/L
		Calcium (Ca)	2013/10/15	<500		ug/L
		Chromium (Cr)	2013/10/15	<5.0		ug/L
		Cobalt (Co)	2013/10/15	<1.0		ug/L
		Copper (Cu)	2013/10/15	<1.0		ug/L
		Total Hardness (CaCO3)	2013/10/15	<1000		ug/L
		Tin (Sn)	2013/10/15	<2.0		ug/L
		Iron (Fe)	2013/10/15	<60		ug/L
		Magnesium (Mg)	2013/10/15	<100		ug/L
		Manganese (Mn)	2013/10/15	<1.0		ug/L
		Molybdenum (Mo)	2013/10/15	<1.0		ug/L
		Mercury (Hg)	2013/10/15	<0.10		ug/L
		Nickel (Ni)	2013/10/15	<2.0		ug/L
		Total phosphorous	2013/10/15	<10		ug/L
		Lead (Pb)	2013/10/15	<0.50		ug/L
		Potassium (K)	2013/10/15	<500		ug/L
		Selenium (Se)	2013/10/15	<3.0		ug/L
		Sodium (Na)	2013/10/15	<500		ug/L
		Strontium (Sr)	2013/10/15	<2.0		ug/L
		Thallium (Tl)	2013/10/15	<2.0		ug/L
		Titanium (Ti)	2013/10/15	<10		ug/L
		Uranium (U)	2013/10/15	<1.0		ug/L
		Vanadium (V)	2013/10/15	<2.0		ug/L
		Zinc (Zn)	2013/10/15	<7.0		ug/L
1220481 CG0	QC Standard	Reactive silica (SiO2)	2013/10/15		99	%
	Method Blank	Reactive silica (SiO2)	2013/10/15	<0.1		mg/L
1220997 MH1	QC Standard	Phenols-4AAP	2013/10/17		94	%
	Spiked Blank	Phenols-4AAP	2013/10/17		99	%
	Method Blank	Phenols-4AAP	2013/10/17	<0.002		mg/L
1221871 JS2	Spiked Blank	Aluminum (Al)	2013/10/18		106	%
		Antimony (Sb)	2013/10/18		106	%
		Silver (Ag)	2013/10/18		104	%

TATA STEEL MINERALS CANADA
 Attention: Natasha Poole
 Client Project #: QUATERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: TSMC

Quality Assurance Report (Continued)

Maxxam Job Number: B364381

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units
1221871 JS2	Spiked Blank	Arsenic (As)	2013/10/18		103	%
		Barium (Ba)	2013/10/18		97	%
		Beryllium (Be)	2013/10/18		101	%
		Bismuth (Bi)	2013/10/18		99	%
		Boron (B)	2013/10/18		104	%
		Cadmium (Cd)	2013/10/18		100	%
		Calcium (Ca)	2013/10/18		100	%
		Chromium (Cr)	2013/10/18		98	%
		Cobalt (Co)	2013/10/18		94	%
		Copper (Cu)	2013/10/18		94	%
		Tin (Sn)	2013/10/18		107	%
		Iron (Fe)	2013/10/18		102	%
		Magnesium (Mg)	2013/10/18		102	%
		Manganese (Mn)	2013/10/18		102	%
		Molybdenum (Mo)	2013/10/18		107	%
		Mercury (Hg)	2013/10/18		96	%
		Nickel (Ni)	2013/10/18		98	%
		Total phosphorous	2013/10/18		101	%
		Lead (Pb)	2013/10/18		98	%
		Potassium (K)	2013/10/18		101	%
		Selenium (Se)	2013/10/18		97	%
		Sodium (Na)	2013/10/18		104	%
		Strontium (Sr)	2013/10/18		100	%
		Thallium (Tl)	2013/10/18		100	%
		Titanium (Ti)	2013/10/18		110	%
		Uranium (U)	2013/10/18		102	%
		Vanadium (V)	2013/10/18		104	%
		Zinc (Zn)	2013/10/18		96	%
	Method Blank	Aluminum (Al)	2013/10/18	<10		ug/L
		Antimony (Sb)	2013/10/18	<1.0		ug/L
		Silver (Ag)	2013/10/18	<1.0		ug/L
		Arsenic (As)	2013/10/18	<1.0		ug/L
		Barium (Ba)	2013/10/18	<2.0		ug/L
		Beryllium (Be)	2013/10/18	<2.0		ug/L
		Bismuth (Bi)	2013/10/18	<1.0		ug/L
		Boron (B)	2013/10/18	<50		ug/L
		Cadmium (Cd)	2013/10/18	<0.20		ug/L
		Calcium (Ca)	2013/10/18	<500		ug/L
		Chromium (Cr)	2013/10/18	<5.0		ug/L
		Cobalt (Co)	2013/10/18	<1.0		ug/L
		Copper (Cu)	2013/10/18	<1.0		ug/L
		Total Hardness (CaCO3)	2013/10/18	<1000		ug/L
		Tin (Sn)	2013/10/18	<2.0		ug/L
		Iron (Fe)	2013/10/18	<60		ug/L
		Magnesium (Mg)	2013/10/18	<100		ug/L
		Manganese (Mn)	2013/10/18	1.3, RDL=1.0		ug/L
		Molybdenum (Mo)	2013/10/18	<1.0		ug/L
		Mercury (Hg)	2013/10/18	<0.10		ug/L
		Nickel (Ni)	2013/10/18	<2.0		ug/L
		Total phosphorous	2013/10/18	<10		ug/L
		Lead (Pb)	2013/10/18	<0.50		ug/L
		Potassium (K)	2013/10/18	<500		ug/L
		Selenium (Se)	2013/10/18	<3.0		ug/L
		Sodium (Na)	2013/10/18	<500		ug/L
		Strontium (Sr)	2013/10/18	<2.0		ug/L

TATA STEEL MINERALS CANADA
 Attention: Natasha Poole
 Client Project #: QUATERLY SURFACE WATER
 P.O. #: 2200000001
 Site Location: TSMC

Quality Assurance Report (Continued)

Maxxam Job Number: B364381

QA/QC Batch				Date Analyzed			
Num Init	QC Type	Parameter		yyyy/mm/dd	Value	Recovery	Units
1221871	JS2	Method Blank	Thallium (Tl)	2013/10/18	<2.0		ug/L
			Titanium (Ti)	2013/10/18	17, RDL=10		ug/L
			Uranium (U)	2013/10/18	<1.0		ug/L
			Vanadium (V)	2013/10/18	2.1, RDL=2.0		ug/L
			Zinc (Zn)	2013/10/18	<7.0		ug/L

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.



Validation Signature Page

Maxxam Job #: B364381

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).






 Delia Barbul, B.Sc., Chemist

 Jonathan Fauvel, B.Sc, Chimiste, Analyste II




 Myriam Assayag

 Maria Chrifi Alaoui, B.Sc., Chemist




 Madina Hamrouni, B.Sc., Chemist




 Mathieu Letourneau, B.Sc., chimist

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

TATA STEEL MINERALS CANADA
 85 Atlantic Street
 Schefferville, PQ
 CANADA G0G2T0

Your P.O. #: 2200000001
 Your Project #: QUARTERLY MONITORING
 Site#: DSO TIMMINS
 Site Location: TSMC
 Your C.O.C. #: C#9720602

Report Date: 2014/06/19
 Report #: R1881192
 Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B433794

Received: 2014/06/12, 13:45

Sample Matrix: WATER
 # Samples Received: 8

Analyses	Quantity	Date		Laboratory Method	Primary Reference
		Extracted	Analyzed		
Total Alkalinity (pH end point 4.5)***	8	N/A	2014/06/12	STL SOP-00038	MA. 315 – Alc.-Aci 1
Anions*	8	N/A	2014/06/19	STL SOP-00014	MA. 300 - Ions 1.3
Petroleum Hydrocarbons (C10-C50)*	1	2014/06/17	2014/06/18	STL SOP-00173	MA.400 - Hyd 1.1
Real Color*	8	N/A	2014/06/12	STL SOP-00046	MA. 103 - Col. 2.0
Conductivity*	8	N/A	2014/06/12	STL SOP-00038	SM 2510
Dissolved Organic Carbon (2)***	8	2014/06/12	2014/06/17	STL SOP-00243	SM 5310B
Total Suspended Solids*	8	2014/06/13	2014/06/13	STL SOP-00015	MA. 104 - S.S. 2.0
Total Extractable Metals by ICP*	8	2014/06/19	2014/06/19	STL SOP-00006	MA.200- Mét 1.2
Dissolved Metals by ICP-MS (Low Level)*	8	2014/06/19	2014/06/19	STL SOP-00006	MA.200- Mét 1.2
Ammonia Nitrogen*	8	N/A	2014/06/16	STL SOP-00040	MA.300 – N 2.0
Nitrate and/or Nitrite*	8	N/A	2014/06/19	STL SOP-00014	MA. 300 - Ions 1.3
pH*	8	N/A	2014/06/12	STL SOP-00038	MA.100- pH1.1
Total Phenols by 4-AAP*	8	2014/06/19	2014/06/19	STL SOP-00033	MA.404-I.Phé 2.2
Ortho Phosphate*	8	N/A	2014/06/12	STL SOP-00003	SM 4500-P E
Sulfides (S2-)*	8	2014/06/18	2014/06/18	STL SOP-00005	MA. 300 – S 1.2
Reactive Silica (SiO2) (1)***	8	N/A	2014/06/16	QUE SOP-00132	HACH, Method 8186
Total Dissolved Solids*	8	2014/06/13	2014/06/13	STL SOP-00050	MA. 115 – S.D. 1.0
Turbidity*	8	N/A	2014/06/12	STL SOP-00022	MA. 103 - Tur. 1.0

Note: RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam - Québec

(2) DOC present in the sample should be considered as non-purgeable DOC

* Maxxam is accredited as per the MDDELCC program.

*** This analysis is not subject to MDDELCC accreditation.

TATA STEEL MINERALS CANADA
85 Atlantic Street
Schefferville, PQ
CANADA G0G2T0

Your P.O. #: 2200000001
Your Project #: QUARTERLY MONITORING
Site#: DSO TIMMINS
Site Location: TSMC
Your C.O.C. #: C#9720602

Report Date: 2014/06/19
Report #: R1881192
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B433794

Received: 2014/06/12, 13:45

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Séverine Planté,
Email: SPlante@maxxam.ca
Phone# (514) 448-9001

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B433794
 Report Date: 2014/06/19

TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

HYDROCARBONS BY GCFID (WATER)

Maxxam ID		Y70731		
Sampling Date		2014/06/10		
COC Number		C#9720602		
	Units	COA-SW10-Q1	RDL	QC Batch
PETROLEUM HYDROCARBONS				
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	100	1321178
Surrogate Recovery (%)				
1-Chlorooctadecane	%	83	N/A	1321178
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable				

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

DISSOLVED METALS (WATER)

Maxxam ID		Y70726	Y70727	Y70728	Y70729	Y70730	Y70731		
Sampling Date		2014/06/10	2014/06/10	2014/06/10	2014/06/10	2014/06/10	2014/06/10		
COC Number		C#9720602	C#9720602	C#9720602	C#9720602	C#9720602	C#9720602		
	Units	COA-SW3-Q1	COA-SW4-Q1	COA-SW7-Q1	COA-SW8-Q1	COA-SW9-Q1	COA-SW10-Q1	RDL	QC Batch
METALS ICP-MS									
Aluminum (Al)	ug/L	50	23	26	75	39	380	10	1322588
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1322588
Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	1322588
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1322588
Barium (Ba)	ug/L	8.6	4.0	2.7	<2.0	2.1	9.3	2.0	1322588
Beryllium (Be)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	1322588
Bismuth (Bi)	ug/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	1322588
Boron (B)	ug/L	<20	<20	<20	<20	<20	<20	20	1322588
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	1322588
Calcium (Ca)	ug/L	1800	1800	880	450	<300	710	300	1322588
Chromium (Cr)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.96	0.50	1322588
Cobalt (Co)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.58	0.50	1322588
Copper (Cu)	ug/L	1.1	<0.50	<0.50	<0.50	1.0	2.6	0.50	1322588
Total Hardness (CaCO ₃)	ug/L	10000	9700	4700	1800	<1000	4000	1000	1322588
Tin (Sn)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1322588
Iron (Fe)	ug/L	<100	<100	<100	<100	120	550	100	1322588
Magnesium (Mg)	ug/L	1400	1200	620	180	<100	530	100	1322588
Manganese (Mn)	ug/L	29	20	4.3	4.2	17	67	0.40	1322588
Molybdenum (Mo)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	1322588
Mercury (Hg)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	1322588
Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.2	<1.0	1.1	1.0	1322588
Lead (Pb)	ug/L	0.19	0.12	<0.10	<0.10	<0.10	0.61	0.10	1322588
Potassium (K)	ug/L	400	230	200	<100	<100	360	100	1322588
Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1322588
Strontium (Sr)	ug/L	5.9	6.6	3.9	2.4	<2.0	3.8	2.0	1322588
Sodium (Na)	ug/L	590	780	490	490	200	280	100	1322588
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1322588
Uranium (U)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1322588
Titanium (Ti)	ug/L	<10	<10	<10	<10	<10	<10	10	1322588
Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.6	2.0	1322588
Zinc (Zn)	ug/L	8.5	5.8	5.0	25	<5.0	9.0	5.0	1322588
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

DISSOLVED METALS (WATER)

Maxxam ID		Y70732	Y70733		
Sampling Date		2014/06/10	2014/06/10		
COC Number		C#9720602	C#9720602		
	Units	COA-SW13-Q1	COA-GW1-Q1	RDL	QC Batch
METALS ICP-MS					
Aluminum (Al)	ug/L	17	<10	10	1322588
Antimony (Sb)	ug/L	<1.0	<1.0	1.0	1322588
Silver (Ag)	ug/L	<0.10	<0.10	0.10	1322588
Arsenic (As)	ug/L	<1.0	<1.0	1.0	1322588
Barium (Ba)	ug/L	<2.0	<2.0	2.0	1322588
Beryllium (Be)	ug/L	<0.50	<0.50	0.50	1322588
Bismuth (Bi)	ug/L	<0.25	<0.25	0.25	1322588
Boron (B)	ug/L	<20	<20	20	1322588
Cadmium (Cd)	ug/L	<0.20	<0.20	0.20	1322588
Calcium (Ca)	ug/L	<300	1000	300	1322588
Chromium (Cr)	ug/L	<0.50	<0.50	0.50	1322588
Cobalt (Co)	ug/L	<0.50	<0.50	0.50	1322588
Copper (Cu)	ug/L	<0.50	6.3	0.50	1322588
Total Hardness (CaCO3)	ug/L	1500	5200	1000	1322588
Tin (Sn)	ug/L	<1.0	<1.0	1.0	1322588
Iron (Fe)	ug/L	<100	1900	100	1322588
Magnesium (Mg)	ug/L	180	640	100	1322588
Manganese (Mn)	ug/L	6.5	50	0.40	1322588
Molybdenum (Mo)	ug/L	<0.50	<0.50	0.50	1322588
Mercury (Hg)	ug/L	<0.10	<0.10	0.10	1322588
Nickel (Ni)	ug/L	<1.0	1.9	1.0	1322588
Lead (Pb)	ug/L	<0.10	0.33	0.10	1322588
Potassium (K)	ug/L	<100	190	100	1322588
Selenium (Se)	ug/L	<1.0	<1.0	1.0	1322588
Strontium (Sr)	ug/L	2.1	5.3	2.0	1322588
Sodium (Na)	ug/L	410	980	100	1322588
Thallium (Tl)	ug/L	<2.0	<2.0	2.0	1322588
Uranium (U)	ug/L	<1.0	<1.0	1.0	1322588
Titanium (Ti)	ug/L	<10	<10	10	1322588
Vanadium (V)	ug/L	<2.0	<2.0	2.0	1322588
Zinc (Zn)	ug/L	<5.0	21	5.0	1322588
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

TOTAL EXTRACTABLE METALS (WATER)

Maxxam ID		Y70726	Y70727	Y70728	Y70729	Y70730	Y70731		
Sampling Date		2014/06/10	2014/06/10	2014/06/10	2014/06/10	2014/06/10	2014/06/10		
COC Number		C#9720602	C#9720602	C#9720602	C#9720602	C#9720602	C#9720602		
	Units	COA-SW3-Q1	COA-SW4-Q1	COA-SW7-Q1	COA-SW8-Q1	COA-SW9-Q1	COA-SW10-Q1	RDL	QC Batch

METALS									
Total phosphorous	mg/L	<0.01	0.02	0.02	<0.01	<0.01	0.12	0.01	1322584

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam ID		Y70732	Y70733		
Sampling Date		2014/06/10	2014/06/10		
COC Number		C#9720602	C#9720602		
	Units	COA-SW13-Q1	COA-GW1-Q1	RDL	QC Batch

METALS					
Total phosphorous	mg/L	0.02	<0.01	0.01	1322584

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		Y70726	Y70727	Y70727	Y70728	Y70729	Y70730		
Sampling Date		2014/06/10	2014/06/10	2014/06/10	2014/06/10	2014/06/10	2014/06/10		
COC Number		C#9720602	C#9720602	C#9720602	C#9720602	C#9720602	C#9720602		
	Units	COA-SW3-Q1	COA-SW4-Q1	COA-SW4-Q1 Lab-Dup	COA-SW7-Q1	COA-SW8-Q1	COA-SW9-Q1	RDL	QC Batch

CONVENTIONALS									
Conductivity	mS/cm	0.024	0.026	N/A	0.012	0.003	0.003	0.001	1319609
Dissolved organic carbon	mg/L	0.9	0.9	N/A	2.0	3.8	2.8	0.2	1319658
Nitrate (N) and Nitrite(N)	mg/L	0.24	0.87	N/A	0.09	<0.02	<0.02	0.02	1319611
Nitrates (N-NO3-)	mg/L	0.24	0.87	N/A	0.09	<0.02	<0.02	0.02	1319611
Nitrites (N-NO2-)	mg/L	<0.02	<0.02	N/A	<0.02	<0.02	<0.02	0.02	1319611
Nitrogen ammonia (N-NH3)	mg/L	<0.02	<0.02	N/A	<0.02	<0.02	<0.02	0.02	1320841
Orthophosphate (P)	mg/L	<0.05	<0.05	N/A	<0.05	<0.05	<0.05	0.05	1319584
pH	pH	6.07	6.06	N/A	6.05	5.84	5.59	N/A	1319603
Phenols-4AAP	mg/L	0.005	0.003	0.005	0.004	0.004	0.004	0.002	1322607
Reactive silica (SiO2)	mg/L	4.4	5.8	N/A	3.5	3.5	0.7	0.1	1321596
Real Color	UCV	16	6	N/A	12	17	11	2	1319754
Sulfides (S2-)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	1321959
Turbidity	NTU	36	58	N/A	5.8	0.7	1.7	0.1	1319762
Alkalinity Total (as CaCO3) pH 4.5	mg/L	8	5	N/A	4	1	<1	1	1319617
Bicarbonates (HCO3 as CaCO3)	mg/L	8	5	N/A	4	1	<1	1	1319617
Carbonate (CO3 as CaCO3)	mg/L	<1	<1	N/A	<1	<1	<1	1	1319617
Chloride (Cl)	mg/L	0.36	1.1	N/A	0.21	0.07	0.12	0.05	1319645
Sulfates (SO4)	mg/L	1.9	1.4	N/A	1.3	<0.5	0.6	0.5	1319645
Total Dissolved Solids	mg/L	24	16	29	12	14	<10	10	1319960
Total suspended solids (TSS)	mg/L	7	7	N/A	5	<2	3	2	1319955

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		Y70731	Y70731		Y70732	Y70733		
Sampling Date		2014/06/10	2014/06/10		2014/06/10	2014/06/10		
COC Number		C#9720602	C#9720602		C#9720602	C#9720602		
	Units	COA-SW10-Q1	COA-SW10-Q1 Lab-Dup	QC Batch	COA-SW13-Q1	COA-GW1-Q1	RDL	QC Batch
CONVENTIONALS								
Conductivity	mS/cm	0.008	N/A	1319609	0.004	0.020	0.001	1319609
Dissolved organic carbon	mg/L	2.4	N/A	1319658	2.2	0.8	0.2	1319658
Nitrate (N) and Nitrite(N)	mg/L	0.18	N/A	1319611	0.02	1.7	0.02	1319611
Nitrates (N-NO3-)	mg/L	0.18	N/A	1319611	0.02	1.7	0.02	1319611
Nitrites (N-NO2-)	mg/L	<0.02	N/A	1319611	<0.02	<0.02	0.02	1319611
Nitrogen ammonia (N-NH3)	mg/L	0.03	N/A	1320841	<0.02	0.11	0.02	1320841
Orthophosphate (P)	mg/L	<0.05	N/A	1319584	<0.05	<0.05	0.05	1319584
pH	pH	5.90	N/A	1319603	5.94	5.81	N/A	1319603
Phenols-4AAP	mg/L	0.004	N/A	1322607	0.004	0.004	0.002	1322607
Reactive silica (SiO2)	mg/L	1.4	N/A	1321596	2.1	4.7	0.1	1321596
Real Color	UCV	210	N/A	1319754	7	11	2	1319754
Sulfides (S2-)	mg/L	<0.02	N/A	1321959	<0.02	<0.02	0.02	1321959
Turbidity	NTU	340	N/A	1319762	1.1	16	0.1	1319762
Alkalinity Total (as CaCO3) pH 4.5	mg/L	2	N/A	1319617	2	2	1	1319617
Bicarbonates (HCO3 as CaCO3)	mg/L	2	N/A	1319617	2	2	1	1319617
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	1319617	<1	<1	1	1319617
Chloride (Cl)	mg/L	0.11	N/A	1319645	0.10	0.31	0.05	1319645
Sulfates (SO4)	mg/L	<0.5	N/A	1319645	0.7	<0.5	0.5	1319645
Total Dissolved Solids	mg/L	91	N/A	1319960	21	37	10	1321229
Total suspended solids (TSS)	mg/L	11	13	1319955	<2	7	2	1321230
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								
N/A = Not Applicable								

Maxxam Job #: B433794
Report Date: 2014/06/19

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: TSMC
Your P.O. #: 2200000001

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD except for the following:

Dissolved Metals by ICP-MS (Low Level): Due to the presence of particles, the sample was re-filtered after preservation.: Y70726, Y70727, Y70728, Y70729, Y70730, Y70731, Y70732, Y70733

HYDROCARBONS BY GCFID (WATER)

Please note that the results have not been corrected for QC recoveries (spiked blank and surrogates). Please note that the results have been corrected for the method blank.

DISSOLVED METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

TOTAL EXTRACTABLE METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

pH-W : Holding time not respected.

Results relate only to the items tested.

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
1319584	DKH	QC Standard	Orthophosphate (P)	2014/06/12		99	%
1319584	DKH	Spiked Blank	Orthophosphate (P)	2014/06/12		98	%
1319584	DKH	Method Blank	Orthophosphate (P)	2014/06/12	<0.05		mg/L
1319603	DB2	Spiked Blank	pH	2014/06/12		102	%
1319609	DB2	Spiked Blank	Conductivity	2014/06/12		103	%
1319609	DB2	Method Blank	Conductivity	2014/06/12	<0.001		mS/cm
1319611	MMF	Spiked Blank	Nitrate (N) and Nitrite(N)	2014/06/13		100	%
			Nitrates (N-NO3-)	2014/06/13		101	%
			Nitrites (N-NO2-)	2014/06/13		100	%
1319611	MMF	Method Blank	Nitrate (N) and Nitrite(N)	2014/06/13	<0.02		mg/L
			Nitrates (N-NO3-)	2014/06/13	<0.02		mg/L
			Nitrites (N-NO2-)	2014/06/13	<0.02		mg/L
1319617	DB2	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2014/06/12		101	%
1319617	DB2	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2014/06/12	<1		mg/L
			Bicarbonates (HCO3 as CaCO3)	2014/06/12	<1		mg/L
			Carbonate (CO3 as CaCO3)	2014/06/12	<1		mg/L
1319645	MMF	Spiked Blank	Chloride (Cl)	2014/06/13		98	%
			Sulfates (SO4)	2014/06/13		98	%
1319645	MMF	Method Blank	Chloride (Cl)	2014/06/13	<0.05		mg/L
			Sulfates (SO4)	2014/06/13	<0.5		mg/L
1319658	JL1	QC Standard	Dissolved organic carbon	2014/06/17		100	%
1319658	JL1	Spiked Blank	Dissolved organic carbon	2014/06/17		98	%
1319658	JL1	Method Blank	Dissolved organic carbon	2014/06/17	0.6 , RDL=0.2		mg/L
1319754	JEM	QC Standard	Real Color	2014/06/12		104	%
1319754	JEM	Method Blank	Real Color	2014/06/12	<2		UCV
1319762	NA3	QC Standard	Turbidity	2014/06/12		105	%
1319762	NA3	Method Blank	Turbidity	2014/06/12	0.1 , RDL=0.1		NTU
1319955	MA3	Spiked Blank	Total suspended solids (TSS)	2014/06/13		98	%
1319955	MA3	Spiked Blank DUP	Total suspended solids (TSS)	2014/06/13		96	%
1319955	MA3	Method Blank	Total suspended solids (TSS)	2014/06/13	<2		mg/L
1319960	MA3	Spiked Blank	Total Dissolved Solids	2014/06/13		99	%
1319960	MA3	Spiked Blank DUP	Total Dissolved Solids	2014/06/13		98	%
1319960	MA3	Method Blank	Total Dissolved Solids	2014/06/13	<10		mg/L
1320841	DKH	QC Standard	Nitrogen ammonia (N-NH3)	2014/06/16		100	%
1320841	DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2014/06/16		98	%
1320841	DKH	Method Blank	Nitrogen ammonia (N-NH3)	2014/06/16	<0.02		mg/L
1321178	CG2	Spiked Blank	1-Chlorooctadecane	2014/06/18		79	%
			Petroleum Hydrocarbons (C10-C50)	2014/06/18		84	%
1321178	CG2	Spiked Blank DUP	1-Chlorooctadecane	2014/06/18		87	%
			Petroleum Hydrocarbons (C10-C50)	2014/06/18		90	%
1321178	CG2	Method Blank	1-Chlorooctadecane	2014/06/18		84	%
			Petroleum Hydrocarbons (C10-C50)	2014/06/18	<100		ug/L
1321229	ACH	Spiked Blank	Total Dissolved Solids	2014/06/19		100	%
1321229	ACH	Spiked Blank DUP	Total Dissolved Solids	2014/06/19		100	%
1321229	ACH	Method Blank	Total Dissolved Solids	2014/06/19	<10		mg/L
1321230	ACH	Spiked Blank	Total suspended solids (TSS)	2014/06/17		95	%
1321230	ACH	Spiked Blank DUP	Total suspended solids (TSS)	2014/06/17		95	%
1321230	ACH	Method Blank	Total suspended solids (TSS)	2014/06/17	<2		mg/L

