**APPENDIX A**

# Conceptual Hydrogeological Modelling Report

AtkinsRéalis

## Technical Report

Minerai de Fer Québec

April 30, 2024

O/Project no.: 692696
O/Reference no.: 692696-7000-4WER-0001_01

# Kami Iron Ore Mine Project Hydrogeological Modelling

AtkinsRéalis
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Montréal, April 30, 2024

Monsieur Michel Groleau
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**Object:** Kami Iron Ore Mine Project Conceptual Hydrogeological
Hydrogeological Modelling Report
Our file: 692696-7000-4WER-0001_01

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Dear sir Groleau,

We are pleased to submit the final version of the report mentioned in the above subject.
Do not hesitate to communicate with the undersigned should you have further questions regarding the content of this report.

Truly yours,

**ATKINSRÉALIS INC.**

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# 1. Introduction

## 1.1 Context

Champion Iron Mines Ltd (Champion), is proposing to construct and operate the Kami Iron Ore Project (the “Kami Project”), which will involve the construction, operation and eventual closure of an iron ore open pit mine and the supporting infrastructure. The mine operation is expected to produce 8 million tonnes of iron ore concentrate annually, which will be transported by rail to the Pointe Noire port terminal in Ville de Sept-Îles, Québec, for international shipping.

The Kami Project includes construction, operation, and closure/decommissioning and post closure of the following primary components:

- The open pit mine (the Rose Pit).
- The Overburden Stockpile and Mine Rock Stockpile.
- The processing infrastructures including crushing, grinding, spiral concentration, magnetic separation, and tailings thickening areas.
- The Tailings Management Facility (TMF).
- The ancillary infrastructure to support the mine and process plant.
- A rail transportation component including spur line construction to connect the mine site to the Québec North Shore & Labrador Railway (QNS&L).

The project was previously developed by Alderon in 2010 – 2012 and an Environmental Impact Statement was submitted to the government of Newfoundland & Labrador (N.L.) in October 2012. It was approved by the latter in January 2014. In 2018, the Feasibility Study of the project was updated by Alderon. Champion Iron is the new owner of the Kami asset and wishes to update the Feasibility Study and to resubmit the project for approval by the government of N.L. The overall Feasibility Study is led by BBA.

Compared to the water management philosophy presented by Alderon in 2012, improvements were made to the Feasibility Study in order to comply with the conditions requested by the N.L. government as part of the 2014 project release. Refining the hydrogeological knowledge of the project is the main 2014 condition affecting the water management plan.

The main uncertainty related to water management in the Kami Project is the amount of groundwater infiltration associated with the development of Rose Pit. Due to the geology of the area and the poor quality of the bedrock, a large amount of infiltration is expected in the pit.

A review of project data, new site investigations and the creation of an updated conceptual hydrogeological model incorporating a better understanding of the site were carried out with the objective of reducing the risks associated with pit dewatering while complying with the 2014 N.L. government project conditions. The completion of these tasks has improved the hydrogeological understanding of the site and will allow Champion to plan for the large water infiltration volumes expected during dewatering operations.

## 1.2 Mandate

As part of the Pre-Feasibility Study update and following the conditions of the 2014 government approval, Champion has mandated AtkinsRéalis Inc. (AtkinsRéalis) to conduct a hydrogeological study. The hydrogeological study is an input to the infrastructure design, and includes:

- Data revision and data gap analysis (completed Q2 2023);
- Hydrogeological conceptual modelling of the site, including geological interpretation of the faults;
- Numerical model construction;
- Estimation of open pit dewatering rate;
- Planning of the field work necessary to fill the data gaps.

A detailed hydrogeological model will be prepared in the next phase of engineering, following the field work, which has been completed in Q3 2023 and will resume in the next phase of engineering.

# 2. Conceptual Model

## 2.1 Site Location and Proposed Infrastructures

The proposed Kamistiatusset Iron Ore Mine Project (Kami Project) is located in the general vicinity of the towns of Wabush and Labrador City (Labrador), approximately 5 km northeast of the town of Fermont, along the Québec-Labrador border (Figure B1).

The Kami Project is situated in a hilly terrain, marked by lakes and valleys with a northeast-southwest orientation. Topography across the site is generally governed by the underlying geological structures with elevations ranging from 594 m to 700 m (Stantec, 2012a).

The pit footprint will be centered on the valley south of Pike Lake and will extend over the topographic highs to the west (680 m), towards Gleeson Lake and to the east (665 m), north of Molar Lake. To the east and west, the pit will be surrounded by Mills and Daviault lakes respectively. The surface area of the pit footprint will be of approximately 2.80 km$^2$, with an overall perimeter of 8 km. The maximum pit depth will extend to approximately 450 m below the existing grade.

In addition to the pit, the site will also include the Overburden Stockpile, the Mine Rock Stockpile, the Tailings Management Facility (TMF), a Railway line and processing infrastructures.

# 2.2 Geology

## 2.2.1 Overburden

Overburden materials consist of veneers of organic soils (peat) overlying sequences of glacial till, and occasional glacio-fluvial and fluvial deposits overlying bedrock (Stantec, 2012a). The overburden in the Rose Pit area is generally described as a thin layer of organic topsoil or peat, overlying loose to compact brown silty sand glacial till with cobbles and boulders, becoming denser with depth (Stantec, 2012a). The interface with the bedrock sometimes exhibits sand and gravel, possibly highly weathered bedrock in some boreholes (Stantec, 2012a).

Around Rose Pit, the ROB-series boreholes, 22 boreholes drilled by Stantec in 2011, provide detailed overburden stratigraphy, with most of them reaching the first few metres of bedrock. Geotechnical logs are provided in Appendix C. In the pit footprint, exploration boreholes (K-series) also provide information on overburden thickness, but not detailed stratigraphy.

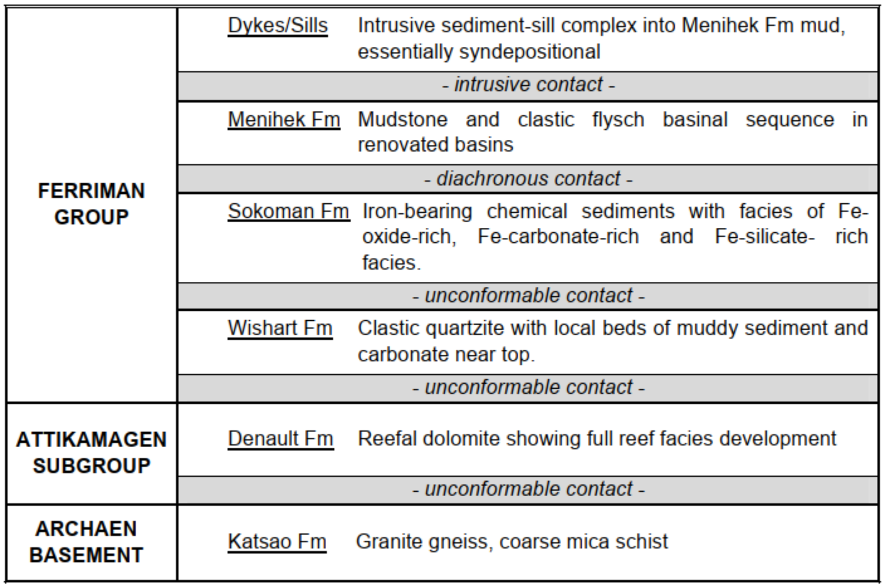
Based on the ROB and K-series boreholes, the overburden in the vicinity of the Rose Pit exhibits a highly variable range in thickness and a complex bedrock surface topography. In general, glacial till thicknesses range from 0.9 (K-10-52) to 62.2 m (K-11-108), with an average of 21.6 m. The maximal thickness encountered in the ROB-series boreholes is 52.4 m at ROB-11-07. The center of the valley, marked by an alignment northeast-southwest of small lakes, is formed by a depression in the bedrock where the till thickness is greater.

Outside the pit area, south of Long Lake, geotechnical investigations conducted by Stantec in 2012 confirm the presence of a topsoil layer underlain by till deposits. Depending on topography, till thickness is also variable in this area, and ranges from 0.2 to 48.4 m, at BH-12-42 and BH-GE-11 respectively.