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
1321596	FTN	QC Standard	Reactive silica (SiO ₂)	2014/06/17		98	%
1321596	FTN	Method Blank	Reactive silica (SiO ₂)	2014/06/17	<0.1		mg/L
1321959	LI	Spiked Blank	Sulfides (S ₂ -)	2014/06/18		96	%
1321959	LI	Method Blank	Sulfides (S ₂ -)	2014/06/18	<0.02		mg/L
1322584	JS2	Spiked Blank	Total phosphorous	2014/06/19		101	%
1322584	JS2	Method Blank	Total phosphorous	2014/06/19	<0.01		mg/L
1322588	AL5	Spiked Blank	Aluminum (Al)	2014/06/19		93	%
			Antimony (Sb)	2014/06/19		104	%
			Silver (Ag)	2014/06/19		99	%
			Arsenic (As)	2014/06/19		109	%
			Barium (Ba)	2014/06/19		99	%
			Beryllium (Be)	2014/06/19		104	%
			Bismuth (Bi)	2014/06/19		97	%
			Boron (B)	2014/06/19		97	%
			Cadmium (Cd)	2014/06/19		103	%
			Calcium (Ca)	2014/06/19		96	%
			Chromium (Cr)	2014/06/19		96	%
			Cobalt (Co)	2014/06/19		97	%
			Copper (Cu)	2014/06/19		100	%
			Tin (Sn)	2014/06/19		99	%
			Iron (Fe)	2014/06/19		94	%
			Magnesium (Mg)	2014/06/19		93	%
			Manganese (Mn)	2014/06/19		100	%
			Molybdenum (Mo)	2014/06/19		100	%
			Mercury (Hg)	2014/06/19		91	%
			Nickel (Ni)	2014/06/19		100	%
			Lead (Pb)	2014/06/19		96	%
			Potassium (K)	2014/06/19		95	%
			Selenium (Se)	2014/06/19		107	%
			Strontium (Sr)	2014/06/19		98	%
			Sodium (Na)	2014/06/19		95	%
			Thallium (Tl)	2014/06/19		95	%
			Uranium (U)	2014/06/19		99	%
			Titanium (Ti)	2014/06/19		97	%
			Vanadium (V)	2014/06/19		100	%
			Zinc (Zn)	2014/06/19		106	%
1322588	AL5	Method Blank	Aluminum (Al)	2014/06/19	<10		ug/L
			Antimony (Sb)	2014/06/19	<1.0		ug/L
			Silver (Ag)	2014/06/19	0.19 ,		ug/L
					RDL=0.10		
			Arsenic (As)	2014/06/19	<1.0		ug/L
			Barium (Ba)	2014/06/19	<2.0		ug/L
			Beryllium (Be)	2014/06/19	<0.50		ug/L
			Bismuth (Bi)	2014/06/19	<0.25		ug/L
			Boron (B)	2014/06/19	<20		ug/L
			Cadmium (Cd)	2014/06/19	<0.20		ug/L
			Calcium (Ca)	2014/06/19	<300		ug/L
			Chromium (Cr)	2014/06/19	<0.50		ug/L
			Cobalt (Co)	2014/06/19	<0.50		ug/L
			Copper (Cu)	2014/06/19	<0.50		ug/L
			Total Hardness (CaCO ₃)	2014/06/19	<1000		ug/L

Maxxam Job #: B433794
 Report Date: 2014/06/19

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Tin (Sn)	2014/06/19	<1.0		ug/L
			Iron (Fe)	2014/06/19	<100		ug/L
			Magnesium (Mg)	2014/06/19	<100		ug/L
			Manganese (Mn)	2014/06/19	0.58 , RDL=0.40		ug/L
			Molybdenum (Mo)	2014/06/19	<0.50		ug/L
			Mercury (Hg)	2014/06/19	<0.10		ug/L
			Nickel (Ni)	2014/06/19	<1.0		ug/L
			Lead (Pb)	2014/06/19	<0.10		ug/L
			Potassium (K)	2014/06/19	<100		ug/L
			Selenium (Se)	2014/06/19	<1.0		ug/L
			Strontium (Sr)	2014/06/19	<2.0		ug/L
			Sodium (Na)	2014/06/19	<100		ug/L
			Thallium (Tl)	2014/06/19	<2.0		ug/L
			Uranium (U)	2014/06/19	<1.0		ug/L
			Titanium (Ti)	2014/06/19	<10		ug/L
			Vanadium (V)	2014/06/19	<2.0		ug/L
			Zinc (Zn)	2014/06/19	<5.0		ug/L
1322607	CC6	QC Standard	Phenols-4AAP	2014/06/19		84	%
1322607	CC6	Spiked Blank	Phenols-4AAP	2014/06/19		102	%
1322607	CC6	Method Blank	Phenols-4AAP	2014/06/19	0.002 , RDL=0.002		mg/L

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

Maxxam Job #: B433794
Report Date: 2014/06/19

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: TSMC
Your P.O. #: 2200000001

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Corina Tue, B.Sc., Chemist



Delia Barbul, B.Sc., Chemist



Dochka Koleva Hristo, B.Sc., Chemist



David Provencher, B.Sc., Chemist



Jonathan Fauvel, B.Sc, Chimiste, Analyste II

Karyn Vaucher
Membre OCQ #2011-004

Karyn Vaucher



Madina Hamrouni, B.Sc., Chemist

Maxxam Job #: B433794
Report Date: 2014/06/19

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: TSMC
Your P.O. #: 2200000001

VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Attention:Loic Didillon

TATA STEEL MINERALS CANADA
 1000, RUE SHERBROOKE OUEST
 BUREAU 1120
 MONTRÉAL, PQ
 CANADA H3A 3G4

Your P.O. #: 2200000001
 Your Project #: QUATERLY MONITORING
 Site#: DSO TIMMINS
 Site Location: TSMC
 Your C.O.C. #: 97206-01-01

Report Date: 2014/07/23

Report #: R1896816

Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B441557
Received: 2014/07/15, 9:00

Sample Matrix: WATER
 # Samples Received: 8

Analyses	Quantity	Date		Laboratory Method	Primary Reference
		Extracted	Analyzed		
Total Alkalinity (pH end point 4.5)***	8	N/A	2014/07/15	QUE SOP-00142	MA.303-TitrAuto 2.1
Anions (1)*	4	N/A	2014/07/18	STL SOP-00014	MA300-Ions 1.3 R2 m
Anions (1)*	4	N/A	2014/07/21	STL SOP-00014	MA300-Ions 1.3 R2 m
Petroleum Hydrocarbons (C10-C50)*	1	2014/07/17	2014/07/18	QUE SOP-00209	MA. 400 - Hyd. 1.1
Real Color*	8	N/A	2014/07/15	QUE SOP-00115	MA. 103 - Col. 2.0
Conductivity*	8	N/A	2014/07/15	QUE SOP-00142	MA.303-TitrAuto 2.1
Dissolved Organic Carbon (2, 3)	8	2014/07/23	2014/07/23		
Total Extractable Mercury - Cold Vapour (1)***	2	2014/07/21	2014/07/22	STL SOP-00042	MA200-Hg 1.1 R1 m
Total Suspended Solids*	8	2014/07/15	2014/07/15	QUE SOP-00111	SM 2540 D
Total Extractable Metals (Low Level)*	6	2014/07/16	2014/07/17	LCQ 05.12/ICP-MS	MA. 200 - Mét. 1.1
Total Extractable Metals (Low Level) (1)*	2	2014/07/17	2014/07/18	STL SOP-00006	MA200-Mét 1.2 R4 m
Ammonia Nitrogen (1)*	8	N/A	2014/07/17	STL SOP-00040	MA300-N 2.0 R1 m
Nitrate and/or Nitrite (1)*	4	N/A	2014/07/18	STL SOP-00014	MA300-Ions 1.3 R2 m
Nitrate and/or Nitrite (1)*	4	N/A	2014/07/21	STL SOP-00014	MA300-Ions 1.3 R2 m
pH*	8	N/A	2014/07/15	QUE SOP-00142	MA.303-TitrAuto 2.1
Total Phenols by 4-AAP (1)*	8	2014/07/18	2014/07/18	STL SOP-00033	MA404-I.Phé 2.2 R2 m
Ortho Phosphate*	8	N/A	2014/07/15	QUE SOP-00121	MA.303 - P 1.1
Sulfides (S2-)*	2	2014/07/15	2014/07/15	QUE SOP-00107	MA 300 - S 1.1
Sulfides (S2-)*	6	2014/07/16	2014/07/16	QUE SOP-00107	MA 300 - S 1.1
Reactive Silica (SiO2)***	8	N/A	2014/07/15	QUE SOP-00132	HACH, Method 8186
Total Dissolved Solids*	8	2014/07/16	2014/07/16	QUE SOP-00119	MA. 103 - S.T. 1.0
Turbidity*	8	N/A	2014/07/15	QUE SOP-00118	MA.103-TUR. 1.0

Note: RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam -Ville St. Laurent
- (2) This test was performed by Sub Quebec to Exova - PC
- (3) DOC present in the sample should be considered as non-purgeable DOC

* Maxxam is accredited as per the MDDELCC program.

*** This analysis is not subject to MDDELCC accreditation.

Attention:Loic Didillon

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Your P.O. #: 2200000001
Your Project #: QUATERLY MONITORING
Site#: DSO TIMMINS
Site Location: TSMC
Your C.O.C. #: 97206-01-01

Report Date: 2014/07/23
Report #: R1896816
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B441557

Received: 2014/07/15, 9:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Mathieu Letourneau, B.Sc., chimist, Customer Service
Email: MLetourneau@maxxam.ca
Phone# (418) 658-5784

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B441557
 Report Date: 2014/07/23

TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

HYDROCARBONS BY GCFID (WATER)

Maxxam ID		Z07942		
Sampling Date		2014/07/14 09:30		
COC Number		97206-01-01		
	Units	COA-SW10-Q2	RDL	QC Batch
PETROLEUM HYDROCARBONS				
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	100	1334806
Surrogate Recovery (%)				
1-Chlorooctadecane	%	95	N/A	1334806
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable				

Maxxam Job #: B441557
 Report Date: 2014/07/23

TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

METALS (WATER)

Maxxam ID		Z07487	Z07939		
Sampling Date		2014/07/14 09:05	2014/07/14 08:40		
COC Number		97206-01-01	97206-01-01		
	Units	COA-SW3-Q2	COA-SW7-Q2	RDL	QC Batch

METALS					
Mercury (Hg)	mg/L	<0.00001	<0.00001	0.00001	1336290
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

TOTAL EXTRACTABLE METALS (WATER)

Maxxam ID		Z07487	Z07487		Z07938		Z07939		
Sampling Date		2014/07/14 09:05	2014/07/14 09:05		2014/07/14 10:00		2014/07/14 08:40		
COC Number		97206-01-01	97206-01-01		97206-01-01		97206-01-01		
	Units	COA-SW3-Q2	COA-SW3-Q2 Lab-Dup	QC Batch	COA-SW4-Q2	QC Batch	COA-SW7-Q2	RDL	QC Batch

METALS ICP-MS									
Aluminum (Al)	ug/L	35	31	1335005	67	1334105	15	10	1335005
Antimony (Sb)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Silver (Ag)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Arsenic (As)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Barium (Ba)	ug/L	7.2	7.1	1335005	3.3	1334105	<2.0	2.0	1335005
Beryllium (Be)	ug/L	<2.0	<2.0	1335005	<2.0	1334105	<2.0	2.0	1335005
Bismuth (Bi)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Boron (B)	ug/L	<50	<50	1335005	<50	1334105	<50	50	1335005
Cadmium (Cd)	ug/L	<0.20	<0.20	1335005	<0.20	1334105	<0.20	0.20	1335005
Calcium (Ca)	ug/L	1700	1700	1335005	2500	1334105	<500	500	1335005
Chromium (Cr)	ug/L	<5.0	<5.0	1335005	<5.0	1334105	<5.0	5.0	1335005
Cobalt (Co)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Copper (Cu)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Total Hardness (CaCO3)	ug/L	9600	9600	1335005	12000	1334105	2200	1000	1335005
Tin (Sn)	ug/L	<2.0	<2.0	1335005	<2.0	1334105	<2.0	2.0	1335005
Iron (Fe)	ug/L	68	65	1335005	110	1334105	<60	60	1335005
Magnesium (Mg)	ug/L	1300	1300	1335005	1300	1334105	340	100	1335005
Manganese (Mn)	ug/L	11	11	1335005	17	1334105	1.6	1.0	1335005
Molybdenum (Mo)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Mercury (Hg)	ug/L	<0.10	<0.10	1335005	<0.10	1334105	<0.10	0.10	1335005
Nickel (Ni)	ug/L	<2.0	<2.0	1335005	<2.0	1334105	<2.0	2.0	1335005
Total phosphorous	ug/L	<10	<10	1335005	<10	1334105	<10	10	1335005
Lead (Pb)	ug/L	<0.50	<0.50	1335005	<0.50	1334105	<0.50	0.50	1335005
Potassium (K)	ug/L	<500	<500	1335005	<500	1334105	<500	500	1335005
Selenium (Se)	ug/L	<3.0	<3.0	1335005	<3.0	1334105	<3.0	3.0	1335005
Sodium (Na)	ug/L	610	590	1335005	840	1334105	600	500	1335005
Strontium (Sr)	ug/L	6.7	5.7	1335005	7.4	1334105	3.0	2.0	1335005
Thallium (Tl)	ug/L	<2.0	<2.0	1335005	<2.0	1334105	<2.0	2.0	1335005
Titanium (Ti)	ug/L	<10	<10	1335005	<10	1334105	<10	10	1335005
Uranium (U)	ug/L	<1.0	<1.0	1335005	<1.0	1334105	<1.0	1.0	1335005
Vanadium (V)	ug/L	<2.0	<2.0	1335005	<2.0	1334105	<2.0	2.0	1335005
Zinc (Zn)	ug/L	<7.0	<7.0	1335005	<7.0	1334105	<7.0	7.0	1335005

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

TOTAL EXTRACTABLE METALS (WATER)

Maxxam ID		Z07940	Z07941	Z07942	Z07943	Z07943	Z07944		
Sampling Date		2014/07/14 07:30	2014/07/14 11:20	2014/07/14 09:30	2014/07/14 08:00	2014/07/14 08:00	2014/07/14 10:45		
COC Number		97206-01-01	97206-01-01	97206-01-01	97206-01-01	97206-01-01	97206-01-01		
	Units	COA-SW8-Q2	COA-SW9-Q2	COA-SW10-Q2	COA-SW13-Q2	COA-SW13-Q2 Lab-Dup	COA-GW1-Q2	RDL	QC Batch

METALS ICP-MS									
Aluminum (Al)	ug/L	38	110	1300	12	12	<10	10	1334105
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1334105
Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1334105
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1334105
Barium (Ba)	ug/L	<2.0	3.0	13	<2.0	<2.0	<2.0	2.0	1334105
Beryllium (Be)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1334105
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1334105
Boron (B)	ug/L	<50	<50	<50	<50	<50	<50	50	1334105
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	1334105
Calcium (Ca)	ug/L	<500	<500	1300	<500	<500	1200	500	1334105
Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	1334105
Cobalt (Co)	ug/L	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	1.0	1334105
Copper (Cu)	ug/L	<1.0	<1.0	3.2	<1.0	<1.0	5.6	1.0	1334105
Total Hardness (CaCO3)	ug/L	2100	1200	7900	1400	1400	6000	1000	1334105
Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1334105
Iron (Fe)	ug/L	66	390	2800	62	64	210	60	1334105
Magnesium (Mg)	ug/L	220	110	1200	200	200	740	100	1334105
Manganese (Mn)	ug/L	1.9	30	110	2.3	2.4	16	1.0	1334105
Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1334105
Mercury (Hg)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	1334105
Nickel (Ni)	ug/L	<2.0	<2.0	2.7	<2.0	<2.0	<2.0	2.0	1334105
Total phosphorous	ug/L	<10	12	33	<10	14	<10	10	1334105
Lead (Pb)	ug/L	<0.50	<0.50	0.99	<0.50	<0.50	1.1	0.50	1334105
Potassium (K)	ug/L	<500	<500	730	<500	<500	<500	500	1334105
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	1334105
Sodium (Na)	ug/L	<500	<500	<500	<500	<500	1000	500	1334105
Strontium (Sr)	ug/L	2.3	2.4	5.9	<2.0	<2.0	6.0	2.0	1334105
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1334105
Titanium (Ti)	ug/L	<10	<10	31	<10	<10	<10	10	1334105
Uranium (U)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1334105
Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1334105
Zinc (Zn)	ug/L	<7.0	<7.0	10	<7.0	<7.0	37	7.0	1334105

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		Z07487	Z07487	Z07938	Z07938		Z07939		
Sampling Date		2014/07/14 09:05	2014/07/14 09:05	2014/07/14 10:00	2014/07/14 10:00		2014/07/14 08:40		
COC Number		97206-01-01	97206-01-01	97206-01-01	97206-01-01		97206-01-01		
	Units	COA-SW3-Q2	COA-SW3-Q2 Lab-Dup	COA-SW4-Q2	COA-SW4-Q2 Lab-Dup	QC Batch	COA-SW7-Q2	RDL	QC Batch

CONVENTIONALS									
Conductivity	mS/cm	0.030	N/A	0.033	N/A	1333890	0.012	0.001	1333890
Nitrates (N-NO ₃ -)	mg/L	0.22	N/A	0.85	N/A	1334626	<0.02	0.02	1334626
Nitrites (N-NO ₂ -)	mg/L	<0.02	N/A	<0.02	N/A	1334626	<0.02	0.02	1334626
Nitrogen ammonia (N-NH ₃)	mg/L	0.04	N/A	0.03	N/A	1334927	0.02	0.02	1334927
Orthophosphate (P)	mg/L	<0.01	N/A	<0.01	N/A	1333884	<0.01	0.01	1333884
pH	pH	7.21	N/A	7.14	N/A	1333885	6.43	N/A	1333885
Phenols-4AAP	mg/L	<0.002	N/A	<0.002	N/A	1335550	<0.002	0.002	1335550
Reactive silica (SiO ₂)	mg/L	2.8	N/A	4.4	N/A	1334021	1.9	0.1	1334021
Real Color	UCV	10	N/A	8	N/A	1333962	4	2	1333962
Sulfides (S ₂ -)	mg/L	<0.02	N/A	<0.02	N/A	1333971	<0.02	0.02	1334623
Turbidity	NTU	16	16	27	27	1333968	0.5	0.1	1333968
Alkalinity Total (as CaCO ₃) pH 4.5	mg/L	12	N/A	9	N/A	1333886	4	1	1333886
Bicarbonates (HCO ₃ as CaCO ₃)	mg/L	12	N/A	9	N/A	1333886	4	1	1333886
Carbonate (CO ₃ as CaCO ₃)	mg/L	<1	N/A	<1	N/A	1333886	<1	1	1333886
Chloride (Cl)	mg/L	0.32	N/A	1.1	N/A	1334636	0.08	0.05	1334636
Nitrate (N) and Nitrite(N)	mg/L	0.22	N/A	0.85	N/A	1334636	<0.02	0.02	1334636
Sulfates (SO ₄)	mg/L	1.8	N/A	1.4	N/A	1334636	0.5	0.5	1334636
Total Dissolved Solids	mg/L	17	N/A	21	N/A	1334157	<10	10	1334157
Total suspended solids (TSS)	mg/L	<2	N/A	4	N/A	1333852	<2	2	1333852

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 N/A = Not Applicable

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		Z07940	Z07940	Z07941	Z07941	Z07942	Z07942		
Sampling Date		2014/07/14 07:30	2014/07/14 07:30	2014/07/14 11:20	2014/07/14 11:20	2014/07/14 09:30	2014/07/14 09:30		
COC Number		97206-01-01	97206-01-01	97206-01-01	97206-01-01	97206-01-01	97206-01-01		
	Units	COA-SW8-Q2	COA-SW8-Q2 Lab-Dup	COA-SW9-Q2	COA-SW9-Q2 Lab-Dup	COA-SW10-Q2	COA-SW10-Q2 Lab-Dup	RDL	QC Batch

CONVENTIONALS									
Conductivity	mS/cm	0.009	N/A	0.010	N/A	0.015	N/A	0.001	1333890
Nitrates (N-NO3-)	mg/L	<0.02	N/A	0.03	N/A	0.18	N/A	0.02	1334626
Nitrites (N-NO2-)	mg/L	<0.02	N/A	<0.02	N/A	<0.02	N/A	0.02	1334626
Nitrogen ammonia (N-NH3)	mg/L	0.02	N/A	0.03	0.03	0.03	N/A	0.02	1334927
Orthophosphate (P)	mg/L	<0.01	N/A	<0.01	N/A	0.01	N/A	0.01	1333884
pH	pH	6.41	N/A	6.47	N/A	6.75	N/A	N/A	1333885
Phenols-4AAP	mg/L	<0.002	N/A	<0.002	<0.002	<0.002	N/A	0.002	1335550
Reactive silica (SiO2)	mg/L	3.2	N/A	0.1	N/A	1.4	N/A	0.1	1334021
Real Color	UCV	7	N/A	17	N/A	190	N/A	2	1333962
Sulfides (S2-)	mg/L	<0.02	N/A	<0.02	N/A	<0.02	N/A	0.02	1334623
Turbidity	NTU	0.3	0.3	1.3	N/A	200	190	0.1	1333968
Alkalinity Total (as CaCO3) pH 4.5	mg/L	4	N/A	3	N/A	6	N/A	1	1333886
Bicarbonates (HCO3 as CaCO3)	mg/L	4	N/A	3	N/A	6	N/A	1	1333886
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	<1	N/A	<1	N/A	1	1333886
Chloride (Cl)	mg/L	<0.05	N/A	0.12	N/A	0.12	N/A	0.05	1334636
Nitrate (N) and Nitrite(N)	mg/L	<0.02	N/A	0.03	N/A	0.18	N/A	0.02	1334636
Sulfates (SO4)	mg/L	<0.5	N/A	1.1	N/A	0.5	N/A	0.5	1334636
Total Dissolved Solids	mg/L	<10	N/A	<10	N/A	57	N/A	10	1334157
Total suspended solids (TSS)	mg/L	<2	N/A	<2	N/A	33	35	2	1333852

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		Z07943	Z07943	Z07944		
Sampling Date		2014/07/14 08:00	2014/07/14 08:00	2014/07/14 10:45		
COC Number		97206-01-01	97206-01-01	97206-01-01		
	Units	COA-SW13-Q2	COA-SW13-Q2 Lab-Dup	COA-GW1-Q2	RDL	QC Batch
CONVENTIONALS						
Conductivity	mS/cm	0.014	N/A	0.026	0.001	1333890
Nitrates (N-NO3-)	mg/L	0.02	<0.02	1.6	0.02	1334626
Nitrites (N-NO2-)	mg/L	<0.02	<0.02	<0.02	0.02	1334626
Nitrogen ammonia (N-NH3)	mg/L	0.02	N/A	0.04	0.02	1334927
Orthophosphate (P)	mg/L	<0.01	N/A	<0.01	0.01	1333884
pH	pH	6.82	N/A	6.56	N/A	1333885
Phenols-4AAP	mg/L	<0.002	N/A	<0.002	0.002	1335550
Reactive silica (SiO2)	mg/L	1.0	N/A	3.6	0.1	1334021
Real Color	UCV	5	5	5	2	1333962
Sulfides (S2-)	mg/L	<0.02	N/A	<0.02	0.02	1334623
Turbidity	NTU	0.7	N/A	1.6	0.1	1333968
Alkalinity Total (as CaCO3) pH 4.5	mg/L	6	N/A	5	1	1333886
Bicarbonates (HCO3 as CaCO3)	mg/L	6	N/A	5	1	1333886
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	<1	1	1333886
Chloride (Cl)	mg/L	0.06	0.07	0.23	0.05	1334636
Nitrate (N) and Nitrite(N)	mg/L	0.02	<0.02	1.6	0.02	1334636
Sulfates (SO4)	mg/L	<0.5	<0.5	<0.5	0.5	1334636
Total Dissolved Solids	mg/L	<10	N/A	16	10	1334157
Total suspended solids (TSS)	mg/L	<2	N/A	<2	2	1333852
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable						

Maxxam Job #: B441557
Report Date: 2014/07/23

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY MONITORING
Site Location: TSMC
Your P.O. #: 2200000001

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD

HYDROCARBONS BY GCFID (WATER)

Please note that the results have not been corrected for QC recoveries (spiked blank and surrogates). Please note that the results have been corrected for the method blank.

METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

TOTAL EXTRACTABLE METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

Results relate only to the items tested.

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
1333852	MCC	Spiked Blank	Total suspended solids (TSS)	2014/07/15		92	%
1333852	MCC	Method Blank	Total suspended solids (TSS)	2014/07/15	<2		mg/L
1333884	CG0	QC Standard	Orthophosphate (P)	2014/07/15		106	%
1333884	CG0	Method Blank	Orthophosphate (P)	2014/07/15	<0.01		mg/L
1333885	CG0	QC Standard	pH	2014/07/15		99	%
1333886	CG0	QC Standard	Alkalinity Total (as CaCO ₃) pH 4.5	2014/07/15		99	%
1333886	CG0	Method Blank	Alkalinity Total (as CaCO ₃) pH 4.5	2014/07/15	<1		mg/L
1333890	CG0	QC Standard	Conductivity	2014/07/15		100	%
1333890	CG0	Method Blank	Conductivity	2014/07/15	<0.001		mS/cm
1333962	CG0	Spiked Blank	Real Color	2014/07/15		96	%
1333962	CG0	Method Blank	Real Color	2014/07/15	<2		UCV
1333968	FTN	Spiked Blank	Turbidity	2014/07/15		98	%
1333968	FTN	Method Blank	Turbidity	2014/07/15	<0.1		NTU
1333971	BD	Spiked Blank	Sulfides (S ₂ -)	2014/07/15		94	%
1333971	BD	Method Blank	Sulfides (S ₂ -)	2014/07/15	<0.02		mg/L
1334021	CG0	QC Standard	Reactive silica (SiO ₂)	2014/07/15		96	%
1334021	CG0	Method Blank	Reactive silica (SiO ₂)	2014/07/15	0.1 , RDL=0.1		mg/L
1334105	JFB	QC Standard	Aluminum (Al)	2014/07/17		116	%
			Antimony (Sb)	2014/07/17		115	%
			Arsenic (As)	2014/07/17		112	%
			Barium (Ba)	2014/07/17		110	%
			Beryllium (Be)	2014/07/17		108	%
			Boron (B)	2014/07/17		103	%
			Cadmium (Cd)	2014/07/17		107	%
			Calcium (Ca)	2014/07/17		115	%
			Chromium (Cr)	2014/07/17		110	%
			Cobalt (Co)	2014/07/17		111	%
			Copper (Cu)	2014/07/17		110	%
			Iron (Fe)	2014/07/17		109	%
			Magnesium (Mg)	2014/07/17		115	%
			Manganese (Mn)	2014/07/17		112	%
			Molybdenum (Mo)	2014/07/17		104	%
			Nickel (Ni)	2014/07/17		111	%
			Total phosphorous	2014/07/17		107	%
			Lead (Pb)	2014/07/17		113	%
			Potassium (K)	2014/07/17		113	%
			Selenium (Se)	2014/07/17		108	%
			Sodium (Na)	2014/07/17		109	%
			Strontium (Sr)	2014/07/17		108	%
			Thallium (Tl)	2014/07/17		115	%
			Uranium (U)	2014/07/17		111	%
			Vanadium (V)	2014/07/17		107	%
			Zinc (Zn)	2014/07/17		113	%
1334105	JFB	Spiked Blank	Aluminum (Al)	2014/07/17		103	%
			Antimony (Sb)	2014/07/17		101	%
			Silver (Ag)	2014/07/17		98	%
			Arsenic (As)	2014/07/17		105	%
			Barium (Ba)	2014/07/17		101	%
			Beryllium (Be)	2014/07/17		103	%
			Bismuth (Bi)	2014/07/17		106	%

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Boron (B)	2014/07/17		105	%
			Cadmium (Cd)	2014/07/17		99	%
			Calcium (Ca)	2014/07/17		107	%
			Chromium (Cr)	2014/07/17		102	%
			Cobalt (Co)	2014/07/17		100	%
			Copper (Cu)	2014/07/17		103	%
			Tin (Sn)	2014/07/17		99	%
			Iron (Fe)	2014/07/17		102	%
			Magnesium (Mg)	2014/07/17		107	%
			Manganese (Mn)	2014/07/17		109	%
			Molybdenum (Mo)	2014/07/17		99	%
			Mercury (Hg)	2014/07/17		111	%
			Nickel (Ni)	2014/07/17		102	%
			Total phosphorous	2014/07/17		101	%
			Lead (Pb)	2014/07/17		105	%
			Potassium (K)	2014/07/17		107	%
			Selenium (Se)	2014/07/17		101	%
			Sodium (Na)	2014/07/17		103	%
			Strontium (Sr)	2014/07/17		105	%
			Thallium (Tl)	2014/07/17		104	%
			Titanium (Ti)	2014/07/17		109	%
			Uranium (U)	2014/07/17		106	%
			Vanadium (V)	2014/07/17		104	%
			Zinc (Zn)	2014/07/17		104	%
1334105	JFB	Method Blank	Aluminum (Al)	2014/07/17	14 , RDL=10		ug/L
			Antimony (Sb)	2014/07/17	<1.0		ug/L
			Silver (Ag)	2014/07/17	<1.0		ug/L
			Arsenic (As)	2014/07/17	<1.0		ug/L
			Barium (Ba)	2014/07/17	<2.0		ug/L
			Beryllium (Be)	2014/07/17	<2.0		ug/L
			Bismuth (Bi)	2014/07/17	<1.0		ug/L
			Boron (B)	2014/07/17	<50		ug/L
			Cadmium (Cd)	2014/07/17	<0.20		ug/L
			Calcium (Ca)	2014/07/17	<500		ug/L
			Chromium (Cr)	2014/07/17	<5.0		ug/L
			Cobalt (Co)	2014/07/17	<1.0		ug/L
			Copper (Cu)	2014/07/17	<1.0		ug/L
			Total Hardness (CaCO3)	2014/07/17	<1000		ug/L
			Tin (Sn)	2014/07/17	<2.0		ug/L
			Iron (Fe)	2014/07/17	<60		ug/L
			Magnesium (Mg)	2014/07/17	<100		ug/L
			Manganese (Mn)	2014/07/17	<1.0		ug/L
			Molybdenum (Mo)	2014/07/17	<1.0		ug/L
			Mercury (Hg)	2014/07/17	<0.10		ug/L
			Nickel (Ni)	2014/07/17	<2.0		ug/L
			Total phosphorous	2014/07/17	<10		ug/L
			Lead (Pb)	2014/07/17	<0.50		ug/L
			Potassium (K)	2014/07/17	<500		ug/L
			Selenium (Se)	2014/07/17	<3.0		ug/L
			Sodium (Na)	2014/07/17	<500		ug/L

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Strontium (Sr)	2014/07/17	<2.0		ug/L
			Thallium (Tl)	2014/07/17	<2.0		ug/L
			Titanium (Ti)	2014/07/17	<10		ug/L
			Uranium (U)	2014/07/17	<1.0		ug/L
			Vanadium (V)	2014/07/17	<2.0		ug/L
			Zinc (Zn)	2014/07/17	<7.0		ug/L
1334157	MCC	Spiked Blank	Total Dissolved Solids	2014/07/16		103	%
1334157	MCC	Method Blank	Total Dissolved Solids	2014/07/16	<10		mg/L
1334623	BD	QC Standard	Sulfides (S2-)	2014/07/16		88	%
1334623	BD	Method Blank	Sulfides (S2-)	2014/07/16	<0.02		mg/L
1334626	FS	Spiked Blank	Nitrates (N-NO3-)	2014/07/17		101	%
			Nitrites (N-NO2-)	2014/07/17		105	%
1334626	FS	Method Blank	Nitrates (N-NO3-)	2014/07/17	<0.02		mg/L
			Nitrites (N-NO2-)	2014/07/17	<0.02		mg/L
1334636	FS	Spiked Blank	Chloride (Cl)	2014/07/17		98	%
			Nitrate (N) and Nitrite(N)	2014/07/17		103	%
			Sulfates (SO4)	2014/07/17		99	%
1334636	FS	Method Blank	Chloride (Cl)	2014/07/17	<0.05		mg/L
			Nitrate (N) and Nitrite(N)	2014/07/17	<0.02		mg/L
			Sulfates (SO4)	2014/07/17	<0.5		mg/L
1334806	GM2	Spiked Blank	1-Chlorooctadecane	2014/07/18		94	%
			Petroleum Hydrocarbons (C10-C50)	2014/07/18		94	%
1334806	GM2	Method Blank	1-Chlorooctadecane	2014/07/18		87	%
			Petroleum Hydrocarbons (C10-C50)	2014/07/18	150 , RDL=100		ug/L
1334927	DKH	QC Standard	Nitrogen ammonia (N-NH3)	2014/07/17		97	%
1334927	DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2014/07/17		98	%
1334927	DKH	Method Blank	Nitrogen ammonia (N-NH3)	2014/07/17	<0.02		mg/L
1335005	JS2	QC Standard	Aluminum (Al)	2014/07/18		102	%
			Antimony (Sb)	2014/07/18		107	%
			Silver (Ag)	2014/07/18		107	%
			Arsenic (As)	2014/07/18		100	%
			Barium (Ba)	2014/07/18		103	%
			Beryllium (Be)	2014/07/18		96	%
			Boron (B)	2014/07/18		102	%
			Cadmium (Cd)	2014/07/18		99	%
			Chromium (Cr)	2014/07/18		103	%
			Cobalt (Co)	2014/07/18		102	%
			Copper (Cu)	2014/07/18		97	%
			Iron (Fe)	2014/07/18		98	%
			Manganese (Mn)	2014/07/18		106	%
			Molybdenum (Mo)	2014/07/18		108	%
			Nickel (Ni)	2014/07/18		97	%
			Lead (Pb)	2014/07/18		102	%
			Selenium (Se)	2014/07/18		96	%
			Strontium (Sr)	2014/07/18		101	%
			Thallium (Tl)	2014/07/18		106	%
			Vanadium (V)	2014/07/18		98	%
			Zinc (Zn)	2014/07/18		95	%
1335005	JS2	Spiked Blank	Aluminum (Al)	2014/07/18		101	%
			Antimony (Sb)	2014/07/18		104	%

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUARTERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Silver (Ag)	2014/07/18		102	%
			Arsenic (As)	2014/07/18		101	%
			Barium (Ba)	2014/07/18		100	%
			Beryllium (Be)	2014/07/18		100	%
			Bismuth (Bi)	2014/07/18		98	%
			Boron (B)	2014/07/18		104	%
			Cadmium (Cd)	2014/07/18		101	%
			Calcium (Ca)	2014/07/18		101	%
			Chromium (Cr)	2014/07/18		98	%
			Cobalt (Co)	2014/07/18		96	%
			Copper (Cu)	2014/07/18		95	%
			Tin (Sn)	2014/07/18		104	%
			Iron (Fe)	2014/07/18		101	%
			Magnesium (Mg)	2014/07/18		102	%
			Manganese (Mn)	2014/07/18		102	%
			Molybdenum (Mo)	2014/07/18		102	%
			Mercury (Hg)	2014/07/18		97	%
			Nickel (Ni)	2014/07/18		98	%
			Total phosphorous	2014/07/18		99	%
			Lead (Pb)	2014/07/18		99	%
			Potassium (K)	2014/07/18		102	%
			Selenium (Se)	2014/07/18		97	%
			Sodium (Na)	2014/07/18		105	%
			Strontium (Sr)	2014/07/18		95	%
			Thallium (Tl)	2014/07/18		100	%
			Titanium (Ti)	2014/07/18		99	%
			Uranium (U)	2014/07/18		92	%
			Vanadium (V)	2014/07/18		98	%
			Zinc (Zn)	2014/07/18		94	%
1335005	JS2	Method Blank	Aluminum (Al)	2014/07/18	<10		ug/L
			Antimony (Sb)	2014/07/18	<1.0		ug/L
			Silver (Ag)	2014/07/18	<1.0		ug/L
			Arsenic (As)	2014/07/18	<1.0		ug/L
			Barium (Ba)	2014/07/18	<2.0		ug/L
			Beryllium (Be)	2014/07/18	<2.0		ug/L
			Bismuth (Bi)	2014/07/18	<1.0		ug/L
			Boron (B)	2014/07/18	<50		ug/L
			Cadmium (Cd)	2014/07/18	<0.20		ug/L
			Calcium (Ca)	2014/07/18	<500		ug/L
			Chromium (Cr)	2014/07/18	<5.0		ug/L
			Cobalt (Co)	2014/07/18	<1.0		ug/L
			Copper (Cu)	2014/07/18	<1.0		ug/L
			Total Hardness (CaCO3)	2014/07/18	<1000		ug/L
			Tin (Sn)	2014/07/18	<2.0		ug/L
			Iron (Fe)	2014/07/18	<60		ug/L
			Magnesium (Mg)	2014/07/18	<100		ug/L
			Manganese (Mn)	2014/07/18	<1.0		ug/L
			Molybdenum (Mo)	2014/07/18	<1.0		ug/L
			Mercury (Hg)	2014/07/18	<0.10		ug/L
			Nickel (Ni)	2014/07/18	<2.0		ug/L
			Total phosphorous	2014/07/18	<10		ug/L

Maxxam Job #: B441557
 Report Date: 2014/07/23

 TATA STEEL MINERALS CANADA
 Client Project #: QUATERLY MONITORING
 Site Location: TSMC
 Your P.O. #: 2200000001

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Lead (Pb)	2014/07/18	<0.50		ug/L
			Potassium (K)	2014/07/18	<500		ug/L
			Selenium (Se)	2014/07/18	<3.0		ug/L
			Sodium (Na)	2014/07/18	<500		ug/L
			Strontium (Sr)	2014/07/18	<2.0		ug/L
			Thallium (Tl)	2014/07/18	<2.0		ug/L
			Titanium (Ti)	2014/07/18	<10		ug/L
			Uranium (U)	2014/07/18	<1.0		ug/L
			Vanadium (V)	2014/07/18	<2.0		ug/L
			Zinc (Zn)	2014/07/18	<7.0		ug/L
1335550	CC6	QC Standard	Phenols-4AAP	2014/07/18		99	%
1335550	CC6	Spiked Blank	Phenols-4AAP	2014/07/18		102	%
1335550	CC6	Method Blank	Phenols-4AAP	2014/07/18	<0.002		mg/L
1336290	CC6	QC Standard	Mercury (Hg)	2014/07/22		99	%
1336290	CC6	Spiked Blank	Mercury (Hg)	2014/07/22		96	%
1336290	CC6	Method Blank	Mercury (Hg)	2014/07/22	<0.00001		mg/L

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

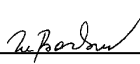

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

Maxxam Job #: B441557
Report Date: 2014/07/23

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY MONITORING
Site Location: TSMC
Your P.O. #: 2200000001

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Delia Barbul, B.Sc., Chemist




Dochka Koleva Hristo, B.Sc., Chemist




Emmanuelle Caron, Ph.D., chimiste




Galya Minkova, B.Sc. Chimiste, Analyste II




Jonathan Fauvel, B.Sc, Chimiste, Analyste II




Madina Hamrouni, B.Sc., Chemist




Mathieu Letourneau, B.Sc., chimist, Customer Service

Maxxam Job #: B441557
Report Date: 2014/07/23

TATA STEEL MINERALS CANADA
Client Project #: QUATERLY MONITORING
Site Location: TSMC
Your P.O. #: 2200000001

VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your P.O. #: 2200000001
Your Project #: QUARTERLY MONITORING
Site#: TSMC
Your C.O.C. #: 82546-05-01

Attention:Loic Didillon

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Report Date: 2014/09/02
Report #: R1913633
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B451327

Received: 2014/08/21, 08:30

Sample Matrix: WATER
Samples Received: 5

Analyses	Quantity	Date	Date	Laboratory Method	Primary Reference
		Extracted	Analyzed		
Total Alkalinity (pH end point 4.5)***	5	N/A	2014/08/21	QUE SOP-00142	MA.303-TitrAuto 2.1
Anions (1)*	5	N/A	2014/08/28	STL SOP-00014	MA300-Ions 1.3 R2 m
Petroleum Hydrocarbons (C10-C50)*	1	2014/08/25	2014/08/25	QUE SOP-00209	MA. 400 - Hyd. 1.1
Real Color*	5	N/A	2014/08/21	QUE SOP-00115	MA. 103 - Col. 2.0
Conductivity*	4	N/A	2014/08/21	QUE SOP-00142	MA.303-TitrAuto 2.1
Conductivity*	1	N/A	2014/08/28	QUE SOP-00142	MA.303-TitrAuto 2.1
Dissolved Organic Carbon (1, 2)***	5	2014/08/28	2014/08/28	STL SOP-00243	SM 21 5310-B m
Total Extractable Mercury - Cold Vapour (1)***	5	2014/08/25	2014/08/26	STL SOP-00042	MA200-Hg 1.1 R1 m
Total Suspended Solids*	5	2014/08/22	2014/08/22	QUE SOP-00111	SM 2540 D
Total Extractable Metals (Low Level) (1)*	5	2014/08/25	2014/08/25	STL SOP-00006	MA200-Mét 1.2 R4 m
Ammonia Nitrogen (1)*	5	N/A	2014/08/27	STL SOP-00040	MA300-N 2.0 R1 m
Nitrate and/or Nitrite (1)*	5	N/A	2014/08/28	STL SOP-00014	MA300-Ions 1.3 R2 m
pH*	5	N/A	2014/08/21	QUE SOP-00142	MA.303-TitrAuto 2.1
Total Phenols by 4-AAP (1)*	5	2014/08/28	2014/08/28	STL SOP-00033	MA404-I.Phé 2.2 R2 m
Ortho Phosphate*	5	N/A	2014/08/21	QUE SOP-00121	MA.303 - P 1.1
Sulfides (S2-)*	3	2014/08/25	2014/08/25	QUE SOP-00107	MA 300 - S 1.1
Sulfides (S2-)*	2	2014/08/26	2014/08/26	QUE SOP-00107	MA 300 - S 1.1
Reactive Silica (SiO2)***	5	N/A	2014/08/22	QUE SOP-00132	HACH, Method 8186
Total Dissolved Solids*	5	2014/08/22	2014/08/22	QUE SOP-00119	MA. 103 - S.T. 1.0
Total Organic Carbon (1, 3)*	5	N/A	2014/08/28	STL SOP-00243	SM 21 5310-B m
Turbidity*	5	N/A	2014/08/21	QUE SOP-00118	MA.103-TUR. 1.0

Note: RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam -Ville St. Laurent
- (2) DOC present in the sample should be considered as non-purgeable DOC
- (3) TOC present in the sample should be considered as non-purgeable TOC

* Maxxam is accredited as per the MDDELCC program.
*** This analysis is not subject to MDDELCC accreditation.

Your P.O. #: 2200000001
Your Project #: QUARTERLY MONITORING
Site#: TSMC
Your C.O.C. #: 82546-05-01

Attention:Loic Didillon

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Report Date: 2014/09/02
Report #: R1913633
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B451327
Received: 2014/08/21, 08:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathieu Letourneau, B.Sc., chimist, Customer Service

Email: MLetourneau@maxxam.ca

Phone# (418) 658-5784

=====
This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

HYDROCARBONS BY GCFID (WATER)

Maxxam ID		Z54967		
Sampling Date		2014/08/20		
COC Number		82546-05-01		
	Units	COA-SW10-Q3	RDL	QC Batch
PETROLEUM HYDROCARBONS				
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	100	1352015
Surrogate Recovery (%)				
1-Chlorooctadecane	%	102	N/A	1352015
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				
N/A = Not Applicable				

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

METALS (WATER)

Maxxam ID		Z54855	Z54965	Z54966	Z54967	Z54968		
Sampling Date		2014/08/20	2014/08/20	2014/08/20	2014/08/20	2014/08/20		
COC Number		82546-05-01	82546-05-01	82546-05-01	82546-05-01	82546-05-01		
	Units	COA-SW3-Q3	COA-SW7-Q3	COA-SW9-Q3	COA-SW10-Q3	COA-SW13-Q3	RDL	QC Batch

METALS								
Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	1352000

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

TOTAL EXTRACTABLE METALS (WATER)

Maxxam ID		Z54855	Z54965	Z54966	Z54967	Z54968		
Sampling Date		2014/08/20	2014/08/20	2014/08/20	2014/08/20	2014/08/20		
COC Number		82546-05-01	82546-05-01	82546-05-01	82546-05-01	82546-05-01		
	Units	COA-SW3-Q3	COA-SW7-Q3	COA-SW9-Q3	COA-SW10-Q3	COA-SW13-Q3	RDL	QC Batch
METALS ICP-MS								
Aluminum (Al)	ug/L	20	13	82	840	13	10	1352155
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1352155
Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1352155
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	1.2	<1.0	1.0	1352155
Barium (Ba)	ug/L	5.8	<2.0	2.2	7.1	<2.0	2.0	1352155
Beryllium (Be)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1352155
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1352155
Boron (B)	ug/L	<50	<50	<50	<50	<50	50	1352155
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	1352155
Calcium (Ca)	ug/L	1800	<500	<500	570	<500	500	1352155
Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	1352155
Cobalt (Co)	ug/L	<1.0	<1.0	<1.0	1.0	<1.0	1.0	1352155
Copper (Cu)	ug/L	<1.0	<1.0	1.1	2.6	<1.0	1.0	1352155
Total Hardness (CaCO3)	ug/L	10000	2400	<1000	3900	1300	1000	1352155
Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1352155
Iron (Fe)	ug/L	<60	<60	710	3200	84	60	1352155
Magnesium (Mg)	ug/L	1400	330	<100	600	190	100	1352155
Manganese (Mn)	ug/L	3.2	1.9	31	56	3.0	1.0	1352155
Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1352155
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1352155
Total phosphorous	ug/L	<10	<10	25	42	21	10	1352155
Lead (Pb)	ug/L	<0.50	<0.50	<0.50	0.65	<0.50	0.50	1352155
Potassium (K)	ug/L	<500	<500	<500	550	<500	500	1352155
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	1352155
Sodium (Na)	ug/L	550	610	<500	<500	<500	500	1352155
Strontium (Sr)	ug/L	5.8	3.2	2.1	3.3	<2.0	2.0	1352155
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1352155
Titanium (Ti)	ug/L	<10	<10	<10	33	<10	10	1352155
Uranium (U)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1352155
Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1352155
Zinc (Zn)	ug/L	<7.0	8.5	27	16	11	7.0	1352155
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		Z54855		Z54855		Z54965		Z54966		
Sampling Date		2014/08/20		2014/08/20		2014/08/20		2014/08/20		
COC Number		82546-05-01		82546-05-01		82546-05-01		82546-05-01		
	Units	COA-SW3-Q3	RDL	COA-SW3-Q3 Lab-Dup	QC Batch	COA-SW7-Q3	QC Batch	COA-SW9-Q3	RDL	QC Batch

CONVENTIONALS										
Conductivity	mS/cm	0.021	0.001	N/A	1354202	0.006	1350960	0.037	0.001	1350960
Dissolved organic carbon	mg/L	0.7	0.2	N/A	1354109	1.2	1354109	2.6	0.2	1354109
Nitrates (N-NO3-)	mg/L	0.16	0.02	N/A	1353100	<0.02	1353100	<0.02	0.02	1353100
Nitrites (N-NO2-)	mg/L	<0.02	0.02	N/A	1353100	<0.02	1353100	<0.02	0.02	1353100
Nitrogen ammonia (N-NH3)	mg/L	<0.02	0.02	N/A	1353223	<0.02	1353223	0.05	0.02	1353223
Orthophosphate (P)	mg/L	<0.01	0.01	N/A	1350985	0.01	1350985	<0.01	0.01	1350985
pH	pH	3.01	N/A	2.99	1350957	5.91	1350957	6.87	N/A	1350957
Phenols-4AAP	mg/L	0.002	0.002	N/A	1353975	0.002	1353975	0.003	0.002	1353975
Reactive silica (SiO2)	mg/L	2.6	0.1	N/A	1351821	1.8	1351821	0.2	0.1	1351821
Real Color	UCV	<2	2	N/A	1350988	3	1350988	20	2	1350988
Sulfides (S2-)	mg/L	<0.02	0.02	N/A	1352364	<0.02	1352364	<0.02	0.02	1352489
Total Organic Carbon	mg/L	0.7	0.2	N/A	1354135	1.2	1354135	4.7	0.2	1354135
Turbidity	NTU	2.9	0.1	N/A	1350972	0.6	1350972	0.9	0.1	1350972
Alkalinity Total (as CaCO3) pH 4.5	mg/L	<1	1	N/A	1350959	3	1350959	6	1	1350959
Bicarbonates (HCO3 as CaCO3)	mg/L	<1	1	N/A	1350959	3	1350959	6	1	1350959
Carbonate (CO3 as CaCO3)	mg/L	<1	1	N/A	1350959	<1	1350959	<1	1	1350959
Chloride (Cl)	mg/L	0.32	0.05	N/A	1353102	0.08	1353102	0.05	0.05	1353102
Sulfates (SO4)	mg/L	1.7	0.5	N/A	1353102	<0.5	1353102	1.6	0.5	1353102
Total Dissolved Solids	mg/L	25	10	N/A	1351308	11	1351308	20	10	1351308
Total suspended solids (TSS)	mg/L	<2	2	N/A	1351233	<2	1351233	<2	2	1351233

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		Z54967	Z54967		Z54968	Z54968		
Sampling Date		2014/08/20	2014/08/20		2014/08/20	2014/08/20		
COC Number		82546-05-01	82546-05-01		82546-05-01	82546-05-01		
	Units	COA-SW10-Q3	COA-SW10-Q3 Lab-Dup	QC Batch	COA-SW13-Q3	COA-SW13-Q3 Lab-Dup	RDL	QC Batch
CONVENTIONALS								
Conductivity	mS/cm	0.007	N/A	1350960	0.004	N/A	0.001	1350960
Dissolved organic carbon	mg/L	1.6	N/A	1354109	1.8	N/A	0.2	1354109
Nitrates (N-NO3-)	mg/L	0.13	N/A	1353100	<0.02	<0.02	0.02	1353100
Nitrites (N-NO2-)	mg/L	<0.02	N/A	1353100	<0.02	<0.02	0.02	1353100
Nitrogen ammonia (N-NH3)	mg/L	<0.02	N/A	1353223	<0.02	N/A	0.02	1353223
Orthophosphate (P)	mg/L	0.02	N/A	1350985	<0.01	N/A	0.01	1350985
pH	pH	6.12	N/A	1350957	5.85	N/A	N/A	1350957
Phenols-4AAP	mg/L	0.002	N/A	1353975	0.002	N/A	0.002	1353975
Reactive silica (SiO2)	mg/L	0.7	N/A	1351821	0.7	N/A	0.1	1351821
Real Color	UCV	140	N/A	1350988	5	N/A	2	1350988
Sulfides (S2-)	mg/L	<0.02	N/A	1352489	<0.02	N/A	0.02	1352364
Total Organic Carbon	mg/L	3.1	N/A	1354135	1.9	N/A	0.2	1354135
Turbidity	NTU	63	63	1350972	0.7	N/A	0.1	1350972
Alkalinity Total (as CaCO3) pH 4.5	mg/L	2	N/A	1350959	<1	N/A	1	1350959
Bicarbonates (HCO3 as CaCO3)	mg/L	2	N/A	1350959	<1	N/A	1	1350959
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	1350959	<1	N/A	1	1350959
Chloride (Cl)	mg/L	0.10	N/A	1353102	0.06	0.10	0.05	1353102
Sulfates (SO4)	mg/L	<0.5	N/A	1353102	<0.5	<0.5	0.5	1353102
Total Dissolved Solids	mg/L	32	N/A	1351308	15	N/A	10	1351308
Total suspended solids (TSS)	mg/L	8	N/A	1351233	<2	N/A	2	1351233
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable								

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD except for the following:

Dissolved Organic Carbon: Analyses requested past holding time: Z54855, Z54965, Z54966, Z54967, Z54968

HYDROCARBONS BY GCFID (WATER)

Please note that the results have not been corrected for QC recoveries (spiked blank and surrogates). Please note that the results have been corrected for the method blank.

METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

TOTAL EXTRACTABLE METALS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

Dissolve organic carbon: Samples received at the laboratory in between the 24hours following the sampling. Filtration and preservation of samples performed past holding time.

Results relate only to the items tested.