An interpolation of the till thickness at the study area is provided in Figure B2. In the pit and tailings area, the interpolation is based on data from exploration and geotechnical drilling. Outside this area, on the periphery of the study zone, control points were added to fill the data gaps: estimated thickness ranges between 1 and 5 m on the topographic highs and is approximately 20 m in the valleys.

## 2.2.2 Regional Bedrock Geology

The rocks of the Kami Project property form part of the highly metamorphosed and deformed metasedimentary sequence in the Grenville Province of the Labrador Trough (Stantec, 2012a). The bedrock geology consists of folded, metamorphosed sequences of the Ferriman Group, overlying Archean aged basement rock (**Figure 2-1**). A regional geological map of the area is presented in Figure B3.



| | | |
|---|---|---|
| **FERRIMAN GROUP** | Dykes/Sills | Intrusive sediment-sill complex into Menihek Fm mud, essentially syndepositional |
| | *- intrusive contact -* | |
| | Menihek Fm | Mudstone and clastic flysch basinal sequence in renovated basins |
| | *- diachronous contact -* | |
| | Sokoman Fm | Iron-bearing chemical sediments with facies of Fe-oxide-rich, Fe-carbonate-rich and Fe-silicate- rich facies. |
| | *- unconformable contact -* | |
| | Wishart Fm | Clastic quartzite with local beds of muddy sediment and carbonate near top. |
| | *- unconformable contact -* | |
| **ATTIKAMAGEN SUBGROUP** | Denault Fm | Reefal dolomite showing full reef facies development |
| | *- unconformable contact -* | |
| **ARCHAEN BASEMENT** | Katsao Fm | Granite gneiss, coarse mica schist |

**Figure 2-1: Kami Project Property Stratigraphy (Stantec, 2012a) from Clark and Wares' (2006) Nomenclature**

## 2.2.3 Rose Pit Bedrock Geology

As presented in Figure B4, in the pit area, bedrock information is available from exploration boreholes (K-series) and shallow geotechnical boreholes (ROB-series). The maximum vertical depth of ROB-series boreholes is 60 m at ROB-11-07 (mainly in overburden), while that of K-series is around 500 m, at K-11-161.

### 2.2.3.1 Shallow Bedrock

Based on RBR-12-01, RBR-12-02 and the 18 ROB-series boreholes reaching the bedrock (typically 3 to 4 m of core), the shallow bedrock zone can range from a highly competent (based on Rock Quality Designation – RQD) to a highly weathered and fractured material with minimal core recovery (RQD = 0). Strong to very strong rock conditions (with likely poor permeability) were noted at ROB-11-06, 10, 11, 12, 17 and 20; poor rock conditions consistent with highly weathered or severely fractured conditions (and possible moderate permeability) were noted at ROB-11-03, 07, 08, 09, 18, 19 and RBR-12-01 and 02. Moderately strong to slightly fractured conditions are noted at ROB-11-01, 02, 04, 05, 13, 14, 15 and 16. The borehole logs presenting the measured RQDs are presented in Appendix C.

### 2.2.3.2 Structural Geology

A recent re-evaluation and analysis of geological data and exploration logs have helped refine the structural understanding of the rock formations encountered at the Kami Project deposit, leading to the creation of a 3D geological Leapfrog model (GMining, 2023).

The various formations identified are presented in Figure B4. From the deepest to the shallowest, the sequence consists of Archean gneiss (Katsao formation), dolomitic marble (Denault formation), quartzite sandstone (Wishart formation), iron formations (Sokoman formation) and mica schist (Menihek formation). The Rose Central and Rose North deposits represent a northeast-southwest trending anticline and syncline, respectively, juxtaposed by thrusting from the southeast. The folds are overturned and generally steeply inclined, dipping towards the southeast.

The Rose Central anticline gently plunges towards the northeast and closes at the approximate eastern extent of the proposed Rose Pit (Stantec, 2012a).

To the east of the pit, the core of the anticline is composed of the Denault and Wishart formations. To the west of the pit, the syncline is mainly composed of the Katsao, Wishart and Sokoman formations. The core of the syncline has not been identified due to the absence of boreholes having crossed this structure, but it is thought to be in the Menihek formation. In general, the formations dip to the southeast at an angle of 75° and a strike of 135° (Stantec, 2012a). Two NW-SE sections, perpendicular to the formations, show the geological sequence at depth near RBR-12-01 and RBR-12-02 (Figure B5).

### 2.2.3.3 Katsao-Wishart Fault

The stability analysis carried out by Stantec in 2012a provided an initial characterization of the rock formation quality, subdividing the pit into four (4) main areas or rockmass domains: NR1 and NR2 to the west, and RC1 and RC2 to the east. Generally, the bedrock in the eastern part of the pit is of good quality, while that in the western part is of good to poor quality, with deep and intense weathering. The most significant area of weathering was noted at NR2 (Stantec, 2012a). In this zone, the entire Wishart was observed in some boreholes to be weathered to poorly consolidated sand. The intense fracturing and alteration of the Wishart is linked to the presence of a major fault interpreted on a regional scale and formed by the contact between the Katsao and Wishart formations. The Katsao-Wishart fault is illustrated at a regional scale on Figure B3 and in the pit area on Figure B4.

In terms of groundwater flow, it appears that the entire Wishart Formation could be considered as a water-bearing structure with an average width of 50 m (Figure B5).

### 2.2.3.4 Central Fault

An analysis of televiewers surveys from 2008 to 2012 is presented in Appendix D. For each selected borehole, potential fault intervals were identified based on the general bedrock quality and fracture type. Drillcore photos (Appendix E), taken during 2 site visits (May and July 2023), were also analyzed to identify potential fault zones. This analysis led to the identification of several potential fault intervals within the pit area. These highly fractured and altered zones feature pulverized rock horizons of varying thicknesses (between 20 and 50 m) and are mainly found within the Sokoman formation, in the central part of the pit. These intervals occur at different depths (between 150 and 350 m along the borehole depth) but do not appear to be related to changes in stratigraphy.

To identify a potential 3D fault plane, fractured intervals were mapped into the Leapfrog model. However, the spatial distribution of data did not allow to locate a precise fault plane. However, it appeared that the major fracture zones had a similar orientation with a 75° dip to the southeast. These fracture zones could be related to the development of the iron deposit and the upwelling of hydrothermal fluids as suggested by intervals of vuggy bedrock on core samples (**Figure 2-2**).

**Figure 2-2: Vuggy Bedrock Located at Around 430 m in the Sokoman Formation (KGT-23-03)**

For simplification, these major fracture zones, within the Sokoman, in the center of the pit, will be referred to as the "Central fault" for the remainder of the study. The approximate location of the Central fault is shown on Figures B3, B4 and B5. The true thickness of these fractures has been interpreted between 20 and 40 m, based on boreholes analyses at RBR-12-02, K-12-176A and K-12-179. In terms of groundwater flow, the central fault could be considered as a water-bearing structure with an average width of 30 m.

#### 2.2.3.5 Other Potential Faults

Stantec's Pit Slope Design report (2012a) mentions the presence of a potential fault in the Menihek unit (syncline axis). However, deep exploration holes have not encountered the closure of the syncline and the existence or location of this fault was not confirmed to date.

Interpreted sub-vertical dip-slip faults bisect the deposits, trending roughly northwest-southeast. Three of these major features have been interpreted by Alderon and are illustrated on Figures B3 and B4; however, it is understood that more structures may be present based on reviews of aerial imagery. As a result of directional bias of the exploration boreholes, these structures are rarely intersected and are currently only interpreted through 3D geological interpolation (Stantec, 2012a).

## 2.3 Climate and Hydrology

In general, the area of West Labrador experiences sub-arctic climatic conditions characterized by long cold winters and short mild summers. Based on data obtained from the Wabush Lake A station for the period of 1961-2012 (Environment Canada, 2023), a large variation in mean daily temperatures is observed throughout the year, from -22.0 °C in January to 13.8 °C in July, with a mean annual daily temperature of -3.2 °C (SNCL, 2023).