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
	1350957	CG0	QC Standard	pH	2014/08/21		99	%
	1350959	CG0	QC Standard	Alkalinity Total (as CaCO3) pH 4.5	2014/08/21		103	%
	1350959	CG0	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2014/08/21	<1		mg/L
	1350960	CG0	QC Standard	Conductivity	2014/08/21		99	%
	1350960	CG0	Method Blank	Conductivity	2014/08/21	<0.001		mS/cm
	1350972	CG0	Spiked Blank	Turbidity	2014/08/21		94	%
	1350972	CG0	Method Blank	Turbidity	2014/08/21	<0.1		NTU
	1350985	CG0	QC Standard	Orthophosphate (P)	2014/08/21		106	%
	1350985	CG0	Method Blank	Orthophosphate (P)	2014/08/21	<0.01		mg/L
	1350988	CG0	Spiked Blank	Real Color	2014/08/21		100	%
	1350988	CG0	Method Blank	Real Color	2014/08/21	<2		UCV
	1351233	AG5	Spiked Blank	Total suspended solids (TSS)	2014/08/22		103	%
	1351233	AG5	Method Blank	Total suspended solids (TSS)	2014/08/22	<2		mg/L
	1351308	BD	Spiked Blank	Total Dissolved Solids	2014/08/22		106	%
	1351308	BD	Method Blank	Total Dissolved Solids	2014/08/22	<10		mg/L
	1351821	CG0	QC Standard	Reactive silica (SiO2)	2014/08/22		98	%
	1351821	CG0	Method Blank	Reactive silica (SiO2)	2014/08/22	<0.1		mg/L
	1352000	OZP	QC Standard	Mercury (Hg)	2014/08/26		108	%
	1352000	OZP	Spiked Blank	Mercury (Hg)	2014/08/26		101	%
	1352000	OZP	Method Blank	Mercury (Hg)	2014/08/26	<0.00001		mg/L
	1352015	VBO	Spiked Blank	1-Chlorooctadecane	2014/08/25		100	%
				Petroleum Hydrocarbons (C10-C50)	2014/08/25		103	%
	1352015	VBO	Method Blank	1-Chlorooctadecane	2014/08/29		97	%
				Petroleum Hydrocarbons (C10-C50)	2014/08/29	<100		ug/L
	1352155	JS2	QC Standard	Antimony (Sb)	2014/08/25		106	%
				Beryllium (Be)	2014/08/25		103	%
				Manganese (Mn)	2014/08/25		102	%
				Thallium (Tl)	2014/08/25		101	%
				Vanadium (V)	2014/08/25		101	%
	1352155	JS2	Spiked Blank	Aluminum (Al)	2014/08/25		99	%
				Antimony (Sb)	2014/08/25		104	%
				Silver (Ag)	2014/08/25		102	%
				Arsenic (As)	2014/08/25		101	%
				Barium (Ba)	2014/08/25		96	%
				Beryllium (Be)	2014/08/25		99	%
				Bismuth (Bi)	2014/08/25		103	%
				Boron (B)	2014/08/25		105	%
				Cadmium (Cd)	2014/08/25		97	%
				Calcium (Ca)	2014/08/25		95	%
				Chromium (Cr)	2014/08/25		96	%
				Cobalt (Co)	2014/08/25		94	%
				Copper (Cu)	2014/08/25		94	%
				Tin (Sn)	2014/08/25		106	%
				Iron (Fe)	2014/08/25		103	%
				Magnesium (Mg)	2014/08/25		102	%
				Manganese (Mn)	2014/08/25		102	%
				Molybdenum (Mo)	2014/08/25		104	%
				Nickel (Ni)	2014/08/25		95	%
				Total phosphorous	2014/08/25		96	%
				Lead (Pb)	2014/08/25		95	%
				Potassium (K)	2014/08/25		100	%

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
				Selenium (Se)	2014/08/25		95	%
				Sodium (Na)	2014/08/25		101	%
				Strontium (Sr)	2014/08/25		99	%
				Thallium (Tl)	2014/08/25		94	%
				Titanium (Ti)	2014/08/25		101	%
				Uranium (U)	2014/08/25		97	%
				Vanadium (V)	2014/08/25		97	%
				Zinc (Zn)	2014/08/25		98	%
1352155	JS2		Method Blank	Aluminum (Al)	2014/08/25	<10		ug/L
				Antimony (Sb)	2014/08/25	<1.0		ug/L
				Silver (Ag)	2014/08/25	<1.0		ug/L
				Arsenic (As)	2014/08/25	<1.0		ug/L
				Barium (Ba)	2014/08/25	<2.0		ug/L
				Beryllium (Be)	2014/08/25	<2.0		ug/L
				Bismuth (Bi)	2014/08/25	<1.0		ug/L
				Boron (B)	2014/08/25	<50		ug/L
				Cadmium (Cd)	2014/08/25	<0.20		ug/L
				Calcium (Ca)	2014/08/25	<500		ug/L
				Chromium (Cr)	2014/08/25	<5.0		ug/L
				Cobalt (Co)	2014/08/25	<1.0		ug/L
				Copper (Cu)	2014/08/25	<1.0		ug/L
				Total Hardness (CaCO3)	2014/08/25	<1000		ug/L
				Tin (Sn)	2014/08/25	<2.0		ug/L
				Iron (Fe)	2014/08/25	<60		ug/L
				Magnesium (Mg)	2014/08/25	<100		ug/L
				Manganese (Mn)	2014/08/25	<1.0		ug/L
				Molybdenum (Mo)	2014/08/25	<1.0		ug/L
				Nickel (Ni)	2014/08/25	<2.0		ug/L
				Total phosphorous	2014/08/25	<10		ug/L
				Lead (Pb)	2014/08/25	<0.50		ug/L
				Potassium (K)	2014/08/25	<500		ug/L
				Selenium (Se)	2014/08/25	<3.0		ug/L
				Sodium (Na)	2014/08/25	<500		ug/L
				Strontium (Sr)	2014/08/25	<2.0		ug/L
				Thallium (Tl)	2014/08/25	<2.0		ug/L
				Titanium (Ti)	2014/08/25	<10		ug/L
				Uranium (U)	2014/08/25	<1.0		ug/L
				Vanadium (V)	2014/08/25	<2.0		ug/L
				Zinc (Zn)	2014/08/25	<7.0		ug/L
1352364	AG5		QC Standard	Sulfides (S2-)	2014/08/25		87	%
1352364	AG5		Method Blank	Sulfides (S2-)	2014/08/25	<0.02		mg/L
1352489	AG5		QC Standard	Sulfides (S2-)	2014/08/26		95	%
1352489	AG5		Method Blank	Sulfides (S2-)	2014/08/26	<0.02		mg/L
1353100	VB		Spiked Blank	Nitrates (N-NO3-)	2014/08/27		103	%
				Nitrites (N-NO2-)	2014/08/27		104	%
1353100	VB		Method Blank	Nitrates (N-NO3-)	2014/08/27	<0.02		mg/L
				Nitrites (N-NO2-)	2014/08/27	<0.02		mg/L
1353102	VB		Spiked Blank	Chloride (Cl)	2014/08/27		99	%
				Sulfates (SO4)	2014/08/27		100	%
1353102	VB		Method Blank	Chloride (Cl)	2014/08/27	<0.05		mg/L
				Sulfates (SO4)	2014/08/27	<0.5		mg/L

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
	1353223	DKH	QC Standard	Nitrogen ammonia (N-NH3)	2014/08/27		100	%
	1353223	DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2014/08/27		90	%
	1353223	DKH	Method Blank	Nitrogen ammonia (N-NH3)	2014/08/27	<0.02		mg/L
	1353975	DB2	QC Standard	Phenols-4AAP	2014/08/28		96	%
	1353975	DB2	Spiked Blank	Phenols-4AAP	2014/08/28		97	%
	1353975	DB2	Method Blank	Phenols-4AAP	2014/08/28	<0.002		mg/L
	1354109	VB	Spiked Blank	Dissolved organic carbon	2014/08/28		102	%
	1354109	VB	Method Blank	Dissolved organic carbon	2014/08/28	1.7 , RDL=0.2		mg/L
	1354135	MR4	Spiked Blank	Total Organic Carbon	2014/08/28		105	%
	1354135	MR4	Method Blank	Total Organic Carbon	2014/08/28	0.3 , RDL=0.2		mg/L
	1354202	CG0	QC Standard	Conductivity	2014/08/28		101	%
	1354202	CG0	Method Blank	Conductivity	2014/08/28	<0.001		mS/cm

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Alexandre Lemire



Alexandre Lemire, M.Sc., Analyst 2

Delia Barbul



Delia Barbul, B.Sc., Chemist

Dochka Hristo



Dochka Koleva Hristo, B.Sc., Chemist

David Provencher



David Provencher, B.Sc., Chemist



Marc Bouchard

Marc Bouchard, B.Sc., Biochimiste, Québec

Madina Hamrouni



Madina Hamrouni, B.Sc., Chemist

Veronic Beausejour



Veronic Beausejour, B.Sc., Chemist, Supervisor

Maxxam Job #: B451327
Report Date: 2014/09/02

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Your P.O. #: 2200000001
Sampler Initials: LC

VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Attention: Loic Didillon

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Your P.O. #: 2200000001
Your Project #: QUARTERLY MONITORING
Site#: TSMC
Site Location: DSO3 1A
Your C.O.C. #: 96191-01-01

Report Date: 2014/09/08
Report #: R1915637
Version: 2R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B453121

Received: 2014/08/28, 18:00

Sample Matrix: SURFACE WATER
Samples Received: 1

Analyses	Quantity	Date	Date	Laboratory Method	Primary Reference
		Extracted	Analyzed		
Total Alkalinity (pH end point 4.5)***	1	N/A	2014/08/29	QUE SOP-00142	MA.303-TitrAuto 2.1
Anions*	1	N/A	2014/08/29	QUE SOP-00141	MA. 300-Ions 1.3
Anions*	1	N/A	2014/08/29	QUE SOP-00141	MA. 300-Ions 1.3
Real Color*	1	N/A	2014/08/29	QUE SOP-00115	MA. 103 - Col. 2.0
Conductivity*	1	N/A	2014/08/29	QUE SOP-00142	MA.303-TitrAuto 2.1
Dissolved Organic Carbon (1, 2)***	1	2014/08/30	2014/09/02	STL SOP-00243	SM 21 5310-B m
Total Extractable Mercury - Cold Vapour (1)***	1	2014/09/02	2014/09/03	STL SOP-00042	MA200-Hg 1.1 R1 m
Total Suspended Solids*	1	2014/08/29	2014/08/29	QUE SOP-00111	SM 2540 D
Total Extractable Metals (Low Level) (1)*	1	2014/09/03	2014/09/03	STL SOP-00006	MA200-Mét 1.2 R4 m
Ammonia Nitrogen (1)*	1	N/A	2014/09/02	STL SOP-00040	MA300-N 2.0 R1 m
pH*	1	N/A	2014/08/29	QUE SOP-00142	MA.303-TitrAuto 2.1
Total Phenols by 4-AAP (1)*	1	2014/09/03	2014/09/03	STL SOP-00033	MA404-I.Phé 2.2 R2 m
Ortho Phosphate*	1	N/A	2014/08/29	QUE SOP-00121	MA.303 - P 1.1
Sulfides (S2-)*	1	2014/08/29	2014/08/29	QUE SOP-00107	MA 300 - S 1.1
Reactive Silica (SiO2)***	1	N/A	2014/08/29	QUE SOP-00132	HACH, Method 8186
Total Dissolved Solids*	1	2014/09/02	2014/09/02	QUE SOP-00119	MA. 103 - S.T. 1.0
Turbidity*	1	N/A	2014/08/29	QUE SOP-00118	MA.103-TUR. 1.0

Note: RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam -Ville St. Laurent
- (2) DOC present in the sample should be considered as non-purgeable DOC

* Maxxam is accredited as per the MDDELCC program.
*** This analysis is not subject to MDDELCC accreditation.

Attention:Loic Didillon

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Your P.O. #: 2200000001
Your Project #: QUARTERLY MONITORING
Site#: TSMC
Site Location: DSO3 1A
Your C.O.C. #: 96191-01-01

Report Date: 2014/09/08
Report #: R1915637
Version: 2R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B453121

Received: 2014/08/28, 18:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Mathieu Letourneau, B.Sc., chimist, Customer Service
Email: MLetourneau@maxxam.ca
Phone# (418) 658-5784

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

METALS (SURFACE WATER)

Maxxam ID		Z64002		
Sampling Date		2014/08/28 09:00		
COC Number		96191-01-01		
	Units	COA-SW4-Q3	RDL	QC Batch
METALS				
Mercury (Hg)	mg/L	<0.00001	0.00001	1355271
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Maxxam ID		Z64002		
Sampling Date		2014/08/28 09:00		
COC Number		96191-01-01		
	Units	COA-SW4-Q3	RDL	QC Batch

METALS ICP-MS				
Aluminum (Al)	ug/L	22	10	1355975
Antimony (Sb)	ug/L	<1.0	1.0	1355975
Silver (Ag)	ug/L	<1.0	1.0	1355975
Arsenic (As)	ug/L	<1.0	1.0	1355975
Barium (Ba)	ug/L	2.4	2.0	1355975
Beryllium (Be)	ug/L	<2.0	2.0	1355975
Bismuth (Bi)	ug/L	<1.0	1.0	1355975
Boron (B)	ug/L	<50	50	1355975
Cadmium (Cd)	ug/L	<0.20	0.20	1355975
Calcium (Ca)	ug/L	1800	500	1355975
Chromium (Cr)	ug/L	<5.0	5.0	1355975
Cobalt (Co)	ug/L	<1.0	1.0	1355975
Copper (Cu)	ug/L	<1.0	1.0	1355975
Total Hardness (CaCO3)	ug/L	9900	1000	1355975
Tin (Sn)	ug/L	<2.0	2.0	1355975
Iron (Fe)	ug/L	86	60	1355975
Magnesium (Mg)	ug/L	1300	100	1355975
Manganese (Mn)	ug/L	8.0	1.0	1355975
Molybdenum (Mo)	ug/L	<1.0	1.0	1355975
Nickel (Ni)	ug/L	<2.0	2.0	1355975
Total phosphorous	ug/L	<10	10	1355975
Lead (Pb)	ug/L	<0.50	0.50	1355975
Potassium (K)	ug/L	<500	500	1355975
Selenium (Se)	ug/L	<3.0	3.0	1355975
Sodium (Na)	ug/L	1000	500	1355975
Strontium (Sr)	ug/L	7.0	2.0	1355975
Thallium (Tl)	ug/L	<2.0	2.0	1355975
Titanium (Ti)	ug/L	<10	10	1355975
Uranium (U)	ug/L	<1.0	1.0	1355975
Vanadium (V)	ug/L	<2.0	2.0	1355975
Zinc (Zn)	ug/L	<7.0	7.0	1355975
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

CONVENTIONAL PARAMETERS (SURFACE WATER)

Maxxam ID		Z64002	Z64002		
Sampling Date		2014/08/28 09:00	2014/08/28 09:00		
COC Number		96191-01-01	96191-01-01		
	Units	COA-SW4-Q3	COA-SW4-Q3 Lab-Dup	RDL	QC Batch

CONVENTIONALS					
Conductivity	mS/cm	0.024	N/A	0.001	1354834
Dissolved organic carbon	mg/L	0.4	N/A	0.2	1355134
Nitrogen ammonia (N-NH3)	mg/L	0.06	N/A	0.02	1355332
Orthophosphate (P)	mg/L	<0.01	N/A	0.01	1354837
pH	pH	6.26	N/A	N/A	1354832
Phenols-4AAP	mg/L	<0.002	N/A	0.002	1356138
Reactive silica (SiO2)	mg/L	5.0	N/A	0.1	1354850
Real Color	UCV	5	N/A	2	1354856
Sulfides (S2-)	mg/L	<0.02	N/A	0.02	1354982
Turbidity	NTU	14	15	0.1	1354855
Alkalinity Total (as CaCO3) pH 4.5	mg/L	3	N/A	1	1354833
Bicarbonates (HCO3 as CaCO3)	mg/L	3	N/A	1	1354833
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	1	1354833
Chloride (Cl)	mg/L	1.2	N/A	0.05	1354549
Nitrites (N-NO2-)	mg/L	<0.01	N/A	0.01	1354547
Nitrates (N-NO3-)	mg/L	0.91	N/A	0.01	1354547
Nitrate (N) and Nitrite(N)	mg/L	0.91	N/A	0.02	1354549
Sulfates (SO4)	mg/L	1.4	N/A	0.5	1354549
Total Dissolved Solids	mg/L	53	N/A	10	1355356
Total suspended solids (TSS)	mg/L	2	N/A	2	1354466
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD

Note that the report was re-emitted to include cobalt, as it was not reported in the first version, but required by client.

METALS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

Results relate only to the items tested.

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
1354466	AG5	Spiked Blank	Total suspended solids (TSS)	2014/08/29		106	%
1354466	AG5	Method Blank	Total suspended solids (TSS)	2014/08/29	<2		mg/L
1354547	MCC	QC Standard	Nitrates (N-NO3-)	2014/08/29		99	%
1354547	MCC	Spiked Blank	Nitrites (N-NO2-)	2014/08/29		110	%
1354547	MCC	Method Blank	Nitrites (N-NO2-)	2014/08/29	<0.01		mg/L
			Nitrates (N-NO3-)	2014/08/29	<0.01		mg/L
1354549	MCC	QC Standard	Chloride (Cl)	2014/08/29		105	%
			Nitrate (N) and Nitrite(N)	2014/08/29		99	%
			Sulfates (SO4)	2014/08/29		95	%
1354549	MCC	Spiked Blank	Nitrate (N) and Nitrite(N)	2014/08/29		110	%
1354549	MCC	Method Blank	Chloride (Cl)	2014/08/29	<0.05		mg/L
			Nitrate (N) and Nitrite(N)	2014/08/29	<0.02		mg/L
			Sulfates (SO4)	2014/08/29	<0.5		mg/L
1354832	CG0	QC Standard	pH	2014/08/29		99	%
1354833	CG0	QC Standard	Alkalinity Total (as CaCO3) pH 4.5	2014/08/29		104	%
1354833	CG0	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2014/08/29	<1		mg/L
1354834	CG0	QC Standard	Conductivity	2014/08/29		102	%
1354834	CG0	Method Blank	Conductivity	2014/08/29	<0.001		mS/cm
1354837	FTN	QC Standard	Orthophosphate (P)	2014/08/29		114	%
1354837	FTN	Method Blank	Orthophosphate (P)	2014/08/29	<0.01		mg/L
1354850	CG0	QC Standard	Reactive silica (SiO2)	2014/08/29		82	%
1354850	CG0	Method Blank	Reactive silica (SiO2)	2014/08/29	<0.1		mg/L
1354855	FTN	Spiked Blank	Turbidity	2014/08/29		92	%
1354855	FTN	Method Blank	Turbidity	2014/08/29	<0.1		NTU
1354856	FTN	Spiked Blank	Real Color	2014/08/29		99	%
1354856	FTN	Method Blank	Real Color	2014/08/29	<2		UCV
1354982	AG5	QC Standard	Sulfides (S2-)	2014/08/29		82	%
1354982	AG5	Method Blank	Sulfides (S2-)	2014/08/29	<0.02		mg/L
1355134	MR4	Spiked Blank	Dissolved organic carbon	2014/09/02		103	%
1355134	MR4	Method Blank	Dissolved organic carbon	2014/09/02	0.5 , RDL=0.2		mg/L
1355271	OZP	QC Standard	Mercury (Hg)	2014/09/03		108	%
1355271	OZP	Spiked Blank	Mercury (Hg)	2014/09/03		107	%
1355271	OZP	Method Blank	Mercury (Hg)	2014/09/03	<0.00001		mg/L
1355332	DKH	QC Standard	Nitrogen ammonia (N-NH3)	2014/09/02		113	%
1355332	DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2014/09/02		113	%
1355332	DKH	Method Blank	Nitrogen ammonia (N-NH3)	2014/09/02	0.06 , RDL=0.02		mg/L
1355356	MCC	Spiked Blank	Total Dissolved Solids	2014/09/02		105	%
1355356	MCC	Method Blank	Total Dissolved Solids	2014/09/02	<10		mg/L
1355975	JF1	QC Standard	Antimony (Sb)	2014/09/03		110	%
			Beryllium (Be)	2014/09/03		103	%
			Manganese (Mn)	2014/09/03		104	%
			Thallium (Tl)	2014/09/03		105	%
			Vanadium (V)	2014/09/03		104	%
1355975	JF1	Spiked Blank	Aluminum (Al)	2014/09/03		101	%
			Antimony (Sb)	2014/09/03		110	%
			Silver (Ag)	2014/09/03		94	%
			Arsenic (As)	2014/09/03		104	%

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Barium (Ba)	2014/09/03		107	%
			Beryllium (Be)	2014/09/03		103	%
			Bismuth (Bi)	2014/09/03		99	%
			Boron (B)	2014/09/03		101	%
			Cadmium (Cd)	2014/09/03		105	%
			Calcium (Ca)	2014/09/03		102	%
			Chromium (Cr)	2014/09/03		99	%
			Cobalt (Co)	2014/09/03		97	%
			Copper (Cu)	2014/09/03		95	%
			Tin (Sn)	2014/09/03		109	%
			Iron (Fe)	2014/09/03		100	%
			Magnesium (Mg)	2014/09/03		100	%
			Manganese (Mn)	2014/09/03		105	%
			Molybdenum (Mo)	2014/09/03		106	%
			Nickel (Ni)	2014/09/03		95	%
			Total phosphorous	2014/09/03		96	%
			Lead (Pb)	2014/09/03		101	%
			Potassium (K)	2014/09/03		101	%
			Selenium (Se)	2014/09/03		98	%
			Sodium (Na)	2014/09/03		104	%
			Strontium (Sr)	2014/09/03		103	%
			Thallium (Tl)	2014/09/03		99	%
			Titanium (Ti)	2014/09/03		104	%
			Uranium (U)	2014/09/03		97	%
			Vanadium (V)	2014/09/03		99	%
			Zinc (Zn)	2014/09/03		99	%
1355975	JF1	Method Blank	Aluminum (Al)	2014/09/03	<10		ug/L
			Antimony (Sb)	2014/09/03	<1.0		ug/L
			Silver (Ag)	2014/09/03	<1.0		ug/L
			Arsenic (As)	2014/09/03	<1.0		ug/L
			Barium (Ba)	2014/09/03	<2.0		ug/L
			Beryllium (Be)	2014/09/03	<2.0		ug/L
			Bismuth (Bi)	2014/09/03	<1.0		ug/L
			Boron (B)	2014/09/03	<50		ug/L
			Cadmium (Cd)	2014/09/03	<0.20		ug/L
			Calcium (Ca)	2014/09/03	<500		ug/L
			Chromium (Cr)	2014/09/03	<5.0		ug/L
			Cobalt (Co)	2014/09/03	<1.0		ug/L
			Copper (Cu)	2014/09/03	<1.0		ug/L
			Total Hardness (CaCO3)	2014/09/03	<1000		ug/L
			Tin (Sn)	2014/09/03	<2.0		ug/L
			Iron (Fe)	2014/09/03	<60		ug/L
			Magnesium (Mg)	2014/09/03	<100		ug/L
			Manganese (Mn)	2014/09/03	<1.0		ug/L
			Molybdenum (Mo)	2014/09/03	<1.0		ug/L
			Nickel (Ni)	2014/09/03	<2.0		ug/L
			Total phosphorous	2014/09/03	<10		ug/L
			Lead (Pb)	2014/09/03	<0.50		ug/L
			Potassium (K)	2014/09/03	<500		ug/L
			Selenium (Se)	2014/09/03	<3.0		ug/L

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Sodium (Na)	2014/09/03	<500		ug/L
			Strontium (Sr)	2014/09/03	<2.0		ug/L
			Thallium (Tl)	2014/09/03	<2.0		ug/L
			Titanium (Ti)	2014/09/03	<10		ug/L
			Uranium (U)	2014/09/03	<1.0		ug/L
			Vanadium (V)	2014/09/03	<2.0		ug/L
			Zinc (Zn)	2014/09/03	<7.0		ug/L
1356138	DB2	QC Standard	Phenols-4AAP	2014/09/03		95	%
1356138	DB2	Spiked Blank	Phenols-4AAP	2014/09/03		100	%
1356138	DB2	Method Blank	Phenols-4AAP	2014/09/03	<0.002		mg/L

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

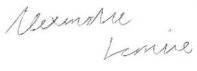

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Maxxam Job #: B453121
Report Date: 2014/09/08

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

VALIDATION SIGNATURE PAGE

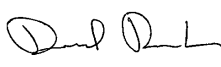
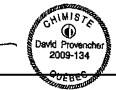
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Alexandre Lemire, M.Sc., Analyst 2



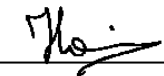


Dochka Koleva Hristo, B.Sc., Chemist

David Provencher, B.Sc., Chemist

Maria Chrifi Alaoui, B.Sc., Chemist

Madina Hamrouni, B.Sc., Chemist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Attention: Loic Didillon

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Your P.O. #: 2200000001
Your Project #: QUARTERLY MONITORING
Site#: TSMC
Site Location: DSO3 1A
Your C.O.C. #: 102664-01-01

Report Date: 2014/10/10
Report #: R1929974
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B461144

Received: 2014/09/30, 08:30

Sample Matrix: SURFACE WATER
Samples Received: 6

Analyses	Quantity	Date	Date	Laboratory Method	Primary Reference
		Extracted	Analyzed		
Total Alkalinity (pH end point 4.5)	6	N/A	2014/09/30	QUE SOP-00142	MA.303-TitrAuto 2.1
Anions	6	N/A	2014/09/30	QUE SOP-00141	MA. 300-Ions 1.3
Anions	6	N/A	2014/09/30	QUE SOP-00141	MA. 300-Ions 1.3
Petroleum Hydrocarbons (C10-C50)	1	2014/10/01	2014/10/01	QUE SOP-00209	MA. 400 - Hyd. 1.1
Real Color	6	N/A	2014/09/30	QUE SOP-00115	MA. 103 - Col. 2.0
Conductivity	5	N/A	2014/09/30	QUE SOP-00142	MA.303-TitrAuto 2.1
Conductivity	1	N/A	2014/10/06	QUE SOP-00142	MA.303-TitrAuto 2.1
Dissolved Organic Carbon (1, 2)	6	2014/10/01	2014/10/02	STL SOP-00243	SM 21 5310-B m
Total Extractable Mercury - Cold Vapour (1)	6	2014/10/06	2014/10/07	STL SOP-00042	MA200-Hg 1.1 R1 m
Total Suspended Solids	6	2014/10/01	2014/10/01	QUE SOP-00111	SM 2540 D
Total Extractable Metals (Low Level) (1)	6	2014/10/02	2014/10/04	STL SOP-00006	MA200-Mét 1.2 R4 m
Ammonia Nitrogen (1)	6	N/A	2014/10/02	STL SOP-00040	MA300-N 2.0 R1 m
pH	6	N/A	2014/09/30	QUE SOP-00142	MA.303-TitrAuto 2.1
Total Phenols by 4-AAP (1)	6	2014/10/09	2014/10/09	STL SOP-00033	MA404-I.Phé 2.2 R2 m
Ortho Phosphate	6	N/A	2014/09/30	QUE SOP-00121	MA.303 - P 1.1
Sulfides (S2-)	6	2014/10/01	2014/10/01	QUE SOP-00107	MA 300 - S 1.1
Reactive Silica (SiO2)	6	N/A	2014/09/30	QUE SOP-00132	HACH, Method 8186
Total Dissolved Solids	6	2014/10/01	2014/10/01	QUE SOP-00119	MA. 103 - S.T. 1.0
Turbidity	6	N/A	2014/09/30	QUE SOP-00118	MA.103-TUR. 1.0

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam -Ville St. Laurent
- (2) DOC present in the sample should be considered as non-purgeable DOC

Attention:Loic Didillon

TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, PQ
CANADA H3A 3G4

Your P.O. #: 2200000001
Your Project #: QUARTERLY MONITORING
Site#: TSMC
Site Location: DSO3 1A
Your C.O.C. #: 102664-01-01

Report Date: 2014/10/10
Report #: R1929974
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B461144
Received: 2014/09/30, 08:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathieu Letourneau, B.Sc., chimist, Customer Service

Email: MLetourneau@maxxam.ca

Phone# (418) 658-5784

=====
This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

HYDROCARBONS BY GCFID (SURFACE WATER)

Maxxam ID		AA6550		
Sampling Date		2014/09/29		
COC Number		102664-01-01		
	Units	COA-SW10-Q4	RDL	QC Batch
PETROLEUM HYDROCARBONS				
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	100	1369164
Surrogate Recovery (%)				
1-Chlorooctadecane	%	73	N/A	1369164
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable				

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

METALS (SURFACE WATER)

Maxxam ID		AA6484	AA6525	AA6526	AA6527	AA6550	AA6551		
Sampling Date		2014/09/29	2014/09/29	2014/09/29	2014/09/29	2014/09/29	2014/09/29		
COC Number		102664-01-01	102664-01-01	102664-01-01	102664-01-01	102664-01-01	102664-01-01		
	Units	COA-SW3-Q4	COA-SW4-Q4	COA-SW7-Q4	COA-SW8-Q4	COA-SW10-Q4	COA-SW13-Q4	RDL	QC Batch

METALS									
Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00010	<0.00001	0.00001	1371104

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Maxxam ID		AA6484	AA6525	AA6526	AA6527	AA6527	AA6550		
Sampling Date		2014/09/29	2014/09/29	2014/09/29	2014/09/29	2014/09/29	2014/09/29		
COC Number		102664-01-01	102664-01-01	102664-01-01	102664-01-01	102664-01-01	102664-01-01		
	Units	COA-SW3-Q4	COA-SW4-Q4	COA-SW7-Q4	COA-SW8-Q4	COA-SW8-Q4 Lab-Dup	COA-SW10-Q4	RDL	QC Batch

METALS ICP-MS									
Aluminum (Al)	ug/L	96	29	53	120	130	8300	10	1369976
Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1369976
Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1369976
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	5.8	1.0	1369976
Barium (Ba)	ug/L	8.5	2.4	<2.0	2.9	2.7	51	2.0	1369976
Beryllium (Be)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1369976
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1369976
Boron (B)	ug/L	<50	<50	<50	<50	<50	<50	50	1369976
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	1369976
Calcium (Ca)	ug/L	2000	2000	<500	<500	<500	2000	500	1369976
Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	23	5.0	1369976
Cobalt (Co)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	6.9	1.0	1369976
Copper (Cu)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	23	1.0	1369976
Total Hardness (CaCO3)	ug/L	11000	10000	2600	1800	1800	19000	1000	1369976
Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1369976
Iron (Fe)	ug/L	180	110	67	310	250	28000	60	1369976
Magnesium (Mg)	ug/L	1300	1200	320	210	210	3500	100	1369976
Manganese (Mn)	ug/L	12	10	4.1	18	17	550	1.0	1369976
Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1369976
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	17	2.0	1369976
Total phosphorous	ug/L	<10	<10	<10	<10	<10	260	10	1369976
Lead (Pb)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	6.6	0.50	1369976
Potassium (K)	ug/L	<500	<500	<500	<500	<500	1600	500	1369976
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	1369976
Sodium (Na)	ug/L	1100	1500	1000	840	790	1400	500	1369976
Strontium (Sr)	ug/L	6.2	6.9	3.1	2.8	2.7	13	2.0	1369976
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1369976
Titanium (Ti)	ug/L	<10	<10	<10	<10	<10	280	10	1369976
Uranium (U)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1369976
Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	17	2.0	1369976
Zinc (Zn)	ug/L	<7.0	<7.0	<7.0	7.3	<7.0	55	7.0	1369976

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Maxxam ID		AA6551		
Sampling Date		2014/09/29		
COC Number		102664-01-01		
	Units	COA-SW13-Q4	RDL	QC Batch
METALS ICP-MS				
Aluminum (Al)	ug/L	17	10	1369976
Antimony (Sb)	ug/L	<1.0	1.0	1369976
Silver (Ag)	ug/L	<1.0	1.0	1369976
Arsenic (As)	ug/L	<1.0	1.0	1369976
Barium (Ba)	ug/L	<2.0	2.0	1369976
Beryllium (Be)	ug/L	<2.0	2.0	1369976
Bismuth (Bi)	ug/L	<1.0	1.0	1369976
Boron (B)	ug/L	<50	50	1369976
Cadmium (Cd)	ug/L	<0.20	0.20	1369976
Calcium (Ca)	ug/L	<500	500	1369976
Chromium (Cr)	ug/L	<5.0	5.0	1369976
Cobalt (Co)	ug/L	<1.0	1.0	1369976
Copper (Cu)	ug/L	<1.0	1.0	1369976
Total Hardness (CaCO3)	ug/L	1800	1000	1369976
Tin (Sn)	ug/L	<2.0	2.0	1369976
Iron (Fe)	ug/L	<60	60	1369976
Magnesium (Mg)	ug/L	210	100	1369976
Manganese (Mn)	ug/L	3.6	1.0	1369976
Molybdenum (Mo)	ug/L	<1.0	1.0	1369976
Nickel (Ni)	ug/L	<2.0	2.0	1369976
Total phosphorous	ug/L	<10	10	1369976
Lead (Pb)	ug/L	<0.50	0.50	1369976
Potassium (K)	ug/L	<500	500	1369976
Selenium (Se)	ug/L	<3.0	3.0	1369976
Sodium (Na)	ug/L	700	500	1369976
Strontium (Sr)	ug/L	2.1	2.0	1369976
Thallium (Tl)	ug/L	<2.0	2.0	1369976
Titanium (Ti)	ug/L	<10	10	1369976
Uranium (U)	ug/L	<1.0	1.0	1369976
Vanadium (V)	ug/L	<2.0	2.0	1369976
Zinc (Zn)	ug/L	<7.0	7.0	1369976
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

CONVENTIONAL PARAMETERS (SURFACE WATER)

Maxxam ID		AA6484	AA6484	AA6525	AA6525	AA6526	AA6526		
Sampling Date		2014/09/29	2014/09/29	2014/09/29	2014/09/29	2014/09/29	2014/09/29		
COC Number		102664-01-01	102664-01-01	102664-01-01	102664-01-01	102664-01-01	102664-01-01		
	Units	COA-SW3-Q4	COA-SW3-Q4 Lab-Dup	COA-SW4-Q4	COA-SW4-Q4 Lab-Dup	COA-SW7-Q4	COA-SW7-Q4 Lab-Dup	RDL	QC Batch

CONVENTIONALS									
Conductivity	mS/cm	0.026	N/A	0.026	N/A	0.008	N/A	0.001	1368906
Dissolved organic carbon	mg/L	0.5	N/A	0.3	N/A	2.7	N/A	0.2	1369350
Nitrogen ammonia (N-NH3)	mg/L	<0.02	N/A	0.02	N/A	0.02	N/A	0.02	1369799
Orthophosphate (P)	mg/L	<0.01	N/A	<0.01	N/A	<0.01	N/A	0.01	1368976
pH	pH	7.32	N/A	6.90	N/A	6.35	N/A	N/A	1368873
Phenols-4AAP	mg/L	<0.002	N/A	<0.002	N/A	<0.002	N/A	0.002	1373213
Reactive silica (SiO2)	mg/L	3.2	N/A	4.8	N/A	3.1	N/A	0.1	1368977
Real Color	UCV	10	N/A	6	N/A	12	N/A	2	1368911
Sulfides (S2-)	mg/L	<0.02	N/A	<0.02	N/A	<0.02	N/A	0.02	1369134
Turbidity	NTU	12	12	15	16	0.8	N/A	0.1	1368981
Alkalinity Total (as CaCO3) pH 4.5	mg/L	11	N/A	6	N/A	2	N/A	1	1368894
Bicarbonates (HCO3 as CaCO3)	mg/L	11	N/A	6	N/A	2	N/A	1	1368894
Carbonate (CO3 as CaCO3)	mg/L	<1	N/A	<1	N/A	<1	N/A	1	1368894
Chloride (Cl)	mg/L	0.34	N/A	1.1	N/A	0.23	N/A	0.05	1368847
Nitrites (N-NO2-)	mg/L	<0.01	N/A	<0.01	N/A	<0.01	N/A	0.01	1368655
Nitrates (N-NO3-)	mg/L	0.22	N/A	0.86	N/A	0.02	N/A	0.01	1368655
Nitrate (N) and Nitrite(N)	mg/L	0.22	N/A	0.86	N/A	0.02	N/A	0.02	1368847
Sulfates (SO4)	mg/L	1.8	N/A	1.4	N/A	0.7	N/A	0.5	1368847
Total Dissolved Solids	mg/L	22	N/A	28	N/A	19	22	10	1369313
Total suspended solids (TSS)	mg/L	<2	N/A	<2	N/A	<2	N/A	2	1369145

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

CONVENTIONAL PARAMETERS (SURFACE WATER)

Maxxam ID		AA6527			AA6550	AA6550		
Sampling Date		2014/09/29			2014/09/29	2014/09/29		
COC Number		102664-01-01			102664-01-01	102664-01-01		
	Units	COA-SW8-Q4	RDL	QC Batch	COA-SW10-Q4	COA-SW10-Q4 Lab-Dup	RDL	QC Batch
CONVENTIONALS								
Conductivity	mS/cm	0.005	0.001	1368906	0.023	N/A	0.001	1371447
Dissolved organic carbon	mg/L	4.6	0.2	1369350	0.9	N/A	0.2	1369350
Nitrogen ammonia (N-NH3)	mg/L	<0.02	0.02	1369799	0.06	N/A	0.02	1369799
Orthophosphate (P)	mg/L	<0.01	0.01	1368976	0.03	N/A	0.01	1368976
pH	pH	5.82	N/A	1368873	6.84	N/A	N/A	1368873
Phenols-4AAP	mg/L	<0.002	0.002	1373213	<0.002	N/A	0.002	1373213
Reactive silica (SiO2)	mg/L	3.5	0.1	1368977	4.6	N/A	0.1	1368977
Real Color	UCV	29	2	1368911	540	N/A	2	1368911
Sulfides (S2-)	mg/L	<0.02	0.02	1369134	<0.02	N/A	0.02	1369134
Turbidity	NTU	2.5	0.1	1368981	1400	1400	0.1	1368981
Alkalinity Total (as CaCO3) pH 4.5	mg/L	<1	1	1368894	5	N/A	1	1368894
Bicarbonates (HCO3 as CaCO3)	mg/L	<1	1	1368894	5	N/A	1	1368894
Carbonate (CO3 as CaCO3)	mg/L	<1	1	1368894	<1	N/A	1	1368894
Chloride (Cl)	mg/L	0.27	0.05	1368847	<0.5	N/A	0.5	1368847
Nitrites (N-NO2-)	mg/L	<0.01	0.01	1368655	<0.1	N/A	0.1	1368655
Nitrates (N-NO3-)	mg/L	<0.01	0.01	1368655	0.9	N/A	0.1	1368655
Nitrate (N) and Nitrite(N)	mg/L	<0.02	0.02	1368847	0.9	N/A	0.2	1368847
Sulfates (SO4)	mg/L	<0.5	0.5	1368847	2	N/A	1	1368847
Total Dissolved Solids	mg/L	23	10	1369313	280	N/A	10	1369313
Total suspended solids (TSS)	mg/L	<2	2	1369145	310	N/A	2	1369145
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable								

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

CONVENTIONAL PARAMETERS (SURFACE WATER)

Maxxam ID		AA6551		
Sampling Date		2014/09/29		
COC Number		102664-01-01		
	Units	COA-SW13-Q4	RDL	QC Batch
CONVENTIONALS				
Conductivity	mS/cm	0.005	0.001	1368906
Dissolved organic carbon	mg/L	1.6	0.2	1369350
Nitrogen ammonia (N-NH3)	mg/L	<0.02	0.02	1369799
Orthophosphate (P)	mg/L	<0.01	0.01	1368976
pH	pH	6.39	N/A	1368873
Phenols-4AAP	mg/L	<0.002	0.002	1373213
Reactive silica (SiO2)	mg/L	1.7	0.1	1368977
Real Color	UCV	6	2	1368911
Sulfides (S2-)	mg/L	0.05	0.02	1369541
Turbidity	NTU	0.9	0.1	1368981
Alkalinity Total (as CaCO3) pH 4.5	mg/L	2	1	1368894
Bicarbonates (HCO3 as CaCO3)	mg/L	2	1	1368894
Carbonate (CO3 as CaCO3)	mg/L	<1	1	1368894
Chloride (Cl)	mg/L	0.13	0.05	1368847
Nitrites (N-NO2-)	mg/L	<0.01	0.01	1368655
Nitrates (N-NO3-)	mg/L	0.03	0.01	1368655
Nitrate (N) and Nitrite(N)	mg/L	0.03	0.02	1368847
Sulfates (SO4)	mg/L	<0.5	0.5	1368847
Total Dissolved Solids	mg/L	24	10	1369313
Total suspended solids (TSS)	mg/L	<2	2	1369378
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable				

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD

HYDROCARBONS BY GCFID (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries (spiked blank and surrogates). Please note that the results have been corrected for the method blank.

METALS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

CONVENTIONAL PARAMETERS (SURFACE WATER)

Please note that the results have not been corrected for QC recoveries nor for the method blank results.

Detection limit raised due to matrix interference.

Sample AA6550 : anions.

Results relate only to the items tested.

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
1368655	MCC	QC Standard	Nitrates (N-NO3-)	2014/09/30		98	%
1368655	MCC	Spiked Blank	Nitrites (N-NO2-)	2014/09/30		100	%
1368655	MCC	Method Blank	Nitrites (N-NO2-)	2014/09/30	<0.01		mg/L
			Nitrates (N-NO3-)	2014/09/30	<0.01		mg/L
1368847	MCC	QC Standard	Chloride (Cl)	2014/09/30		103	%
			Nitrate (N) and Nitrite(N)	2014/09/30		98	%
			Sulfates (SO4)	2014/09/30		94	%
1368847	MCC	Spiked Blank	Nitrate (N) and Nitrite(N)	2014/09/30		101	%
1368847	MCC	Method Blank	Chloride (Cl)	2014/09/30	<0.05		mg/L
			Nitrate (N) and Nitrite(N)	2014/09/30	<0.02		mg/L
			Sulfates (SO4)	2014/09/30	<0.5		mg/L
1368873	CG0	QC Standard	pH	2014/09/30		99	%
1368894	CG0	QC Standard	Alkalinity Total (as CaCO3) pH 4.5	2014/09/30		105	%
1368894	CG0	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2014/09/30	<1		mg/L
1368906	CG0	QC Standard	Conductivity	2014/09/30		103	%
1368906	CG0	Method Blank	Conductivity	2014/09/30	<0.001		mS/cm
1368911	CG0	Spiked Blank	Real Color	2014/09/30		100	%
1368911	CG0	Method Blank	Real Color	2014/09/30	<2		UCV
1368976	FTN	QC Standard	Orthophosphate (P)	2014/09/30		100	%
1368976	FTN	Method Blank	Orthophosphate (P)	2014/09/30	<0.01		mg/L
1368977	FTN	QC Standard	Reactive silica (SiO2)	2014/09/30		99	%
1368977	FTN	Method Blank	Reactive silica (SiO2)	2014/09/30	<0.1		mg/L
1368981	FTN	Spiked Blank	Turbidity	2014/09/30		99	%
1368981	FTN	Method Blank	Turbidity	2014/09/30	<0.1		NTU
1369134	AG5	QC Standard	Sulfides (S2-)	2014/10/01		80	%
1369134	AG5	Method Blank	Sulfides (S2-)	2014/10/01	<0.02		mg/L
1369145	BD	Spiked Blank	Total suspended solids (TSS)	2014/10/01		98	%
1369145	BD	Method Blank	Total suspended solids (TSS)	2014/10/01	<2		mg/L
1369164	MEP	Spiked Blank	1-Chlorooctadecane	2014/10/01		65	%
			Petroleum Hydrocarbons (C10-C50)	2014/10/01		73	%
1369164	MEP	Method Blank	1-Chlorooctadecane	2014/10/01		83	%
			Petroleum Hydrocarbons (C10-C50)	2014/10/01	<100		ug/L
1369313	BD	Spiked Blank	Total Dissolved Solids	2014/10/01		107	%
1369313	BD	Method Blank	Total Dissolved Solids	2014/10/01	<10		mg/L
1369350	JL1	Spiked Blank	Dissolved organic carbon	2014/10/02		101	%
1369350	JL1	Method Blank	Dissolved organic carbon	2014/10/02	0.2 , RDL=0.2		mg/L
1369378	BD	Spiked Blank	Total suspended solids (TSS)	2014/10/01		101	%
1369378	BD	Method Blank	Total suspended solids (TSS)	2014/10/01	<2		mg/L
1369541	BD	QC Standard	Sulfides (S2-)	2014/10/01		86	%
1369541	BD	Method Blank	Sulfides (S2-)	2014/10/01	<0.02		mg/L
1369799	DKH	QC Standard	Nitrogen ammonia (N-NH3)	2014/10/02		100	%
1369799	DKH	Spiked Blank	Nitrogen ammonia (N-NH3)	2014/10/02		102	%
1369799	DKH	Method Blank	Nitrogen ammonia (N-NH3)	2014/10/02	0.02 , RDL=0.02		mg/L
1369976	AL5	QC Standard	Antimony (Sb)	2014/10/02		105	%
			Beryllium (Be)	2014/10/02		97	%
			Manganese (Mn)	2014/10/02		102	%
			Thallium (Tl)	2014/10/02		102	%

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
1369976	AL5	Spiked Blank	Vanadium (V)	2014/10/02		102	%
			Aluminum (Al)	2014/10/02		108	%
			Antimony (Sb)	2014/10/02		112	%
			Silver (Ag)	2014/10/02		106	%
			Arsenic (As)	2014/10/02		106	%
			Barium (Ba)	2014/10/02		106	%
			Beryllium (Be)	2014/10/02		100	%
			Bismuth (Bi)	2014/10/02		103	%
			Boron (B)	2014/10/02		104	%
			Cadmium (Cd)	2014/10/02		105	%
			Calcium (Ca)	2014/10/02		104	%
			Chromium (Cr)	2014/10/02		99	%
			Cobalt (Co)	2014/10/02		99	%
			Copper (Cu)	2014/10/02		97	%
			Tin (Sn)	2014/10/02		111	%
			Iron (Fe)	2014/10/02		103	%
			Magnesium (Mg)	2014/10/02		102	%
			Manganese (Mn)	2014/10/02		106	%
			Molybdenum (Mo)	2014/10/02		108	%
			Nickel (Ni)	2014/10/02		100	%
			Total phosphorous	2014/10/02		100	%
			Lead (Pb)	2014/10/02		100	%
			Potassium (K)	2014/10/02		101	%
			Selenium (Se)	2014/10/02		99	%
Sodium (Na)	2014/10/02		107	%			
Strontium (Sr)	2014/10/02		104	%			
Thallium (Tl)	2014/10/02		102	%			
Titanium (Ti)	2014/10/02		105	%			
Uranium (U)	2014/10/02		105	%			
Vanadium (V)	2014/10/02		102	%			
Zinc (Zn)	2014/10/02		100	%			
1369976	AL5	Method Blank	Aluminum (Al)	2014/10/02	<10		ug/L
			Antimony (Sb)	2014/10/02	<1.0		ug/L
			Silver (Ag)	2014/10/02	<1.0		ug/L
			Arsenic (As)	2014/10/02	<1.0		ug/L
			Barium (Ba)	2014/10/02	<2.0		ug/L
			Beryllium (Be)	2014/10/02	<2.0		ug/L
			Bismuth (Bi)	2014/10/02	<1.0		ug/L
			Boron (B)	2014/10/02	<50		ug/L
			Cadmium (Cd)	2014/10/02	<0.20		ug/L
			Calcium (Ca)	2014/10/02	<500		ug/L
			Chromium (Cr)	2014/10/02	<5.0		ug/L
			Cobalt (Co)	2014/10/02	<1.0		ug/L
			Copper (Cu)	2014/10/02	<1.0		ug/L
			Total Hardness (CaCO3)	2014/10/02	<1000		ug/L
			Tin (Sn)	2014/10/02	<2.0		ug/L
			Iron (Fe)	2014/10/02	<60		ug/L
Magnesium (Mg)	2014/10/02	<100		ug/L			
Manganese (Mn)	2014/10/02	<1.0		ug/L			
Molybdenum (Mo)	2014/10/02	<1.0		ug/L			

Maxxam Job #: B461144
Report Date: 2014/10/10

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC		QC Type	Parameter	Date Analyzed	Value	Recovery	Units
Batch	Init						
			Nickel (Ni)	2014/10/02	<2.0		ug/L
			Total phosphorous	2014/10/02	<10		ug/L
			Lead (Pb)	2014/10/02	<0.50		ug/L
			Potassium (K)	2014/10/02	<500		ug/L
			Selenium (Se)	2014/10/02	<3.0		ug/L
			Sodium (Na)	2014/10/02	<500		ug/L
			Strontium (Sr)	2014/10/02	<2.0		ug/L
			Thallium (Tl)	2014/10/02	<2.0		ug/L
			Titanium (Ti)	2014/10/02	<10		ug/L
			Uranium (U)	2014/10/02	<1.0		ug/L
			Vanadium (V)	2014/10/02	<2.0		ug/L
			Zinc (Zn)	2014/10/02	<7.0		ug/L
1371104	OZP	Spiked Blank	Mercury (Hg)	2014/10/07		95	%
1371104	OZP	Method Blank	Mercury (Hg)	2014/10/07	<0.00001		mg/L
1371447	CG0	QC Standard	Conductivity	2014/10/06		100	%
1371447	CG0	Method Blank	Conductivity	2014/10/06	<0.001		mS/cm
1373213	MH1	QC Standard	Phenols-4AAP	2014/10/09		100	%
1373213	MH1	Spiked Blank	Phenols-4AAP	2014/10/09		99	%
1373213	MH1	Method Blank	Phenols-4AAP	2014/10/09	<0.002		mg/L

RDL = Reportable Detection Limit

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

Maxxam Job #: B461144
Report Date: 2014/10/10

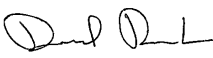

TATA STEEL MINERALS CANADA
Client Project #: QUARTERLY MONITORING
Site Location: DSO3 1A
Your P.O. #: 2200000001
Sampler Initials: JFD

VALIDATION SIGNATURE PAGE


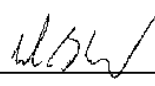
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Dochka Koleva Hristova, B.Sc., Chemist

David Provencher, B.Sc., Chemist

Marc Bouchard, B.Sc., Biochimiste, Québec

Maria Chrifi Alaoui, B.Sc., Chemist

Madina Hamrouni, B.Sc., Chemist

Veronic Beausejour, B.Sc., Chemist, Supervisor

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Appendix VI

Benthic Invertebrate Raw Data

Taxon	Burnetta Creek			Triangle Lake		
	A	B	C	A	B	C
NEMATODA						
MOLLUSCA						
Bivalvia						
Sphaeriidae				2	1	
ANNELIDA						
Oligochaeta						
Enchytraeidae		8				
ARTHROPODA						
Chelicerata						
Arachnida						
Acari						
Hydrachnidae						
Hygrobatidae			1			
Lebertiidae	2					
Sperchontidae	1	1	1			
Crustacea						
Copepoda						
Cyclopoida						
Cyclopidae (benthique)						
Uniramia						
Insecta						
Ephemeroptera						
Baetidae						
Ephemerellidae						
Leptophlebiidae						
Plecoptera						
Chloroperlidae						
Leuctridae						
Nemouridae						
Taeniopterygidae	3					
Trichoptera (petit)						
Hydropsychidae						
Hydroptilidae						
Lepidostomatidae						
Rhyacophilidae						
Diptera						
Nematocera						
Ceratopogonidae						
Chironomidae (pupes)						
Chironomidae (larves)	5	2	2			
Simuliidae						
Brachycera						
Empididae						
Number of organisms (N)	11	11	4	2	1	0
Taxonomic richness (T)	4	3	3	1	1	0
Shannon-Weiner index (H')	1,79	1,096	1,5			
Equitability (J')	0,895	0,691	0,946			
Hilsenhoff family index (FBI)	5,545	7,818	7	6	6	

Appendix VII

Habitat Suitability Index and Habitat Equivalent Unit Calculation for Streams

Habitat characteristics

#	Tronçon	Segment	Longueur (m)	Largeur (m)	Superficie (m ²)	RM%	B%	GA%	CA%	GR%	SA%	SI%	MO%	Total	V1/3	V1/2	V2/3
1	PIN1	A	185	1,00	185			35	35	15	15			100		0,050	
2	Goodream	A	118	4,80	566		20	30	30	20				100	0,640	0,900	0,820
3	Goodream	B	258	2,60	671		30	30	30	10				100	0,940	0,120	0,980
4	Goodream	C	184	4,90	902		20	30	40	10				100	1,170	1,050	0,810
5	Goodream	D	242	10,00	2 420		10	10				80		100		0,050	
6	Goodream	E	1305	4,50	5 873		14	30	28				27	100		0,867	
7	Goodream	F	293	45,00	13 185							50	50	100		0,005	
8	Goodream	G	302	1,50	453				30	10	50			100		0,050	
9	Goodream	H	218	2,50	545		10	40	40				10	100		0,070	

HSI of substrate for Brook Trout

SAFO		RM	B	G	C	G	S	F	O	
	Émergence	0,00	0,00	0,00	1,00	1,00	1,00	0,33	0,33	
	Alevin	0,00	1,00	1,00	1,00	1,00	0,33	0,00	0,00	
	Juvenile	0,00	1,00	1,00	1,00	1,00	1,00	1,00	0,00	
	Adulte	0,67	1,00	1,00	1,00	1,00	0,67	0,33	0,33	
#	Stade	RM	B	G	C	G	S	F	O	Total
1	Émergence	0,00	0,00	0,00	0,35	0,15	0,15	0,00	0,00	0,65
1	Alevin	0,00	0,00	0,35	0,35	0,15	0,05	0,00	0,00	0,90
1	Juvenile	0,00	0,00	0,35	0,35	0,15	0,15	0,00	0,00	1,00
1	Adulte	0,00	0,00	0,35	0,35	0,15	0,10	0,00	0,00	0,95
2	Émergence	0,00	0,00	0,00	0,30	0,20	0,00	0,00	0,00	0,50
2	Alevin	0,00	0,20	0,30	0,30	0,20	0,00	0,00	0,00	1,00
2	Juvenile	0,00	0,20	0,30	0,30	0,20	0,00	0,00	0,00	1,00
2	Adulte	0,00	0,20	0,30	0,30	0,20	0,00	0,00	0,00	1,00
3	Émergence	0,00	0,00	0,00	0,30	0,10	0,00	0,00	0,00	0,40
3	Alevin	0,00	0,30	0,30	0,30	0,10	0,00	0,00	0,00	1,00
3	Juvenile	0,00	0,30	0,30	0,30	0,10	0,00	0,00	0,00	1,00
3	Adulte	0,00	0,30	0,30	0,30	0,10	0,00	0,00	0,00	1,00
4	Émergence	0,00	0,00	0,00	0,40	0,10	0,00	0,00	0,00	0,50
4	Alevin	0,00	0,20	0,30	0,40	0,10	0,00	0,00	0,00	1,00
4	Juvenile	0,00	0,20	0,30	0,40	0,10	0,00	0,00	0,00	1,00
4	Adulte	0,00	0,20	0,30	0,40	0,10	0,00	0,00	0,00	1,00
5	Émergence	0,00	0,00	0,00	0,00	0,00	0,00	0,26	0,00	0,26
5	Alevin	0,00	0,10	0,10	0,00	0,00	0,00	0,00	0,00	0,20
5	Juvenile	0,00	0,10	0,10	0,00	0,00	0,00	0,80	0,00	1,00
5	Adulte	0,00	0,10	0,10	0,00	0,00	0,00	0,26	0,00	0,46
6	Émergence	0,00	0,00	0,00	0,28	0,00	0,00	0,00	0,09	0,37
6	Alevin	0,00	0,14	0,30	0,28	0,00	0,00	0,00	0,00	0,73
6	Juvenile	0,00	0,14	0,30	0,28	0,00	0,00	0,00	0,00	0,73
6	Adulte	0,00	0,14	0,30	0,28	0,00	0,00	0,00	0,09	0,82
7	Émergence	0,00	0,00	0,00	0,00	0,00	0,00	0,17	0,17	0,33
7	Alevin	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
7	Juvenile	0,00	0,00	0,00	0,00	0,00	0,00	0,50	0,00	0,50
7	Adulte	0,00	0,00	0,00	0,00	0,00	0,00	0,17	0,17	0,33
8	Émergence	0,00	0,00	0,00	0,30	0,10	0,50	0,00	0,03	0,93
8	Alevin	0,00	0,00	0,00	0,30	0,10	0,17	0,00	0,00	0,57
8	Juvenile	0,00	0,00	0,00	0,30	0,10	0,50	0,00	0,00	0,90
8	Adulte	0,00	0,00	0,00	0,30	0,10	0,34	0,00	0,03	0,77
9	Émergence	0,00	0,00	0,00	0,40	0,00	0,00	0,00	0,03	0,43
9	Alevin	0,00	0,10	0,40	0,40	0,00	0,00	0,00	0,00	0,90
9	Juvenile	0,00	0,10	0,40	0,40	0,00	0,00	0,00	0,00	0,90
9	Adulte	0,00	0,10	0,40	0,40	0,00	0,00	0,00	0,03	0,93

Composite HSI, substrate x water velocity for Brook Trout

Segment	Stade	Substrat	Vitesse	Composite
1	Émergence	0,65	1,00	0,83
1	Alevin	0,90	1,00	0,95
1	Juvenile	1,00	1,00	1,00
1	Adulte	0,95	1,00	0,98
2	Émergence	0,50	0,67	0,58
2	Alevin	1,00	0,00	0,00
2	Juvenile	1,00	1,00	1,00
2	Adulte	1,00	0,00	0,00
3	Émergence	0,40	0,33	0,37
3	Alevin	1,00	0,33	0,67
3	Juvenile	1,00	1,00	1,00
3	Adulte	1,00	0,33	0,67
4	Émergence	0,50	0,33	0,42
4	Alevin	1,00	0,00	0,00
4	Juvenile	1,00	1,00	1,00
4	Adulte	1,00	0,00	0,00
5	Émergence	0,26	1,00	0,63
5	Alevin	0,20	1,00	0,60
5	Juvenile	1,00	1,00	1,00
5	Adulte	0,46	1,00	0,73
6	Émergence	0,37	1,00	0,69
6	Alevin	0,73	0,00	0,00
6	Juvenile	0,73	1,00	0,86
6	Adulte	0,82	0,00	0,00
7	Émergence	0,33	0,00	0,00
7	Alevin	0,00	0,00	0,00
7	Juvenile	0,50	0,00	0,00
7	Adulte	0,33	0,00	0,00
8	Émergence	0,93	1,00	0,97
8	Alevin	0,57	1,00	0,78
8	Juvenile	0,90	1,00	0,95
8	Adulte	0,77	1,00	0,88
9	Émergence	0,43	1,00	0,72
9	Alevin	0,90	1,00	0,95
9	Juvenile	0,90	1,00	0,95
9	Adulte	0,93	1,00	0,97

HEU calculation for Brook Trout

#	Tronçon	Segment	HSI composite (m²)	Superficie (m²)	HEU (m²)	HEU (100m²)	Total/Stream (m²)
1	PIN1	A	1,00	185	185	2	185
2	Goodream	A	1,00	566	566	6	
3	Goodream	B	1,00	671	671	7	
4	Goodream	C	1,00	902	902		
5	Goodream	D	1,00	2 420	2 420	24	
6	Goodream	E	0,86	5 873	5 070	51	
7	Goodream	F	0,00	13 185	0	0	
8	Goodream	G	0,97	453	438	4	
9	Goodream	H	0,97	545	527	5	10 593



Common Nighthawk survey for the Howse Project,
Labrador

HML

Howse Minerals Limited

Technical Report

Our file: PR185-23-15

September 2015

PROJECT TEAM

GRUPE HÉMI SPHÈRES

Mariana Trindade	Project Manager, Ph.D., Management and Review
Samuel Denault	Biologist, M.Sc., Fieldwork, Analysis and Report
Marie-Ève Dion	Biologist, M.Sc. Env., Review

Collaborator

Jean-François Dion	Environment Technician, HML
--------------------	-----------------------------



Recyclable and made of 100% recycled paper.