Annual precipitation averages 878.1 mm/year with a range of 675.8 (100-years Dry) to 1265.1 mm/year (100-years Wet) (SNCL, 2023), while annual evapotranspiration averages 387.3 mm/yr (SNCL,2023). Freezing conditions typically occur between mid-October and early November, and major snow melt typically occurs between late April and mid-June. The Kami Project property is in an area of "isolated patches of permafrost" according to Natural Resources Canada (NRC, 1993) and although no permafrost zones were encountered during the field work carried out by Stantec in 2012, several wells were reported to be frozen during groundwater level surveys:

- ROB-11-18 was frozen in November 2011 (Stantec, 2012a);
- ROB-11-01A/B were frozen in April 2012 (Stantec, 2012b);
- K-11-113, K-11-147 and ROB-11-08 were frozen in March 2012 (Stantec, 2012b).

## 2.4 Lakes Water Elevation

The major lakes in the study area and their water elevations are shown in **Table 2-1**. At the time of this study, all measured lake water levels were not available, so an estimate was made using topographic contours from lidar or the government digital elevation model (DEM). It is also worth noting that the bathymetry of the lakes was not available at the time of the study.

**Table 2-1: Estimated Lake Water Level Around Rose Pit Area Based on Topographic Data**

| Lake | Lake Water Level Elevation (m) | |
|---|---|---|
| | Based on closest topographic line (Lidar 1 m interval) | Based on closest topographic line (DEM 10 m interval) |
| Pike | 568 | - |
| Molar | - | 594 |
| Long | 538 | - |
| Mills | 579 | - |
| Daviault | - | 594 |
| Riordan | 588 | - |

A regional map of natural watershed is available in SNCL, 2023. Drainage generally occurs to the northeast. More locally, Pike Lake receives surface water from the Rose Pit area and ultimately discharges into Long Lake. Because of its proximity to the pit, Pike Lake is at risk of a reduction in water level due to the dewatering operations of Rose Pit. The potential drawdown at Pike Lake will depend on the following elements:

- Hydraulic gradient between the lake and the pit;
- The presence of high hydraulic conductivity structures, such as faults or fractures, connecting the pit and the lake;
- Thickness and hydraulic conductivity of lake-bottom sediments and/or overburden under the lake;
- Thickness and hydraulic conductivity of the overburden between Pike Lake and the Rose Pit;
- Lake recharge rate (natural or anthropogenic).

For a conservative approach to dewatering flows rate estimation, it was assumed that the level of the lakes in **Table 2-1** would remain stable during the Rose Pit dewatering. Indeed, some lakes (including Pike Lake) could serve as receptors for dewatering water – if quality criteria are met.

## 2.5 Hydrogeological Context

### 2.5.1 Groundwater Levels

Figure B6 shows the location of the 32 wells monitored during fieldwork carried out by Stantec in 2012a. The wells are distributed across the entire proposed pit area, with well screens intercepting till, till/bedrock and bedrock. ROB wells account for most of the wells installed on site (24 wells), mainly in the till and occasionally in the superficial bedrock. Eight exploration boreholes complete the piezometric data from the bedrock aquifer. **Table 2-2** shows the static groundwater levels measured between November 2011 and June 2012. To monitor temporal variations in groundwater levels, pressure transducers were also installed in 11 of these wells, between December 2011 and April 2012. The hydrographs of the pressure transducer data (December 2011 to April 2012) are presented in Appendix F with additional monthly hydrographs. These hydrographs show a general decreasing trend in water levels over the course of the winter when frozen ground conditions and snow cover limit the groundwater recharge (Stantec, 2012a).

Groundwater levels in the Rose Pit area closely correlate with topography and range from 11.64 mbgs in areas of high elevation (ROB-11-06, western part of the pit) to artesian conditions in areas of low elevation (**Table 2-2**). Topographic highs to the west (near Gleeson Lake) and south-east of the pit (North of Elfie Lake) act as preferential recharge areas (grey zones, Figure B6). In contrast, the center of the valley represents a local discharge area (orange zone, Figure B6) where an alignment of lakes such as Mid, Rose and Pike lakes is formed. The relative elevations range from 647 masl at ROB-11-06, in the topographic high to the west, to a low of 578.1 masl at ROB-11-17 in the bottom of the valley; thus creating a water-level difference of 69 m within a relatively small distance (850 m). These high relative elevations account for the numerous flowing artesian wells in the lower areas of the site (Stantec, 2012a). Indeed, during field investigations carried out by AtkinsRéalis in May and September 2023, some wells and exploration boreholes showed artesian conditions. The locations of these wells are presented in Figure B6. Pressure transducers were also installed to confirm water level variations within the pit area, but the data has yet to be analyzed since the associated fieldwork is still ongoing.

The general groundwater flow follows the hydrographic drainage and flows towards Pike Lake. A piezometric map of the Rose Pit area, based on 2012 measurements (**Table 2-2**), is presented in Figure B6. Given the lack of data for each aquifer (bedrock and till), all available measurements were considered to create the piezometric map.

**Table 2-2: 2011-2012 Measured Groundwater Levels in the Pit Area**

| Well ID | Borehole Data | | | | | | | Measured Groundwater Levels (mbgs) | | | | | | | Logger Data | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | X NAD83_Z19N | Y NAD83_Z19N | Z Elevation (m) | Borehole Bottom Elevation (m) | Screen Top Depth (m) | Screen Bottom Depth (m) | Screened Unit | Nov. 2011 | Jan. 2012 | Mar. 2012 | Apr. 2012 | Jun. 2012 | Mean Depth | Mean Groundwater Elevation (m) | Logger Range (m) | Logger Mean Water Elevation (m) | Data Logger Period |
| **ROB-11-01A** | 632955 | 5856148 | 570 | 520 | 47.3 | 50.8 | bedrock | -0.60(A) | - | - | - | - | -0.60 | 571 | - | - | - |
| **ROB-11-01B** | 632955 | 5856148 | 570 | 520 | 4.0 | 46.6 | till | -0.60(A) | - | - | - | - | -0.60 | 571 | - | - | - |
| **ROB-11-02** | 632798 | 5856402 | 569 | 543 | 4.6 | 25.8 | till/bedrock | - | - | -0.33 | 1.12 | - | 0.40 | 569 | - | - | - |
| **ROB-11-03** | 632656 | 5856516 | 576 | 552 | 3.9 | 23.6 | till/bedrock | - | - | -0.83 | - | - | -0.83 | 577 | - | - | - |
| **ROB-11-04** | 632177 | 5856405 | 595 | 571 | 3.1 | 21.3 | till/bedrock | - | - | - | - | 0.12 | 0.12 | 595 | - | - | - |
| **ROB-11-05A** | 631858 | 5856183 | 629 | 609 | 16.6 | 19.5 | bedrock | - | - | 1.91 | 6.28 | 2.12 | 3.44 | 626 | - | - | - |
| **ROB-11-05B** | 631858 | 5856183 | 629 | 609 | 4.7 | 13.6 | till | - | - | 1.63 | - | 1.57 | 1.60 | 627 | 0.44 | 627.28 | 26Mar-21Apr |
| **ROB-11-06** | 631511 | 5855603 | 653 | 639 | 4.6 | 13.6 | till/bedrock | - | - | 11.64 | 10.35 | 5.27 | 9.09 | 644 | 0.25 | 646.93 | 22Mar-21Apr |
| **ROB-11-07** | 631694 | 5855029 | 603 | 543 | 5.2 | 59.9 | till/bedrock | - | - | - | - | 5.78 | 5.78 | 597 | - | - | - |
| **ROB-11-08A** | 632037 | 5855003 | 579 | 550 | 9.1 | 28.5 | till/bedrock | -1.35(A) | -1.45(A) | - | - | - | -1.45 | 581 | - | - | - |
| **ROB-11-08B** | 632037 | 5855003 | 579 | 550 | 6.2 | 9.1 | till | - | 0.58 | 0.15 | - | - | 0.37 | 579 | - | - | - |
| **ROB-11-09** | 632234 | 5854936 | 590 | 559 | 24.5 | 30.9 | till/bedrock | -0.90(A) | - | - | - | - | -0.90 | 591 | - | - | - |
| **ROB-11-10** | 632685 | 5854890 | 616 | 608 | 1.6 | 7.5 | till/bedrock | 4.29 | 5.02 | 6.45 | - | - | 5.25 | 610 | 2.05 | 612.00 | 02Dec-01Apr |
| **ROB-11-11** | 632958 | 5855013 | 617 | 611 | 2.8 | 5.7 | bedrock | 0.85 | 5.21 | 3.39 | - | - | 3.15 | 614 | 2.65 | 617.25 | 02Dec-01Apr |
| **ROB-11-12** | 633282 | 5855180 | 630 | 622 | 1.4 | 7.4 | till/bedrock | 0.15 | 0.78 | 0.76 | 3.25 | - | 1.24 | 628 | 1.18 | 628.65 | 02Dec-21Apr |