Paper made with wind energy and contributing to the responsible use of forest resources.

This report has been formatted for double-sided printing.

REVISION AND PUBLICATION		
Number	Date	Modification or Publication Data
00	2015-07-31	Preliminary Technical Report
01	2015-09-09	Final Technical Report

V:\Contrat en cours\PR185-23-15_Common Nighthawk Survey\Rapport\Hemis_PR185-23-15_Common Nighthawk survey_VF_150916.docx

Report prepared by:



Samuel Denault
Biologist, M.Sc.

Report revised by:



Marie-Ève Dion
Biologist, M.Sc. Env.



Mariana Trindade
PH. D. Geography

This document should be cited as:

Groupe Hémisphères (2015) *Common Nighthawk Survey for Howse Mining Project, Labrador, Summer 2015*. Technical Report submitted to Howse Minerals Ltd., 11 pp. and 3 appendices.

TABLE OF CONTENTS

LIST OF TABLES	IV
LIST OF FIGURES	IV
LIST OF APPENDICES	IV
LIST OF ABBREVIATIONS AND SYMBOLS	V
1 INTRODUCTION.....	1
2 COMMON NIGHTHAWK - LITTERATURE REVIEW.....	1
2.1 STATUS	1
2.2 ECOLOGY.....	1
2.3 DISTRIBUTION.....	1
3 METHODOLOGY	3
3.1 CLASSIFICATION	3
3.2 STUDY AREA.....	3
3.3 COMMON NIGHTHAWK SURVEY TECHNIQUE	3
3.4 OTHER SPECIES OF INTEREST	3
4 RESULTS AND DISCUSSION.....	4
4.1 SURVEY CONDITIONS.....	4
4.2 EFFORT	4
4.3 COMMON NIGHTHAWK PRESENCE	4
4.4 OTHER SPECIES	4
4.5 SPECIES AT RISK	5
4.5.1 Bank Swallow	5
4.5.2 Red-necked Phalarope	6
5 CONCLUSION.....	7
6 SCOPE AND LIMITATIONS OF THE STUDY	7
7 QUALITY ASSURANCE.....	7
8 REFERENCES	8
APPENDICES	11

LIST OF TABLES

Table 1. Survey Effort in Common Nighthawk Point Counts	4
Table 2. List of birds encountered in the Howse Local study area during summer 2015	5

LIST OF FIGURES

Figure 1. Common Nighthawk Distribution in NFL	2
--	---

LIST OF APPENDICES

Appendix I Figures	
Appendix II Survey Conditions	
Appendix III Pictures Taken in Howse area	

LIST OF ABBREVIATIONS AND SYMBOLS

°C	Degrees Celsius
AOU	American Ornithologists' Union
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DSO	Direct Shipping Ore
EIS	Environmental Impact Statement
EPR	Environment Protection Report
GNL	Government of Newfoundland and Labrador
hr	Hour
km	Kilometer
km/hr	Kilometer per hour
m	Meter
min	Minute
NLDEC	Newfoundland and Labrador Department of Conservation
SARA	Species at Risk Act
TSMC	TATA Steel Minerals Canada

1 INTRODUCTION

HML is currently studying the development of the Howse Project in Labrador, located about 25 km north-west of Schefferville, Quebec. In March 2015, Environment Canada raised concerns over the Common Nighthawk (*Chordeiles minor*) after the review of the first draft of the Howse EIS. Concern was based on the presence of suitable habitat for the Common Nighthawk in the vicinity of the Howse Project.

Previously, no standard studies have ever been conducted in the region to determine the presence of this species. In order to address this concern, an in-depth survey of the Common Nighthawk was conducted on the Howse property during summer 2015. Groupe Hémisphères was mandated by HML to conduct a survey dedicated to this species.

2 COMMON NIGHTHAWK - LITERATURE REVIEW

2.1 Status

The Common Nighthawk has exhibited a sharp population decline since 1970 across Canada (COSEWIC, 2007). Reasons for this decline are not fully understood. However, it is suggested that the downward trend experienced by the Common Nighthawk, and of aerial insectivore populations in general, is linked to changes in populations of flying insects.

The common Nighthawk is designated threatened under the SARA and is listed on Schedule 1 (SARA, 2015) and by the COSEWIC (2015). It is also designated as threatened by GNL (NLDEC, 2015). The Common Nighthawk, its nests, and its eggs are protected under the federal Migratory Birds Convention Act, 1994.

2.2 Ecology

Common Nighthawk is a nocturnal species which show peak activity after dusk and before dawn (Fisher *et al.* 2004). Nesting habitat includes logged or slashburned areas of forest, woodland clearings, open forests, rock outcrops, and flat gravel rooftops of city building (Brigham *et al.* 2004). Typically, two eggs are laid on bare soil, gravel or flat rocks.

Nighthawk activity is influenced by weather, insect emergences, timing of nesting effort, time of day and may be influenced by lunar phase (Mills, 1986; Brigham and Barclay, 1992). Common Nighthawk forage anywhere between 1 and 80 m above ground and can be found between 125 m to 6 km from their day roost site (Fisher *et al.* 2004). Therefore, the study area encompasses a 6 km radius around the projected mining activities.

2.3 Distribution

In Newfoundland and Labrador, the Common Nighthawk breeds only in the southern part of Labrador and rarely seen in insular Newfoundland (NLDEC, 2015). Figure 1 presents the Labrador range. In the province of Quebec, the 54th parallel is considered its northern limit (COSEWIC, 2007). The species has never been recorded in Schefferville region (AONQ, 2015; ebird, 2015).



Source: NLDEC, 2015

Figure 1. Common Nighthawk Distribution in NFL

3 METHODOLOGY

3.1 Classification

The English, French and Latin names of birds are based on the 7th edition and 54th supplement to the list of birds North America (AOU, 2013).

3.2 Study Area

Considering that Common Nighthawk can be found between 125 m to 6 km from their day roost site (Fisher *et al.*, 2004), location of potential point counts for the species revolves around a 6 km radius from the Howse mining activities. However, point counts closer to the project were prioritized in this survey.

3.3 Common Nighthawk Survey Technique

Common Nighthawk survey protocol was based on the Common Nighthawk Survey Protocol in Saskatchewan (Saskatchewan Ministry of Environment, 2015) which used the existing route system. Stops were spaced at least 800 m apart. Point counts were conducted in the evening, starting 1 hour before sunset and ending no later than 1 hour after sunrise. To ensure surveying the species during peak activity periods, a maximum of eight stops were conducted per night. Upon arriving at a survey location, all lights were extinguished, followed by 1 minute of silence before commencing the survey. Point counts consist of 3 consecutive 2-minute passive-listening intervals, followed by a 2-minute Common Nighthawk broadcast call playback, then another 2-minute listening period. Total time at each point count were a minimum of 12 minutes (+ one minute of silence from the start). Playback was carried out using mp3 player and speaker Pignose Legendary 7-100 model.

The following information was recorded in Bird Survey Loadform at each stop:

- Temperature
- Wind velocity
- Cloud cover
- Start time and date
- Presence or absence of Common Nighthawk
- Description of the surrounding habitat
- Other species of interest
- Photographs (whenever possible)

Figure 1 (in Appendix I) presents the eight point counts spaced 800 m apart along the road. One point count was located in Howell River Valley since the temperature was expected to be warmer at this site, therefore resulting in a better foraging habitat for an aerial insectivorous. All point counts were visited twice, once on June 23rd and once on July 15th 2015.

3.4 Other species of interest

In order to add complementary information on locally-breeding species, other observations were also compiled.

4 RESULTS AND DISCUSSION

4.1 Survey Conditions

Observation conditions varied from good to excellent with temperature variation between 7°C and 20°C. Cloud cover was variable during the rest of the survey period, but no rain and fog were encountered. On June 23rd, the survey took place between 20:06 and 22:10 while on July 15th, surveys took place between 20:05 and 22:13.

Detailed conditions are presented in Appendix II.

4.2 Effort

Table 1 shows the effort for the Common Nighthawk point counts per biotope. A total of 3:12 hours were dedicated to the detection of the Common Nighthawk at 8 different point counts.

Table 1. Survey Effort in Common Nighthawk Point Counts

BIOTOPE	CONIFEROUS FOREST	SHRUBLAND	TUNDRA	ROCK OUTCROP/BARE GROUND
Point counts per biotope	4	2	1	1
Amount of Time Per biotope	1 h 36	0 h 48	0 h 24	0 h 24
Point counts Name	ENAM05, ENAM06, ENAM07, ENAM08	ENAM21, ENAM47	ENAM34	ENAM43

4.3 Common Nighthawk Presence

No Common Nighthawk were found during the surveys despite the use of playback. However, considering that there are no previous historical records in Schefferville region (Groupe Hémisphères, 2008; AECOM, 2009; Groupe Hémisphères, 2009; 2012; ebird, 2015), it was not unexpected that the species would not be found on the Howse property. In particular, local weather conditions are suboptimal for a nocturnal insectivorous bird. Records at the Schefferville weather station (Environment Canada, 2015) show that in June 2015, 20 days out of 30 had a minimum nightly temperature below 7°C while in July of the same year, there were 15 days out of 31 with the same conditions. Temperatures below 7°C are considered critical for nighthawk foraging behavior due to low insect activity rates (Saskatchewan Ministry of Environment, 2015). Therefore, it appears unlikely that breeding could occur under such severe conditions. Further, the Howse area is approximately 100 meters higher in elevation than the Schefferville weather station and even colder temperatures are expected to occur.

4.4 Other species

As complementary information, Table 2 shows a complete list of the 35 species of birds that were found on Howse property during summer 2015.

Table 2. List of birds encountered in the Howse Local study area during summer 2015

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
Green-winged Teal	<i>Anas crecca</i>	Ruby-crowned Kinglet	<i>Regulus calendula</i>
Surf Scoter	<i>Melanitta perspicillata</i>	Gray-cheeked Thrush *	<i>Catharus minimus</i>
Semipalmated Plover	<i>Charadrius semipalmatus</i>	Swainson's Thrush	<i>Catharus ustulatus</i>
Solitary Sandpiper	<i>Tringa solitaria</i>	American Robin	<i>Turdus migratorius</i>
Least Sandpiper	<i>Calidris minutilla</i>	Northern Waterthrush	<i>Parkesia noveboracensis</i>
Red-necked Phalarope *	<i>Phalaropus lobatus</i>	Blackpoll Warbler	<i>Setophaga striata</i>
Wilson's Snipe	<i>Gallinago delicata</i>	Yellow-rumped Warbler	<i>Setophaga coronata</i>
Great Black-backed Gull	<i>Larus marinus</i>	Wilson's Warbler	<i>Cardellina pusilla</i>
Herring Gull	<i>Larus argentatus</i>	American Tree Sparrow	<i>Spizelloides arborea</i>
Glaucous Gull	<i>Larus hyperboreus</i>	Lincoln's Sparrow	<i>Melospiza lincolni</i>
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	White-throated Sparrow	<i>Zonotrichia albicollis</i>
Yellow-bellied Flycatcher	<i>Cardellina canadensis</i>	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Gray Jay	<i>Perisoreus canadensis</i>	Dark-eyed Junco	<i>Junco hyemalis</i>
Common Raven	<i>Corvus corax</i>	Rusty Blackbird *	<i>Euphagus carolinensis</i>
Tree Swallow	<i>Tachycineta bicolor</i>	Pine Grosbeak	<i>Pinicola enucleator</i>
Bank Swallow *	<i>Riparia riparia</i>	White-winged Crossbill	<i>Loxia leucoptera</i>
Boreal Chickadee	<i>Poecile hudsonicus</i>	Common Redpoll	<i>Acanthis flammea</i>
Winter Wren	<i>Troglodytes hiemalis</i>		

* Species at risk

4.5 Species at risk

The Gray-cheeked Thrush and the Rusty Blackbird were already known to occur in coniferous habitats and wetlands on Howse property (AECOM, 2009). However, two new species at risk were found during Common Nighthawk survey: the Bank Swallow and the Red-necked Phalarope.

4.5.1 Bank Swallow

The Bank Swallow is well known for nesting in the streamside (riparian) banks and bluffs of rivers and streams. This species is a highly social land bird with a Holarctic breeding distribution. It nests in colonies ranging from 10 to almost 2,000 active nests. This widespread species has exhibited a severe long-term decline of 98% of its Canadian population over the last 40 years and is considered as threatened by COSEWIC (COSEWIC, 2013). Before 2015, there were no known records of the Bank Swallow presence in the Schefferville region. However, the species was known to occur near Labrador City and Kuujjuaq (ebird, 2015) and was not completely unexpected regionally. On June 25th, a small colony (approximately 10 nests) was found on a vertical bank of the mining pit Timmins 4 south (DSO Mines). The swallows were still active at the colony on July 15th. It is assumed that if new similar habitats (e.g. sandy vertical banks) are created in the Howse area, this species could potentially find new proper breeding habitats.

Location of the Bank Swallow colony can be seen on Figure 2 (Appendix I) while pictures are presented in Appendix III.

4.5.2 Red-necked Phalarope

The Red-necked Phalarope has declined over the last 40 years in an important staging area; however, overall population trends in Canada during the last three generations are unknown. The species faces potential threats on its breeding grounds, including habitat degradation associated with climate change. It is also susceptible to pollutants and oil exposure during winter migration. This is because birds gather in large numbers on the ocean, especially where currents concentrate pollutants. This species is considered of special concern by COSEWIC (COSEWIC, 2015)

An agitated adult male Red-necked Phalarope was observed in its breeding habitat on July 15th on a small pond with abundant aquatic vegetation. The pond was part of Burnetta Creek. Location of the Red-necked Phalarope can be seen on Figure 2 (in Appendix I) while a picture of the bird and its habitat is presented in Appendix III.

5 CONCLUSION

Groupe Hémisphères was mandated by HML to conduct a Common Nighthawk survey during summer 2015. Point counts spaced at least 800 m apart were conducted in the evening with use of Common Nighthawk broadcast call playback. Two visits were carried out.

Despite searching for the species under conditions that were most likely to elicit a sighting, no Common Nighthawk were found during these surveys and considering that the species has never been encountered in the area, it can be considered as absent and as a non-potential breeder in Howse area. However, 36 species of birds were observed including two new species at risk: Bank Swallow and Red-necked Phalarope.

6 SCOPE AND LIMITATIONS OF THE STUDY

This document is published in accordance with and subject to an agreement between Groupe Hémisphères and the client for whom it has been prepared. It is restricted to those issues that have been raised by the client in its engagement and prepared using the standard of skill and care ordinarily exercised by Environmental Scientists in the preparation of such documents. This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context. This document is confidential and the property of the client

7 QUALITY ASSURANCE

Groupe Hémisphères has an internal system of quality control inspired by ISO 9001: 2008 certification. This system requiring the verification and approval by a senior professional of any concept or report. It takes account the responsibility of management, the documentation and data control, the continuous staff training and the quality assurance for deliverables. This system also includes a strict control over the field's methodologies and safety measures specific to the project.

8 REFERENCES

Databases Consulted

AONQ [Atlas des oiseaux nicheurs du Québec] (2015) Résultats de l'Atlas. website : <http://www.atlas-oiseaux.qc.ca/donneesqc/cartes.jsp?lang=fr>. Consulted on July 2015.

eBird Basic Dataset. Version: EBD_re|July-2015. Cornell Lab of Ornithology, Ithaca, New York. Consulted on July 2015.

Environment Canada, 2015. Historical Climate Data. http://climate.weather.gc.ca/index_e.html#access. Consulted for Schefferville on August 2015.

Bibliography

AECOM Canada Ltd. (2009) *Breeding Bird Monitoring Report – James, Redmond, Silver Yards, Knob Lake, Houston, Howse, and Proposed Road Crossing Areas*. Submitted to Labrador Iron Mines, 31 p.

AOU [American Ornithologists' Union] (2013) *Check-list of North American Birds, 7th edition, Fifty-fourth supplement to the American Ornithologists' Union*. North American Classification Committee, American Ornithologists' Union. Internet site: <http://www.aou.org/checklist/north/>

Brigham, R. M., J. Ng, R. G. Poulin and S. D. Grindal (2011) *Common Nighthawk (Chordeiles minor)*, *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/213>; doi: 10.2173/bna.213

COSEWIC [Committee on the Status of Endangered Wildlife in Canada] (2007) *COSEWIC assessment and status report on the Common Nighthawk Chordeiles minor in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vi + 25pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm)

COSEWIC (2013) *COSEWIC assessment and status report on the Bank Swallow Riparia riparia in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 48 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC (2015) Website: http://www.cosepac.gc.ca/eng/sct5/index_e.cfm

Fisher, R., Q. Fletcher, C. Willis, and R. Brigham (2004) *Roost selection and roosting behavior of male Common Nighthawk*. *The American Midland Naturalist*, 151: 79-87

Garrison, B. A (1999) *Bank Swallow (Riparia riparia)*, *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/414>

Groupe Hémisphères (April 2012b) Survey of Breeding Birds at the KéMag Project Mine Site. Technical Report submitted to New Millennium Iron Corp., 23 p. and 4 appendices.

Groupe Hémisphères (December 2009b) Inventaire 2008 et 2009 des oiseaux nicheurs du futur site DSO. Rapport technique présenté à New Millennium Capital Corp., 22 p. et 4 annexes.

Groupe Hémisphères (October 2008) Inventaire des oiseaux nicheurs du futur site DSO. Rapport technique présenté à New Millennium Capital Corp., 16 p. et 6 annexes.

Hausleitner, D. and, J. Dulisse (2008) *Common Nighthawk inventory in the Pend d'Oreille and Fort Shepherd Conservancy Area*. Prepared for Fish & Wildlife Compensation Program, Columbia Basin,

- Nelson, BC, 17 p. Accessed at:
http://www.env.gov.bc.ca/wildlife/wsi/reports/4641_WSI_4641_RPT_2008NIGHTHAWK.PDF
- Mills, A. M. (1986) *The influence of moonlight on the behavior of goatsuckers* (Caprimulgidae). *The Auk*, 103: 370-278
- NLDEC [Newfoundland and Labrador Department of Conservation] (2015) *Common Nighthawk* (Chordeiles minor). Website:
http://www.env.gov.nl.ca/env/wildlife/endangeredspecies/Common_Nighthawk_Information_Sheet.pdf
- Saskatchewan Ministry of Environment. 2015. Common Nighthawk Survey Protocol. Fish and Wildlife Branch Technical Report No. 2015-15.0. 3211 Albert Street, Regina, Saskatchewan. 7 pp.
- SARA [Species at Risk Act] (2015) *Species Index*. Website:
http://www.registrelep.gc.ca/sar/index/default_e.cfm

APPENDICES

Appendix I

Figures



LEGEND

<ul style="list-style-type: none"> Local Study Area ● Common Nighthawk Point Counts 	<p>Infrastructure and Mining Components</p> <ul style="list-style-type: none"> Proposed Howse Pit Proposed Topsoil/Overburden Stockpile Proposed Site Infrastructure Proposed In-Pit Dump/Waste Dump Existing Sedimentation Pond Road to DSO Area 4 Existing Railroad 	<p>Basemap</p> <ul style="list-style-type: none"> Permanent Watercourse Intermittent Watercourse Storm Runoff Disappearing Stream ● Artesian Spring Water Body Provincial Border Existing Road Main Access Road Wetland
--	--	--

*Hydronyms are oriented along the direction of water flow

FILE, PROJECT, DATE, AUTHOR:
GH-0655, PR185-23-14, 2015-07-30, edickoum

Meters

UTM 19N NAD 83

SCALE: 1:30 000

SOURCES:
 Basemap
 Government of Canada, NTDB, 1:50,000, 1979
 Government of NL and Government of Quebec,
 Boundary used for claims
 Groupe Hémisphères, Hydrology, 2013.

Infrastructure and Mining Components
 New Millennium Capital Corp., Mining sites and roads
 TATA Steel Minerals Canada Limited/ MET-CHEM,
 Howse Deposit Design for General Layout, 2013

COMMON NIGHTHAWK SURVEY FOR HOWSE MINING PROJECT
TECHNICAL REPORT

Common Nighthawk Point Counts

Howse Minerals Limited

5731, rue Saint-Louis,
Bureau 201, Lévis (QC)
Canada, G6V 4E2

1453, rue Beaubien est,
Bureau 301, Montréal (QC)
Canada, H2G 3C6

Figure 1



LEGEND

Local Study Area	Proposed Howse Pit	Permanent Watercourse	Provincial Border
Species at Risk	Proposed Topsoil/Overburden Stockpile	Intermittent Watercourse	Existing Road
Bank Swallow Colony	Proposed Site Infrastructure	Storm Runoff	Main Access Road
Red-necked Phalarope	Proposed In-Pit Dump/Waste Dump	Disappearing Stream	Wetland
	Existing Sedimentation Pond	Artesian Spring	
	Road to DSO Area 4	Water Body	
	Existing Railroad		

*Hydronyms are oriented along the direction of water flow

FILE, PROJECT, DATE, AUTHOR:
GH-0655, PR185-23-14, 2015-07-30, edickoum

SOURCES:
Basemap
Government of Canada, NTDB, 1:50,000, 1979
Government of NL and Government of Quebec,
Boundary used for claims
Groupe Hémisphères, Hydrology, 2013.

Infrastructure and Mining Components
New Millennium Capital Corp., Mining sites and roads
TATA Steel Minerals Canada Limited/ MET-CHEM,
Howse Deposit Design for General Layout, 2013

0 500 1 000 1 500
Meters
UTM 19N NAD 83
SCALE: 1:30 000

COMMON NIGHTHAWK SURVEY FOR HOWSE MINING PROJECT
TECHNICAL REPORT

Species at Risk
Howse Minerals Limited

GroupeHemispheres

5731, rue Saint-Louis,
Bureau 201, Lévis (QC)
Canada, G6V 4E2

1453, rue Beaubien est,
Bureau 301, Montréal (QC)
Canada, H2G 3C6

Figure 2

Appendix II

Survey Conditions

Meteorological Data Recorded During Bird Surveys

Site / Survey	Date / hrs	Temperature (°C)	Nebulosity (0 to 100%)	Precipitation (0 to 10)*	Wind (Beaufort)	direction	Condition
---------------	------------	---------------------	---------------------------	-----------------------------	--------------------	-----------	-----------

HOWSE MINING PROJET

COMMON NIGHTHAWK SURVEY

23-06-2015

20:06	20	8	0	2	SE	Excellent
20:24	20	8	0	1	SE	Excellent
20:43	18	8	0	3	SE	Excellent
21:00	18	8	0	2	SE	Excellent
21:13	17	8	0	3	SE	Good
21:28	16	8	0	2	SE	Excellent
21:42	14	8	0	3	SE	Excellent
21:58	14	8	0	3	SE	Good

15-07-2015

20:05	8	8	0	2	O	Excellent
20:20	8	8	0	2	O	Excellent
20:43	8	8	0	2	O	Excellent
20:59	8	8	0	2	O	Excellent
21:16	7	8	0	3	O	Excellent
21:31	7	8	0	3	O	Good
21:46	7	8	0	3	O	Good
22:01	7	8	0	3	O	Good

* 0 when no precipitation and 10 for large shower

Appendix III

Pictures Taken in Howse area



Surveyed habitat: Coniferous forest (open taiga)



Surveyed Habitat : Shrubland



Surveyed habitat : tundra



Surveyed habitat : rock outcrop, bareground



Location of Bank Swallow colony, DSO Mines, Timmins 4 South. July 2015



Bank Swallow foraging, DSO Mines, Timmins 4 South, July 2015



Red-necked Phalarope, adult male, Burnetta Creek, July 2015

DRAFT
Goodwood-Timmins Haul Road and Howse Property
Historic Resources Impact Assessment, near Schefferville, QC

Archaeological Investigation permits #14.42



Irony Mountain, viewed from northwest end of Howse Property Project Area.

Submitted to
Provincial Archaeology Office
Department of Business, Tourism, Culture and Rural Development
Confederation Building
St. John's, NL
A1B 4J6
&
Loic Didillon
Tata Steel Minerals Canada,
1000, rue Sherbrooke, Bureau 1120,
Montreal, QC,
H3A 3G4

Submitted by
Gerald Penney Associates Limited
104-40 Quidi Vidi Road
St. John's, NL
A1A 1C1

31 October 2014

CONTENTS

Letter of transmittal.....	2
Executive summary.....	3
Participants.....	3
Introduction.....	4
Study area/Natural features.....	5
Previous Archaeology.....	8
Historic Background.....	10
Field Results.....	17
Goodwood-Timmins Haul Road Project Area.....	17
Howse Property Project Area.....	26
Discussion.....	30
Recommendations.....	32
Sources.....	33
Appendix A – Waypoints.....	37
Appendix B – Map of test pits.....	41
Appendix C – Howse survey area.....	42



Letter of Transmittal

Gerald Penney Associates Limited
Box 428
St. John's, NL
A1C 5K4

31 October 2014

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 "Goodwood-Timmins Haul Road and Howse Property Historic Resources Impact Assessment, near Schefferville, QC" as per Archaeological Investigation Permit #14.42.

Sincerely,



Gerald Penney
President

/encls

Executive Summary

From 16 to 21 September 2014, Gerald Penney Associates Limited conducted a Historic Resources Impact Assessment on a c. 30 km Goodwood-Timmins haul road and c. 9 km² Howse Property deposit at an iron ore mine operated by Tata Steele Canada, c. 15 km NW of Schefferville, QC. Surface survey of all uninvestigated sections of the haul road (c. 23 km), and the large Howse deposit project area identified no pre-contact historic resources. 20th century historic resources were identified, though typically recent and within close proximity to an existing access road. Natural finds of potential cultural importance or significance include signs of past caribou presence in the form of several sets of antlers and a skeleton, and several surface-level chert fragments.

Participants

Gerald Penney, M.A.	principal investigator
Blair Temple, M.A.	archaeologist; report preparation
Robert Cuff, M.A.	historical research; report preparation
Toby Simpson, B.A.	archaeologist; drafting/digital mapping
Lori Temple, B.A.	cataloguing
Miki Lee, B.A., Dip. CCM	conservator

The assistance of the Provincial Archaeology Office, Edward Mameanskum, Coco Calderhead, Michael Lewis and Lisa Clancey of Tata Steel Canada, and Vincent Taylor of Gray Rock Mining, is acknowledged. Lisa's help and assistance during the field component is particularly appreciated. Shirley Einish and Judas Shecanapish, of Kawawachikamach, QC, provided valuable field assistance and are gratefully thanked.



Large chunk of dark chert, wpt "Chert8".

Introduction

In the summer of 2013, officials with Tata Steel Canada contacted Gerald Penney Associates Limited (hereinafter GPA) requesting that a Historic Resources Impact Assessment (hereinafter HRIA) be conducted on a proposed 30 km haul road extending from the Goodwood deposit, to their processing facility, c. 20 km NW of Schefferville, QC. The project was put on hold for the remainder of the year, and subsequently revived in 2014. In the spring of 2014, Tata Steel again contacted GPA concerning the assessment of the haul road, as well as an assessment of an iron ore deposit within the Howse property.

Background research was conducted during the summer of 2014. The field component of the HRIA was completed between 16 and 21 September 2014, by archaeologists Blair Temple and Toby Simpson, with the assistance of Shirley Einish and Judas Shecanapish, of Kawawachikamach, QC. Gerald Penney of GPA, had travelled to the mine site at the request of Tata Steel officials for a site familiarization visit on 27 August 2014. No fieldwork was conducted.

Study area/Natural features

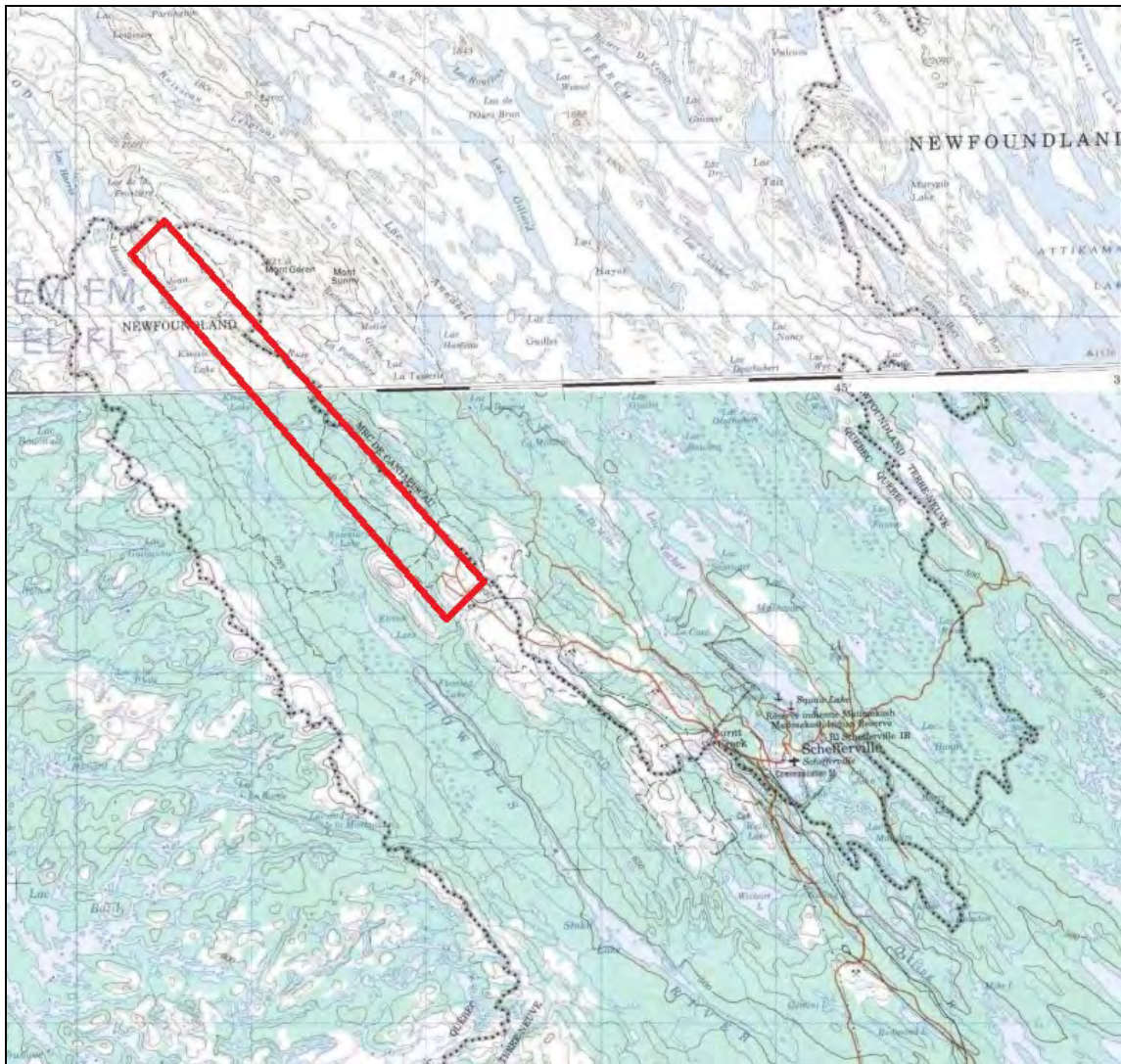
Both project areas are located in western Labrador, NW of the community of Schefferville, QC. The Howse Property is the location of an iron ore deposit, approximately 20 km NW of Schefferville, just over 2.0 km NW of a new processing facility. The property is approximately 9.0 km² in size, of which approximately 1 km² was investigated during a previous HRIA, with no historic resources identified (JWSL 2009). The other study area is the Goodwood-Timmins haul road, approximately 30 km long, which runs between the Goodwood iron ore deposit and the primary processing facility. Portions of this had been previously assessed, to be discussed below.

Both the proposed Howse mine and the Goodwood Road are on the northeast side of a valley of Howells River in western Labrador. The Howells River valley can be conceived of as a 'spur' of Newfoundland and Labrador territory, extending 50 km NNW of the Schefferville.¹ Howells River runs roughly 50 km from headwaters² at the Quebec-Labrador border, SE through several long lakes³ before emptying into Astray Lake, which is naturally drained through the Menihek Lakes, Ashuanipi River, Churchill River and Hamilton Inlet into the Labrador Sea.

¹ For ease of reference we have assigned a field name "Howell River Spur" to the present study area. Field names assigned by GPA will be identified as such on first use and enclosed in double quotes.

² Howells Lake, just NW of Kivivic Lake.

³ From NW to SE: Kivivic, Rosemary, Elross, Fleming and Stakit Lake.



Location of the Howse Property and Goodwood Road project areas, in red. The haul road extends the entire length; the Howse Property is located near the SE end. (Stitch of 23J and 230 NTS 1:250,000 topographic maps).

West of the Howells River Spur, in the Province of Quebec, natural drainage is west and north, into the Caniaspicau River and other tributaries of the Koksoak River. The Koksoak River drains into Ungava Bay above Kuujjuak (formerly, Fort Chimo). East and north of the Howells River Spur is the “Schefferville Pocket”⁴ also in Quebec. The Schefferville Pocket drains north into the Koksoak system via the Swampy Bay River. East of the Schefferville Pocket drainage south into the Ashuanipi/Churchill system defines another Newfoundland Labrador spur, the “Attikamagen Spur.”

⁴ A GPA field name.

Ground cover in the Howells River valley is typically sparse lichen forest, with small patches of black spruce cover. The higher ground tends to be more open and rocky, while boggy areas are common at lower elevations, and around water courses. Bare ground with limited foliage is common. Both project areas have been the focus of mineral exploration and mining operations since the mid-20th century, and thus there are many extensively disturbed areas throughout.



The Labrador Trough (Geological Survey of Newfoundland and Labrador).

The Height of Land which separates the Province of Newfoundland and Labrador from the Province of Quebec (sometimes referred to as the Laurentian Divide) can be conceived of as an “ecological edge” from a number of perspectives. In addition to being a land of “dividing waters” it also corresponds to a division between the sporadically wooded country of NW Labrador and the barren ground and tundra to the north. Geologically, it is part of the Labrador Trough, a significant iron-producing formation straddling the Quebec/western Labrador border. Since 1954 a number of the world’s largest iron ore producers have operated in this formation, and it is further exploration, delineation and development of iron mining in the Labrador Trough that drives current interest and this historic resources assessment.

Previous Archaeology

The study area lies at the centre of the Quebec-Labrador Peninsula, a land mass described as “the last large-sized segment of the North American continent to undergo archaeological exploration” (McCaffrey 2006:164). It also remains an area with a complex and incompletely known cultural history (Holly 2013:57; McCaffrey 2006:165-166).

The larger region received little archaeological attention prior to the hydro-electric developments of the 1970s within Quebec, and 1960s in interior Labrador (Loring et al 2003; McCaffrey 2006). Specific to the Schefferville area, archaeological surveys by David Denton and Moria McCaffrey in the 1980s are among the first in the region. Several pre-contact and historic period sites were identified by McCaffrey in 1989. Of particular interest were the lithic sources recorded, which possibly account for much of the pre-contact presence in the area (Denton and McCaffrey 1988).

During the 1990s and onward, continued mining development and associated activities led to several historic resource assessments in the Schefferville and wider area (e.g. JWSL 2009, McCaffrey 2004). The locations of these investigations were not research-driven, but rather dictated by specific mining activities. Some have proved successful in identifying evidence of pre-contact and historic era occupation. During a 2011 assessment of roadways associated with those proposed here, a pre-contact site (GfDs-03) was identified NE of Morley Lake, near the existing access road (Arkéos 2012:19-24)

Outlining a cultural history of the area has proven difficult due to sparse data, and the slightly differing cultural histories from the surrounding area (i.e. Quebec and Labrador). The earliest occupation of Schefferville and broader area dates to c. 3500 BP (McCaffrey 2006:177). Archaeological evidence suggests that late Archaic and post-Archaic (Intermediate) migration occurred from the east (Labrador coast) and from the south (the Quebec North Shore), both around the same time, resulting in the development of distinctive groups with material traits similar to those to the east and south, yet markedly different (Holly 2013:60; McCaffrey 2006:177-179). Sites of this period are sparse,

however, and tend to be small, suggesting high mobility. Local lithics often predominate, but the range of lithic materials – including Ramah chert from northern Labrador and quartzite from central Quebec – indicate expansive social networks (Denton and McCaffrey 1988). After c. 2000 BP, human presence appears to grow in the central Quebec/Labrador region, with a larger number of sites spread across a wider area. The period is marked by a notable change in both lithic variety and hearth features, the latter suggesting communal groups (Holly and McCaffrey 2012:130; McCaffrey 2006:165-166).

Historic Background

This general area is described in 19th century records as being a meeting-place of the aboriginal inhabitants (now known as Innu or Naskapi) who hunted and travelled the Height of Land. Those hunting caribou in the barren grounds to the west, north and south would gather in the fall before making their way out to the coast at Hudson Bay, Ungava Bay, the Labrador Sea or the Gulf of St. Lawrence. The locale specifically mentioned as such a meeting place is at Petitsikapau Lake, approximately 60-65 km SE of the present study area. As a consequence of such use the Hudson's Bay Company (HBC) established a trading post here, Fort Nascopie, which operated in the mid-19th century.

Sources of historic knowledge of the study area are principally records associated with the fur-trading activities in the mid-19th century, some missionary accounts later in the century and with geological and topographic surveying beginning in 1894, intensifying after World War II, leading to an operating iron mine by 1954.

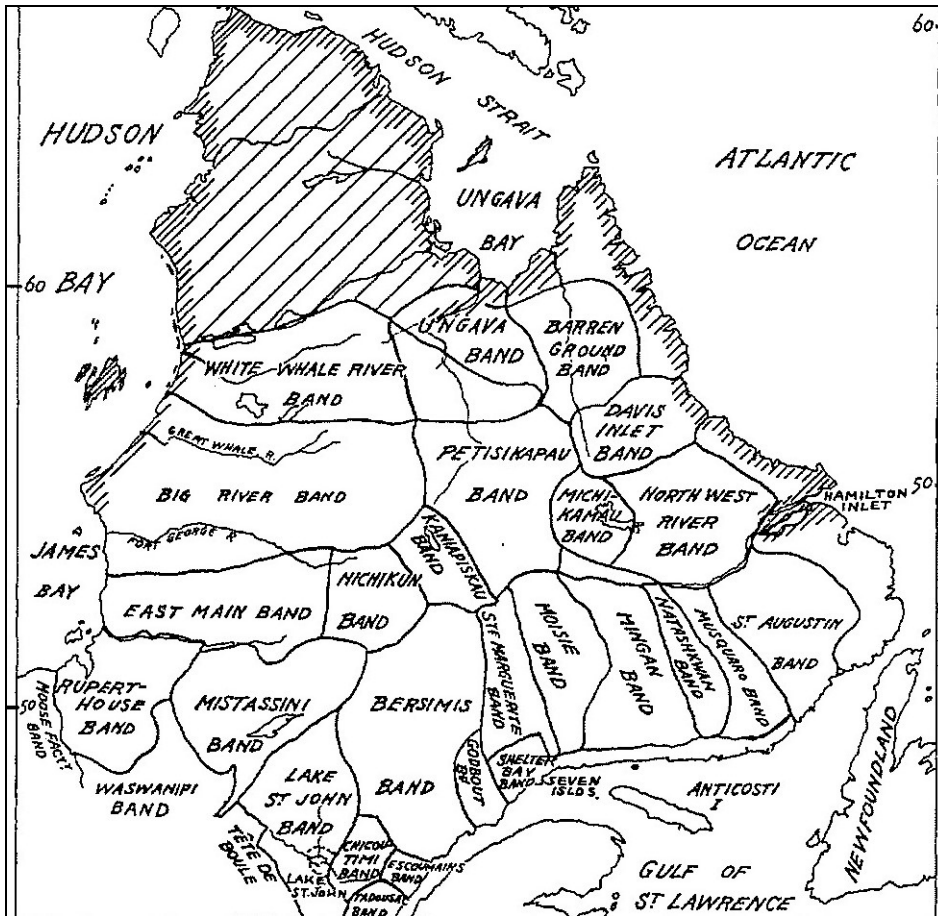
The earliest known trading post in the western Labrador interior was Fort Naskapis, on Ashuanipi Lake. An outpost of the Montreal-based fur traders, the North West Company (NWC), Fort Naskapis⁵ operated from about 1733 to 1750 and channeled trade 350 km south towards NWC posts at Mingan and Sept Isles, Quebec. Fort Naskapis, at the north end of Ashuanipi Lake, was likely near archaeological site Ferguson Bay 1, which derives its significance in part from a presumption of an established "Ashuanipi-Menihek" aboriginal trade travel corridor to and from barren-ground caribou hunting areas proximate to the present study area.

⁵ Naskapis and Nascopie are orthographic variants of an ethnic identifier now often rendered as Naskapi, a term which was used by Europeans to indicate a northern sub-group of the "Montagnais" a people of the north shore of Gulf of St. Lawrence. In Newfoundland and Labrador usage the older terms Montagnais/Mountaineer and Naskapi have been replaced by the term "Innu" to refer to both sub-groups. However, in the Schefferville area of Quebec, where there are two distinct groups recognized based on historical and linguistic differences, the term Naskapi has been retained to refer to a group with northern origins, at the community/reserve of Kawawchikamach. In Quebec the term Innu is usually employed in referring to a group originating in the south (previously, Montagnais), with reserved land at Matimekossh.



Geological Survey of Canada (A.P. Low) mapping of major drainage in the Quebec/Labrador interior – red arrow added to indicate approximate location of the study area.

Coincident with Fort Naskapis there was also a Quebec-based independent trader, Louis Fornel, operating at North West River, Hamilton Inlet from 1742. Although there is likewise frustratingly little known about Fornel's activities, it is likely that part of his trade was drawn from the north, via the Naskaupi River and from the west, via the Churchill River.



Local bands of “Montagnais” and “Naskapi” on the Quebec-Labrador Peninsula, from mid-19th to early 20th century (Speck 1931:565).

Although the HBC’s 1670 charter granted the Company the lands draining into James, Hudson and Ungava bays, HBC trading posts were not established interior of Ungava Bay and the east side of Hudson Bay until the 19th century, after the 1821 merger between the HBC and NWC. Although the merger had an immediate effect in the reduction of the number of fur-trading pots, the removal of competition was followed by increased exploration by HBC employees in search of new sources of furs. Initially this exploration was out of posts on the east side of Hudson Bay, exploring the Eastmain and Big (now, La Grande) river systems. In the 1820s several HBC employees made their way to the Canisapau/Koksoak River system, following the rivers north to Ungava Bay and leading in 1830 to the establishment of a trading post at Fort Chimo (now, Kuujjuak) on the lower Koksoak River. Further exploration out of Fort Chimo led HBC to establish

a number of interior posts in what is now the Quebec-Labrador border area and also to establish a post at North West River on Hamilton Inlet.

The earliest historic account of Height of Land area is from HBC employee Erland Erlandson, who reached Petitskapau Lake in 1834: “There is a lake a little beyond the height of land, Peetaskeekouba by name, in a good fur country, which would be a very eligible situation for an outpost as the Indians separate in it on their way to the different posts on the Gulf” (Davis and Johnson 1963:240). In the 1830s the HBC opened a number of new posts to capture the furs of the Quebec-Labrador Peninsula, including Fort George at the mouth of La Grande River, Fort Chimo, Fort Smith (North West River), and also a series of small interior posts including Fort Canisapau, Fort Nascopee and Fort Winokapau (on the Churchill River).

Fort Nascopee on Petitskapau Lake, built in 1838, was originally to be supplied from and trade through Fort Chimo via the Swampy Bay and Koksoak rivers. However, as the Labrador interior and its inhabitants became better known to the HBC it was decided to close Fort Chimo in 1843 and Fort Nascopee became an outpost of Fort Smith/North West River. The HBC encouraged 20 families of Cree from the vicinity of their post on La Grande River to relocate near Fort Nascopee, where it appears they found:

at least three fourths is unwooded, and the wooded Country is only a few narrow strips they found already in possession of Indians who have long hunted in that quarter, but have only traded at the Ungava Country since 1837. They go by the name of Nascopies and are principally from Seven Islands and others of the Kings Posts.⁶ Their number is as follows:--

64 married men

73 Lads Boys (many growing up to be good hunters)

74 married women

65 girls etc.

As these range over the whole extent of the neighbourhood of Fort Chimo to the hunting grounds of the Indians of the Bay and those of Seven Islands Bay and also towards the post of Canniapiscaw – the most northern in Ruperts River district – they leave little scope for others” (Simpson 1848:2).

⁶ NWC trading posts.

In 1866 the HBC decided to re-establish Fort Chimo and over the next decade closed their interior posts (Caniaspicaw, Nascopee and Winokapau) forcing trade to the coast.

Even though it had been closed for 20+ years, in 1887 explorer R.F. Holme noted that:

the most important point connected with the Labrador interior is the Company's inland post, Fort Nascopee... During the latter years when this post was used, a journey was made annually from North-west river in an inland boat up the Grand [Churchill] river, and through Lake Waminikapou.⁷ The men, about twenty in number, with an officer in charge, went up in the autumn with stores for their own use, and goods for trading purposes, and returned in the spring... leaving the post deserted in the summer months (Holme 1888:192).

The ruin of Fort Nascopee was still being described as a significant gathering-place in 1894, by Canadian geologist A.P. Low:

The ruins of Fort Nascaupée stand in a small clearing, close to the shore of the lake, and only a short distance above high-water mark. The houses were built of small, squared logs, with board roofs. When visited the dwelling-house was in a fair state of repair, with the window sashes and some of the glass still in place. The doors and movables inside had been broken up and used for building is about twelve by eighteen feet, and has a low room under the attic roof above. Adjoining the main building on each side are two smaller buildings, evidently used for a kitchen and store; the roofs of both have fallen in. Traces about twenty yards to the east of these ruins, probably represent the remains of some outbuildings. About fifty yards behind, the powder house covered with earth was seen, with broken roof and partly filled up with earth. Adjoining this is a small burying place with a large wooden cross in its centre, but without any marks on the graves, which are probably those of Indians. In the attic a fragment of "The Albion", of March 7th, 1846, was found. Close to the house were several patches of rhubarb [*sic*] eighteen inches high, while a number of introduced plants still flourish in the door-yard.

Early in the 20th century there were at least two attempts to establish interior fur trading posts: by independent trader John Ferguson on Ashuanipi Lake (1910) and by the HBC at Fort Mackenzie at the confluence of Canisapau and Swampy Bay rivers (1916). In 1918 a HBC trader and his wife, James and Maud Watt, made a journey overland from Fort Mackenzie to Sept Isles, via Petitskapau Lake and the Ashuanipi River. Mrs. Watt described Fort Nascopee as dilapidated, but still an important Innu crossroads and message post: "the meeting place of the long trails."

⁷ Winokapau.

James Watt was instrumental in persuading HBC to open Fort Mackenzie, to recapture the trade of the Innu, who had become increasingly reluctant to cross the barren ground and tundra south of Fort Chimo in the light of a catastrophic decline in the caribou herds on which they depended during their travels. HBC had always been frustrated with the output in furs from the Hudson Bay/Ungava/Labrador interior, as the Innu/Naskapi of necessity spent the majority of their time hunting caribou. Likely the decline in caribou numbers made fur-trapping more of a priority. It is this scenario, during the 1920s, that ethnologist Frank Speck (1931) captured in his description of Innu hunting territories deep in the Quebec-Labrador interior – small family groups which he loosely grouped into three “bands:” Caniapiscau, Petitskapau and Michikamau.



Burnt Creek/Knob Lake camp site, 1950 (Acme News Service).

In 1929 a new era of geological exploration began when a party led by J.E. Gill and W.F. James explored the geology in the area that is now Schefferville/Howells River, identifying significant iron ore deposits at what is now Ruth Lake. Over the next decade detailed mapping of the study area was undertaken as the magnitude of the Labrador ore body began to catch the imagination of industry and governments. In 1937 geologist

W.C. Howells made a watercourse survey between Kivivic and Astray lakes, attaching his name to the river. In 1942 what is known as the Goodwood deposit of iron ore was discovered in Quebec, just north of the border from the Howells River drainage, and the Goodwood-Timmins haul road was built shortly thereafter. The mining/exploration companies (incorporated as the Iron Ore Company of Canada in 1949) built a townsite near the Burnt Creek/Knob Lake deposits, just east of the border and also in the Province of Quebec. The mine, the Quebec North Shore and Labrador railway, and town which later became known as Schefferville were complete and operational by 1954.

Field Results

Field investigations occurred between 16 and 21 September 2014, employing a four-person field crew. The two project areas (hereinafter PAs) were primarily surface and visually surveyed. Due to the nature of ground conditions, areas with exposed soils were frequently encountered, allowing for visual inspection. Test pitting was conducted in areas where historic resources potential was deemed high, based on the natural surroundings and surface conditions. These were determined to be few throughout both study areas. The first four days of field assessment were dedicated to the Goodwood-Timmins PA, with the last two days devoted to the Howse PA. The two separate PAs will be discussed separately. Regarding the Goodwood-Timmins PA, five separate sections of the haul road were investigated, and have been identified as individual “study areas” (hereinafter SAs) for the sake of clarity and discussion.

Goodwood-Timmins Haulroad Project Area. Mapping of the proposed Goodwood-Timmins haul road indicated approximately 30.0 km of road was to be constructed, extending from the processing facility (1.7 km west of Pinnettee Lake), to the Goodwood deposit (approximately 3.0 km west of Lac de la Frontière on the Quebec side of the QC/NL border). The haul road runs in an approximate NW/SE direction. Comparison of supplied mapping, and results of an earlier archaeological investigation of the existing access road system (Arkéos 2012), concluded that approximately 7.0 km of the proposed haul road had already been assessed or was in close enough proximity that no further investigation was warranted. The remaining portions (c. 23 km) are those surveyed during this HRIA.

The remaining sections of the Goodwood-Timmins haul road were split into five subsections or study areas (SAs). All but one (SA4) was investigated in its entirety, within a single field day. The SAs were assessed in approximate order, from NW to SE, and have been designated numerically as such. (This was assigned post-fieldwork). They will be discussed individually, below.

Upon arrival at the mine site, one portion of the haul road were observed to be under construction⁸, and another completed (see Appendix XX): one, the SE portion from point 0+0 m⁹, to c. 5+100 m had been completed before arrival; the other (under construction during GPA's investigation), being a section extending from c. 19+600 m to 24+000 m¹⁰. As the former was under construction, with blasting scheduled within a matter of days, no investigation conducted at this area. The SAs in immediate proximity to the proposed blasting were assess first (SA 2 and 3), in order to complete the work and be significantly removed from the area for health and safety reasons.

Study Area 1 is located at the far NW end of the Goodwood-Timmins haul road PA, and was the first area assessed. It begins at approximately 26+200 m and extends to the Quebec/Labrador border at approximately 28+500 m. Much of this length is located along the edge of a hillside or along rocky ground with rolling topography. Single fragments of chert were identified in two locations (wpt "Chert2" and Chert3"), plus caribou bone and a set of antlers (wpt "Bone" and "Antlers"). The chert fragments were both natural and unused, and would become a common find during the HRIA. Likewise, antlers would become a common find. However, the antlers at SA1 are the only set identified that show evidence of any human modification or interaction. They were found with a large stone on top of the one of the antler, likely having been placed there. The reason for this is unknown. Except for some signs of early mineral exploration, no further historic resources or signs of human presence were identified.

⁸ GPA had been informed of this construction previous to site visit; first observed by Gerald Penney on 27 August 2014.

⁹ These distance markers are derived from construction mapping, and used by road construction crews.

¹⁰ Construction was ongoing at both end of this section, with roadwork advancing daily.



Caribou antlers (wpt “Antlers”) with a flat stone intentionally (?) lain across them.



Rocky landscape at SE end of SA1. Facing SE.

Study Area 2 is a relatively short portion located near the NW end of the larger project area, extending approximately from markers 24+200 m to 25+200 m (its SE end abuts the NW end of the portion under construction, as of 17 September¹¹). It cross-cuts a rocky

¹¹ The construction was constantly proceeding in both a NW and SE direction.

section of Joan Brook running SW from Joan Lake, c. 1.1 km to the north. Caribou antler were recorded (wpt “Antler3”), as well as a possible old caribou path along the southern bank of the brook (wpt “Caritrail”). The presence of this brook was initially thought to hold historic resource potential, but upon examination it was identified as quite rocky and shallow, with steep-sided, rocky banks. Traversing in watercraft would be impossible, and the water level (unless significantly higher in the past), would make it an unlikely place anything but small numbers of freshwater fish. No historic resources were identified.



Section of Joan Brook, SA2, looking south. The haul road will cross the brook at the point where the photo was taken.

Study Area 3 is located from approximately marker 15+300 m to 19+700 m. The NW end abutted the SE end of the portion under construction. The NW end is positioned along the side of a hill, gradually extending into a more wooded area. The only water crossing encountered was little more than a small brook, draining Kivivic Brook into Howells River. Surface level chert fragments were identified in three places (wpt “Chert4”, “Chert5”, and “Chert6”). An interesting geological feature was recorded near the SE end

of the study area. It is a large, prominent rock located within the forest (wpt “Rkshelter”) with no rocks of remotely similar size anywhere in the vicinity. This glacial erratic is has a scallop or large cut on one side at its base, and could provide shelter from the elements in case of an emergency (for human or animal). Examination of the exposed surface identified no evidence of such usage, but it remains an interesting natural feature.



Goodwood-Timmins haul road construction, viewed from NW end of SA3.



Large erratic stone (wpt “Rkshelter”), SA3.



First Aid shack, SE end of SA 3.



Tree-covered terrain, SE half of SA3.

Study area 4 is located immediately NW of SA5, extending from marker 13+600 m to 14+500 m. (SAs 4 and 5 are separated by a large gravel pit, where a seldom-used first aid shack is located). This is shortest portion of the overall haul road to be surveyed. It generally runs along sloped or hilly ground. Despite its proximity to a brook running into Greenbush Lake, the overall area is typically unsuitable for habitation, with the area immediately west of the proposed route quite boggy. Except for a fragment of surface level chert (wpt “Chert12”) and caribou antler (wpt “Antler 2), no historic or cultural resources were recorded.



Large set of caribou antlers (wpt “Antlers2”), SA 4.