| **ROB-11-13A** | 633823 | 5855457 | 633 | 618 | 12.3 | 15.2 | bedrock | - | - | 4.02 | 6.15 | - | 5.09 | 628 | - | - | - |
| **ROB-11-13B** | 633823 | 5855457 | 633 | 618 | 1.6 | 10.6 | till | - | - | 4.68 | 6.06 | - | 5.37 | 628 | 0.30 | 627.65 | 26Mar-21Apr |
| **ROB-11-14** | 633823 | 5855953 | 606 | 597 | 3.1 | 9.0 | till/bedrock | - | - | 0.20 | - | -0.53 | -0.17 | 606 | - | - | - |
| **ROB-11-15** | 633475 | 5856326 | 599 | 590 | 3.0 | 8.8 | till/bedrock | - | - | - | - | - | - | na | - | - | - |
| **ROB-11-16** | 633237 | 5856312 | 571 | 554 | 4.4 | 16.4 | till/bedrock | -0.55 | - | - | - | - | -0.55 | 571 | - | - | - |
| **ROB-11-17** | 632809 | 5855826 | 582 | 534 | 5.2 | 47.7 | till/bedrock | 1.31 | 1.70 | 1.41 | - | - | 1.47 | 580 | 0.71 | 578.35 | 02Dec-01Apr |
| **ROB-11-18** | 632226 | 5855903 | 574 | 544 | 3.2 | 30.4 | till/bedrock | 0(F) | - | - | - | - | 0.00 | 574 | - | - | - |
| **ROB-11-19** | 632258 | 5855429 | 574 | 559 | 2.8 | 14.7 | till/bedrock | - | - | - | - | - | - | na | - | - | - |
| **ROB-11-20** | 633290 | 5855780 | 625 | 610 | 3.0 | 15.0 | till/bedrock | 2.49 | 2.45 | 5.68 | - | - | 3.54 | 621 | 2.71 | 611.44 | 02Dec-01Apr |
| **K-08-10** | 633659 | 5855708 | 637 | 395 | - | - | till/bedrock | - | 9.30 | - | - | - | 9.30 | 628 | - | - | - |
| **K-08-18** | 633161 | 5855951 | 592 | 296 | - | - | till/bedrock | - | 8.62 | 9.24 | - | - | 8.93 | 583 | 0.11 | 582.03 | 22Jan-28Mar |
| **K-11-106** | 631896 | 5855536 | 584 | 462 | - | - | till/bedrock | 6.64 | - | - | 7.32 | - | 6.98 | 577 | 0.50 | 576.30 | 29Mar-21Apr |
| **K-11-108** | 632237 | 5856302 | 586 | 424 | - | - | till/bedrock | - | 2.43 | - | - | - | 2.43 | 584 | 0.50 | 583.10 | 22Jan-28Mar |
| **K-11-113** | 632013 | 5855991 | 597 | 431 | - | - | till/bedrock | - | 13.55 | - | - | - | 13.55 | 583 | - | - | - |
| **K-11-145** | 633698 | 5855726 | 634 | 270 | - | - | till/bedrock | - | 8.48 | - | - | - | 8.48 | 625 | - | - | - |
| **K-11-147** | 633647 | 5855611 | 632 | 301 | - | - | till/bedrock | - | 3.70 | - | - | - | 3.70 | 628 | - | - | - |
| **K-11-163** | 632294 | 5855383 | 584 | 136 | - | - | till/bedrock | - | 6.20 | - | - | - | 6.20 | 578 | - | - | - |

Pressure transducers (Level Logger) deployed; F: Frozen; A: Artesian; Negative values indicate an above groundwater level

### 2.5.2 Groundwater Gradients

Horizontal gradients were estimated between different pairs of wells, in the till/bedrock or the bedrock. Strong gradients are seen on slopes, in the bedrock, between K-08-10 and K-08-18 (0.08 m/m) and ROB-11-05A and K-11-113 (0.17 m/m). More gentle gradients were estimated in the center of the valley, at the till/bedrock interface, between ROB-11-07 and ROB-11-02 (0.02 m/m) and between ROB-11-04 and ROB-11-02 (0.03 m/m). The **Table 2-3** presents the detailed calculation of horizontal gradients in the pit area.