Study area 5 is located from point 5+100 km to approximately 13+400 km. This is the longest single section, and was assessed over the course of two days (18 and 19 September 2014). The most NW portion – from 7+600 m to 13+400 m – was assessed after leaving a vehicle at the NW end, and receiving transport to the 7+600 km mark, and walking back to the vehicle. This c. 5.8 km long section proceeded along the SW side of three unnamed ponds, (which flow NW into Greenbush Lake and on to Howells River). Examination along the western sides of these ponds observed largely marsh and wet shoreline. The near absence of modern garbage or debris (exception, wpt “Wrapper”) points to limited usage in recent decades¹². Evidence of past caribou presence was observed throughout, in the form of bone and antler (wpt “Antler6” and “Skull”), as well as possible paths crisscrossing the study area (wpt “Caripath”, “Caripath2”, “Caripath2B”, and “Caripath3”). A single chert fragment was identified (wpt “Chert 9”). Test pitting was

¹² Our crew stopped and had lunch at easily, the most attractive location among the SW face of these ponds, and no sign of previous presence was observed.

limited, with two test pits along the SW side of the largest (most southeastern) unnamed pond (wpt “TPS1” and TPS2”), and two more in a small open area at its NW end (wpt “TPS3” and “TPS4”).



Test pitting NW end of pond, SA5 (wpt “TP3” and TP4”).

The SE portion of SA5 runs from marker c. 5+100 m to c. 7+600 m. A recent fire pit was observed near the road (wpt “Firepit”), adjacent to a large rock. Additionally, the area around GfDs-03 was examined and surface surveyed, with no further historic resources were identified. A large fragment of dark chert was recorded at surface level (wpt “Chert8”) nearby, but was clearly natural with no evidence of cultural modification. Much of this end of SA5 was located on top of, or on the side of a long, rolling hill. No further historic resources were identified.



Recent fire pit next to large erratic boulder (see shovel), near extant access road (wpt "Firepit").

Howse Property Project Area. The other PA assessed during the HRIA was the Howse Property, investigated on 20 and 21 September 2014. A roughly "Z" shaped area, approximately 1.0 km² in size within the center of the PA had already been assess as part of a previous HRIA in 2008 (JWSL 2009). No historic resources were identified during that assessment.

The circumference of the Howse PA is c. 9.0 km; the total size of the PA is c. 8.0 km², excluding the previously assessed area. The PA was investigated primarily through walking survey, involving assessment along its periphery, the inner portions near the previously assessed area, and along some of the more substantial brooks.



Gravel assess road along SW edge of Howse PA. Base of Irony Mountain at left.

Investigation began on 20 September, focusing on the SE half of the PA. This portion was found to have great change in its topography and ground conditions. The SE end is located quite near ongoing mining operations and is positioned along a rocky ridge. This dips downward to the NE, where Goodream Creek flows into Pinnetee Lake. The land rises sharply again on the opposite, western side of the creek/brook. Much of the SW portion of the PA is rocky, with little foliage, extending all the way to the base of Irony Mountain. A gravel road runs nearly in line with this SW end, near the base of Irony Mountain. This portion is quite accessible, explaining the abandoned truck located in the area. Towards the west, the PA is somewhat more tree covered, with lichen forest, dominated by thick, alder-like growth. Three recent firepits were identified (wpt “Firepit2”, “Firepit3”, and “Firepit4”), two within metres from one another along a gravel access road. Two sets of caribou antler were recorded (wpt “Antler4” and “Antler5”) as well as random bone. A wooden sign with no remaining image or text was recorded, having been used as a rifle target in the past (wpt “target”). Along the western side of the creek running into Pinnetee Lake, two test pits (wpt “TPS8” and “TPS9”) were excavated along the upper bank above the brook. All historic resources identified were quite modern

(dating to the last 2-3 decades), and all within immediate proximity to a gravel access road or past exploration activity.



SE end of the Howse Property PA. Irony Mountain is in background, but obscured by fog.



Recent fire (wpt "Firepit3"), next to access road running through PA.

The remainder of the PA was investigated the following day, 21 September, and involved assessment of the northern and NE portion. The topographic and surface conditions in this portion differ greatly from the other portion of the PA. The extremes in topography are absent, with typically flat or gradually rising/falling landscape. Large portions are quite boggy and marshy, contrasting with the hilly and rocky areas from the previous day along the SE and southern end. There is far more foliage and tree cover, as well more gravel roads for access to drilling locations and various other mining and environmental activities. Finds include the entire skeleton of a caribou (wpt “Skel”), and a further fragment of chert at surface level (wpt “Chert13”). Strictly mining-related finds include an old geotechnical pit (wpt “Oldpit”), a wooden block and pallet in a small cut-over area next to a brook (wpt “Seat”), the function of which is uncertain, and a helicopter pad and water monitoring station c. 100 m to the ESE (wpt “Helipad” and “Helibld”). Along one of the primary gravel roads through the PA, a large teepee was recorded, just metres off the road (wpt “Teepee”). It had no covering (only the upright sticks remain), and has rubber mats leading up a presumed entrance. Its location next to the road, coupled with the modern debris scattered around and the nylon rope used in its construction, suggest a contemporary date for this feature. No other historic resources were identified.



Near complete caribou skeleton (minus skull), north end of Howse PA (wpt “Skel”).



Mining related debris next to brook (wpt "Seat").

Discussion

Extensive surface survey of the Goodwood-Timmins haul road and Howse Property PAs resulted in the recording of several features of cultural interest. Most were admittedly natural, including six sets of caribou antlers and 13 fragments of chert. Some cultural features were identified however. A wide range of features were identified, including recent firepits, a teepee, and mining related debris. All are contemporary or near-contemporary, but the most striking and obvious observation regarding these finds (with the exception of some mining related debris) is that they are nearly always in proximity to an access road. This is not coincidence, as the absence of finds elsewhere shows that access was a predetermining factor in an area's 20th century usage. Finds from the 2011 survey of an existing roadway (Arkéos 2012) highlight this observation. Usage of this specific area was heightened with the development of mining activities and the easier

access it created. Land use is known based on archaeological and ethnographic data, but it was small and possibly seasonal.

One observation regarding land usage beyond the vicinity of any access road is the near absence of debris or garbage. Over the course of many years usage, some quantity of garbage and debris will be left behind. Visual survey of the ponds in SA1 identified a single candy bar wrapper. No camp fires, or signs of recent or past fishing, was found at any location along these particular water bodies. Likewise, survey through general interior area – while admittedly all having limited redeeming quality – identified no sign of any human presence, modern or otherwise. Many parts of both project areas have thin ground cover (i.e. moss, grass) on the upper soil layer. If substantial stone features such as hearths or tent rings are present, they may be partially visible at surface.

In making application for Archaeological Investigation Permit #14.42, GPA stated that watercourses intersected by the proposed haul road route would receive particular attention. During field investigation however, these features were determined to hold little to no historic resources potential. Most were brooks or merely running bogs. The only watercourse crossed of substantial width was that at SA2, but the water levels there were quite low and surrounding ground conditions rocky.

Recommendations

Despite the lack of historic resources identified during the HRIA, review of future development is warranted. Archaeological and ethnographic evidence supports both a pre-contact and historic presence in the Schefferville-Howells River area. Previous to the establishment of the trading posts in the area during the 19th century, human presence in the general vicinity would have been mobile and seasonal, associated with the congregating of people in the larger Lake Michikamau and Lake Petitsikapau area, following caribou herds, and exploiting lithic sources (Denton and McCaffrey 1988). The scarcity of historic resources should not be discussed to the client from further historic resources assessments.

Another issue requiring comment concerns report of an Innu burial at the base of Irony Mountain (personal communication, Coco Calderhead, 22 September 2014). During the field assessment, it was brought to our attention that elders in Schefferville had stated in the past that a human burial was located somewhere along the base of Irony Mountain, seemingly along the face closest to the Howse Property (thus its NE or SE face). No other information was known, and this lack of viable data on this possible burial precluded any search. Additionally, this was beyond the scope of work dictated by permit #14.42. GPA recommends that in the absence of additional information, a buffer zone be established until such time that background research and informant interviews can be conducted. Meanwhile, officials with Tata Steel have stated that there are no plans to extend the Howse Property boundaries any closer to Irony Mountain than they currently exist. The gravel access road running parallel with the base of the mountain is a readily comprehensible barrier, and be employed as an interim barrier. Under this recommendation, no ground disturbance should occur between this road and the base of the mountain.

Sources

Anderson, William Ashley

1961 *Angel of Hudson Bay: the True Story of Maude Watt*. Clarke Irwin, Toronto.

Arkéos Inc.

2012 “Direct-Shipping Ore Project – Phase 2, Provinces of Quebec and Newfoundland and Labrador Archaeological Survey, 2011, (Goodwood-Timmins Road and Secondary Access Roads)”. On file at the Provincial Archaeology Office, St. John’s.

Armitage, Peter

1991 *The Innu (The Montagnais-Naskapi)*. Chelsea House, New York.

Brake, Jamie

2007 “Ashuanipi Kupitan: Excavation at the Ferguson Bay 1 Site in Western Labrador.” MA thesis, Department of Anthropology, Memorial University, St. John’s.

Brice-Bennett, Carol (ed.)

1977 *Our Footprints are Everywhere: Inuit Land Use and Occupancy in Labrador*. Labrador Inuit Association, Nain.

Davis, K.G. and A.M. Johnson (eds)

1963 *Northern Quebec and Labrador Journals and Correspondence 1819-35*. Hudson’s Bay Record Society, London.

Denton, David and Moira McCaffrey

1988 A preliminary Statement on the Prehistoric Utilization of Chert Deposits near Schefferville, Nouveau-Quebec. *Canadian Journal of Archaeology* 12:137-152.

Drummond, R.N., J.D. Ives, and W.G. Mattox

1961 “Correspondence: Knob Lake field research centre.” *Geographical Journal* v128 (1).

Eaton, D.I.V.

1896 *South East Sheet Map of Labrador Peninsula*.

Epp, Henry T.

1984 Ecological Edges and Archaeological Site Location in Saskatchewan, Canada. *North American Archaeologist* 5(4):1984.

Fitzhugh, Lynne D.

1999 *The Labradorians: Voices from the Land of Cain*. Breakwater Books, St. John’s.

Fitzhugh, William

1977 "Prehistory and History," in Brice-Bennett (1977) - *Our Footprints Are Everywhere*.

Geren Richard and Blake McCulloch

1990 *Cain's legacy: the Building of the Iron Ore Company of Canada*. Iron Ore Company of Canada, Sept-Isles.

Gerald Penney Associates Limited

1985 Results of Four Historic Resources Assessments in Newfoundland and Labrador, 1985. In *Archaeology in Newfoundland and Labrador 1985*, edited by Jane Sproull Thomson and Callum Thomson, pp. 66-80. Annual Report No.6. Newfoundland Museum, St. John's.

2010 "Historic Resources Overview Assessment Julienne Lake Iron Deposit, Archaeological Investigation Permit #10.33." On file at the Provincial Archaeology Office, St. John's.

2012 "Historic Resources Overview Assessment, Golden Dory Resources/Gabbro Lake Property." On file at the Provincial Archaeology Office, St. John's.

Hind, Henry Youle

2007 *Explorations in the Interior of the Labrador Peninsula*. Boulder, Portugal Cove [reprint of 1863 edition].

Holly, Donald H. Jr.

2013 *History in the Making: The Archaeology of the Eastern Subarctic*. AltaMira Press, Lanham.

Holly, Donald H. Jr. and Moira McCaffrey

2012 Rethinking Eastern Subarctic History. In *The Oxford Handbook of North American Archaeology*, edited by Timothy R. Pauketat, pp. 124-134. Oxford University Press, Oxford.

Jacques Whitford Stantec Limited (JWSL)

2009 "Stage 1 Historic Resources Assessment – Labrador Iron Mines 2008 Exploration Activities". On file at the Provincial Archaeology Office, St. John's.

Labreche, Yves and Roy Skanes

1997 Stage 1 Historic Resources Overview Assessment of Wilson Lake Road Re-alignment and Evaluation of Trans Labrador Highway Upgrading. In *Archaeology in Newfoundland and Labrador 1997*, edited by K. Nelmes. Provincial Archaeology Office, St. John's.

http://www.tcr.gov.nl.ca/tcr/pao/arch_in_nl/arch_in_nl_1997/toc.html

- Loring, Stephen, Moira McCaffrey, Peter Armitage and Daniel Ashini
2003 The Archaeology and Ethnohistory of a Drowned lake: Innu Nation Research Along the Former Michikamats Lake Shore in Nitassinan (Interior Labrador). *Archaeology of Eastern North America* 31:45-72.
- Low, Albert P.
1896 Report on Explorations in the Labrador Peninsula along the Eastmain, Koksoak, Hamilton, Manicouagan and Portions of Other Rivers in 1892-93-94-95. *Geological Survey of Canada Annual Report No. 8*, Ottawa.
- McCaffrey, Moira
1989 Archaeology in Western Labrador. In *Archaeology in Newfoundland and Labrador 1986*, edited by Callum Thomson and Jane Sproull Thomson, pp.72-113. Annual Report No.7. Newfoundland Museum, St. John's.
2004 "Historic Resources Assessment in the Context of Environmental Baseline Studies for the LabMag Project, Labrador". On file at the Provincial Archaeology Office, St. John's.
2006 Archaic Period Occupation in Subarctic Quebec: A Review of the Evidence. In *The Archaic in the Far Northeast*, edited by David Sanger and M.A.P. Renouf, pp. 161-190. The University of Maine Press, Orono.
- M'Lean, John
1849 *Notes of a Twenty-five Years' Service in the Hudson's Bay Territory*. R. Bently, London.
- MacLeod, Donald
1967 1967 Field Season Report. A report submitted to Dr. J.V. Wright at what is now the Canadian Museum of Civilization, Ottawa. On file at the Provincial Archaeology Office, St. John's.
1968 1968 Field Trip Report. A report submitted to Dr. J.V. Wright at what is now the Canadian Museum of Civilization, Ottawa. On file at the Provincial Archaeology Office, St. John's.
- McKillen, T.N., D.W. Hooley and D. Dufort
2011 Technical Report on the Houston Iron Ore Deposit Western Labrador Province of Newfoundland and Labrador Canada. Labrador Iron Mines Holdings Limited, Toronto. Accessed online at <http://www.labradorironmines.ca/pdf/TechRprtHouston.pdf>, 1 August 2014.
- Mattox, W.G.
1964 "Fort Nascopi on Petitsikapaw Lake." *McGill Sub-Arctic Research Paper* (18).
- Niellon, Francois
1992 *The Naskapi and the Ashuanipi in the Days of New France*. Translated by A. McGain. Labrador Heritage Society, Happy Valley-Goose Bay.

Simpson, George

1848 Letter, 16 Nov 1848. PANL MG 8/8.

Speck, Frank

1931 Montagnais-Naskapi Bands and Early Eskimo Distribution in the Labrador Peninsula. *American Anthropologist* 33(4):557-600.

Speck, Frank G. and Loren C. Eiseley

1942 "Montagnais-Naskapi Bands and Family Hunting Districts of the Central and Southeastern Labrador Peninsula." *Proceedings of the American Philosophical Society*. V 85, #2.

Turner, Lucian M.

2001 *Ethnology of the Ungava District, Hudson Bay Territory*. Montreal and Kingston, McGill-Queens.

Watt, Mrs. J.S.C. [Maud]

1943a "The Long Trail," *The Beaver* March 1943.

1943b "The Long Trail II," *The Beaver* June 1943.

White, James

1926 *Forts and Trading Posts in the Labrador Peninsula and Adjoining Portions of Ontario and Quebec*. Judicial Committee of the Privy Council, London.

Appendix A – Waypoints (NAD 1983, Zone 21U)

Goodwood-Timmins PA (SA1)

<i>Waypoint</i>	<i>Date</i>	<i>Coordinates</i>	<i>Comments</i>
16	16-SEP-14	606597 6105712	
18		606839 6105535	756 m
20		607101 6105313	773 m
23		607252 6104925	778 m
25		607252 6104640	763 m
36		608038 6103641	762 m
441		607122 6105293	787 m
Antler	16-SEP-14	607806 6104175	771 m
Bone	16-SEP-14	607427 6104618	768 m
CAR		605572 6106511	740 m
Chert	16-SEP-14	606218 6106698	782 m
Chert2	16-SEP-14	607545 6104402	771 m
Chert3	16-SEP-14	607961 6103971	763 m
DH-14	16-SEP-14	607966 6104038	761 m
Geohole	16-SEP-14	606650 6105677	765 m
GEOHOLE2	16-SEP-14	607057 6105365	792 m
Oldpeg	16-SEP-14	608276 6103611	757 m
T14		606323 6105913	741 m
T15		606476 6105801	740 m

Goodwood-Timmins PA (SA2)

<i>Waypoint</i>	<i>Date</i>	<i>Coordinates</i>	<i>Comments</i>
Antler3	17-SEP-14	608467 6102416	704 m
Brook2	17-SEP-14	608539 6102607	696 m
Caritrail	17-SEP-14	608550 6102589	703 m
ConNWEND	17-SEP-14	608510 6102335	717 m

Goodwood-Timmins PA (SA3)

<i>Waypoint</i>	<i>Date</i>	<i>Coordinates</i>	<i>Comments</i>
123		613414 6095689	716 m
124		609835 6098915	735 m
A		613175 6096070	640 m
A110		612169 6097150	680 m
Brook	17-SEP-14	611716 6097503	632 m
Chert4	17-SEP-14	610618 6098228	682 m
Chert5	17-SEP-14	611263 6097887	686 m
Chert6	17-SEP-14	613291 6095892	633 m
Rkshelter	17-SEP-14	612407 6096927	656 m
Shacketc	17-SEP-14	612225 6097485	660 m
T100		611029 6098079	677 m

Goodwood-Timmins PA (SA4)

<i>Waypoint</i>	<i>Date</i>	<i>Coordinates</i>	<i>Comments</i>
125		614003 6094987	626 m
A128		613813 6095054	625 m
A130		613973 6094800	669 m
A133		614212 6094419	626 m
Antler2	17-SEP-14	613844 6095014	627 m
Chert12	18-SEP-14	614072 6094680	642 m
Drill?	17-SEP-14	613811 6094872	621 m

Goodwood-Timmins PA (SA5)

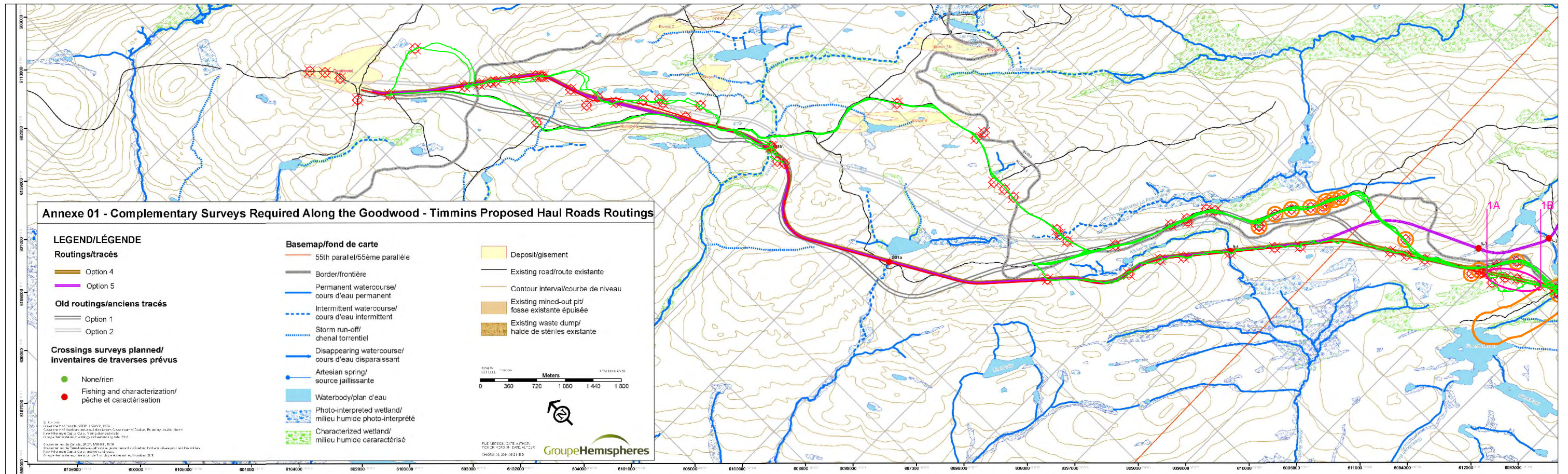
<i>Waypoint</i>	<i>Date</i>	<i>Coordinates</i>	<i>Comments</i>
126	19-SEP-14	614316 6094215	626 m
5+500	19-SEP-14	619971 6088888	666 m
5+750	19-SEP-14	619763 6089040	679 m
6+500	19-SEP-14	619282 6089601	700 m
A135		614371 6094165	669 m
A136		614405 6094111	
A137		614442 6094058	
A140		614619 6093894	669 m
A143		614855 6093739	640 m
A145		614968 6093626	676 m
A147		615087 6093452	640 m
A150		615367 6093029	676 m
A153		615584 6092702	640 m
A155		615731 6092481	675 m
A160		616200 6092024	713 m
A162		616408 6091836	640 m
A165		616652 6091627	713 m
A167		616933 6091492	640 m
A169		617176 6091438	640 m
A170		617291 6091462	728 m
A173		617617 6091199	640 m
A174		617739 6091111	728 m
A176		618033 6090901	640 m
A178		618348 6090674	728 m
A179		618470 6090587	
A180		618570 6090515	730 m
A182		618806 6090276	
A185		619065 6089908	496 m
A188		619323 6089539	686 m
A190		619479 6089317	497 m
A192		619691 6089096	686 m
A195		620109 6088799	499 m
A196		620222 6088774	686 m

A198		620320 6088767	671 m
A200		620442 6088715	500 m
A202		620521 6088642	501 m
A205		620643 6088386	707 m
A206		620715 6088204	671 m
Antler8	18-SEP-14	617876 6091184	733 m
Brook3	18-SEP-14	615004 6093763	668 m
Caripath	18-SEP-14	616857 6091661	710 m
Caripath2	18-SEP-14	616645 6091786	702 m
Caripath2B	18-SEP-14	616399 6092027	694 m
Caripath3	18-SEP-14	616558 6091876	697 m
Chert10	18-SEP-14	614407 6094118	634 m
Chert11	18-SEP-14	614321 6094255	636 m
Chert7	17-SEP-14	619339 6089759	720 m
Chert8	17-SEP-14	619331 6089803	722 m
Chert9	18-SEP-14	617427 6091471	723 m
CJB		619336 6089793	714 m
Cuttree	18-SEP-14	614628 6094044	656 m
DF03		619330 6089771	614 m
End	19-SEP-14	620046 6088825	666 m
Firepit	19-SEP-14	618781 6090621	725 m
Skull	18-SEP-14	617874 6091184	732 m
TPS1	18-SEP-14	616080 6092321	682 m
TPS2	18-SEP-14	616077 6092328	680 m
TPS3	18-SEP-14	615873 6092511	684 m
TPS4	18-SEP-14	615867 6092519	684 m
TRD		618890 6090575	728 m
Wrapper	18-SEP-14	615991 6092364	681 m

Howse PA

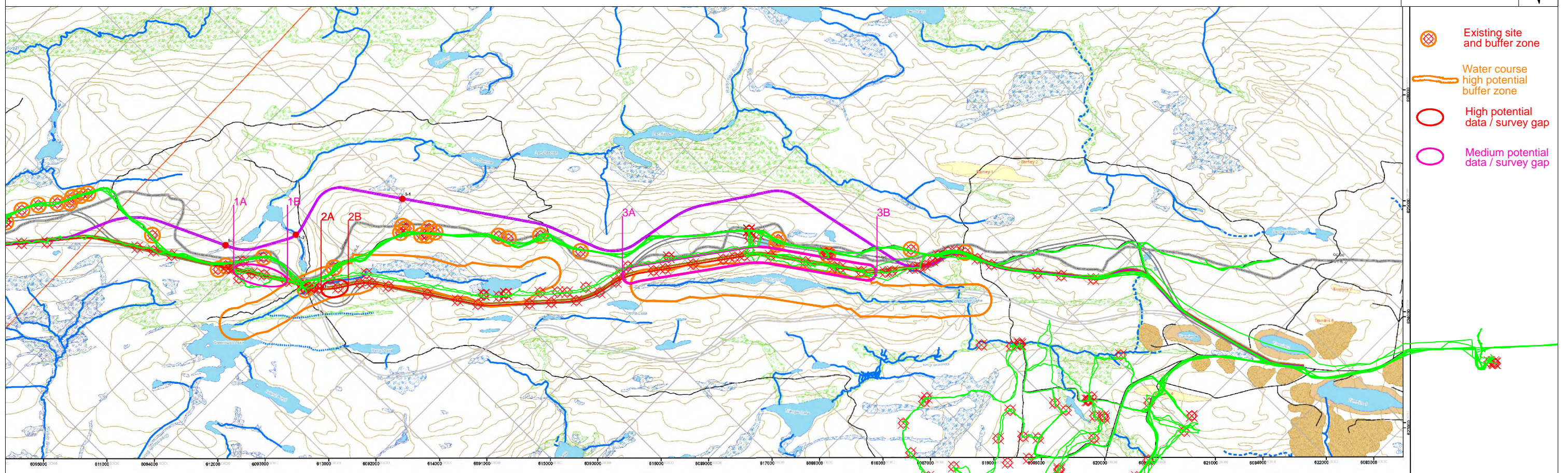
<i>Waypoint</i>	<i>Date</i>	<i>Coordinates</i>	<i>Comment</i>
443	20-SEP-14	619070 6085721	692 m
AH1		619549 6085024	683 m
AH2		621155 6085034	682 m
Antler4	20-SEP-14	619069 6085720	692 m
Antler5	20-SEP-14	619281 6085751	681 m
AP		620282 6085908	660 m
Bog	21-SEP-14	618367 6086390	637 m
Bog2	21-SEP-14	618233 6086864	610 m
Bog2END	21-SEP-14	618291 6087238	612 m
Bogend	21-SEP-14	618285 6086525	628 m
Bone3	20-SEP-14	620425 6086109	672 m
CA		620888 6085535	673 m
Chert13	21-SEP-14	618932 6087588	632 m
DD		619302 6086121	665 m

Firepit2	20-SEP-14	620949 6084965	690 m
Firepit3	20-SEP-14	620354 6086117	669 m
Firepit4	20-SEP-14	620373 6086103	671 m
Gear	21-SEP-14	620039 6086387	669 m
H1		619549 6085024	
H2		621155 6085034	701 m
H3		621065 6086223	
H4		620258 6087225	701 m
H5		619900 6087571	
H6		618491 6087571	
H7		618491 6086076	
HB		620109 6084982	645 m
HB1		620363 6085027	619 m
HD		620015 6085007	648 m
Helibld	21-SEP-14	620249 6087225	628 m
Helipad	21-SEP-14	620259 6087246	631 m
HM1		619073 6085714	
HM2		619073 6086274	655 m
HM3		618553 6086274	
HM4		618553 6086725	625 m
HM5		619571 6086725	640 m
HM6		619571 6086221	
HM7		620072 6086221	
HM8		620072 6085714	
Oldpit	21-SEP-14	619207 6086577	655 m
Peg2	20-SEP-14	619469 6085743	690 m
Seat	21-SEP-14	620162 6087290	625 m
Skel	21-SEP-14	618872 6087580	625 m
Target	20-SEP-14	619484 6085753	691 m
Teepee	21-SEP-14	619449 6086372	669 m
TPS8	20-SEP-14	620347 6085805	662 m
TPS9	20-SEP-14	620359 6085831	662 m



The title of the figure

Scale 1:50000



Map of test pits

Scale 1:50000

Appendix B