**Table 2-3: Horizontal Groundwater Gradients Estimated in the Pit Area**

| ID | Screened Unit | Mean Measured Groundwater Elevation (m) | Groundwater Elevation Difference (m) | Distance (m) | Horizontal Gradient $i_h$ (m/m) | Groundwater Flow Direction |
|---|---|---|---|---|---|---|
| ROB-11-07 | till/bedrock | 596.92 | 28.32 | 1760 | 0.02 | SW-NE towards Pike Lake |
| ROB-11-02 | till/bedrock | 568.6 | | | | |
| ROB-11-04 | till/bedrock | 594.98 | 26.38 | 775 | 0.03 | Easterly towards Pike Lake |
| ROB-11-02 | till/bedrock | 568.6 | | | | |
| K-08-10 | bedrock | 627.6 | 44.43 | 550 | 0.08 | Northerly towards Pike Lake |
| K-08-18 | bedrock | 583.17 | | | | |
| ROB-11-05A | bedrock | 625.56 | 42.51 | 250 | 0.17 | NE-SE towards Rose Lake |
| K-11-113 | bedrock | 583.05 | | | | |

The presence of multi-level wells, ROB-11-01A/B, ROB-11-05A/B, ROB-11-08A/B and ROB-11-13A/B provides an opportunity to estimate local vertical gradients. The following observations were made:

- Due to artesian conditions, water levels were not precisely measured at ROB-11-01A/B;
- A vertical downwards gradient of 0.06 m/m was estimated at ROB-11-05A/B, in the western part of the pit, on a topographic high;
- Vertical upwards gradients were estimated at ROB-11-08A/B (0.17 m/m) in the local discharge area in the valley center;
- Vertical upwards gradients were also estimated at ROB-11-13A/B (0.04 m/m) located on a topographic high in the eastern part of the pit. Stantec (2012a) mentioned that the upward gradient at ROB-11-13A/B in an upland area is attributed to shallow bedrock, which may be locally confined by the overburden.

The **Table 2-4** presents the detailed calculation of vertical gradients in the pit area.

**Table 2-4: Vertical Groundwater Gradients Estimated in the Pit Area**

| ID | Measured Groundwater Levels (mbgs) | | | Groundwater Elevation Difference | Mid Screen Distance | Vertical Gradient $i_v$ | Groundwater Flow Direction |
|---|---|---|---|---|---|---|---|
| | A | B | Date | (m) | (m) | (m/m) | |
| ROB-11-05 | 2.12 | 1.57 | Jun. 2012 | 0.55 | 8.9 | 0.06 | Downwards |
| ROB-11-08 | -1.45 | 0.58 | Jan. 2012 | -2.03 | 11.15 | 0.18 | Upwards |
| ROB-11-13 | 5.09 | 5.37 | Apr. 2012 | -0.28 | 7.65 | 0.04 | Upwards |

## 2.5.3 Groundwater Recharge

As mentioned in previous sections, recharge areas are mainly observed in topographic highs and discharge zones in topographic lows, where artesian conditions have been observed. Groundwater recharge at Rose Pit can be roughly estimated based on the water balance, as follows:

***Recharge = Total Precipitations – Evapotranspiration – Runoff***

Considering annual precipitation for a dry or wet year, recharge is estimated between 0 and 130 mm/year, with:

- Total precipitation (SNCL, 2023) = between 675.8 and 1265.1 mm/year;
- Rose Pit runoff coefficient for summer/fall (SNCL, 2023) = 0.59;
- Evapotranspiration (SNCL, 2023) = 387 mm/year.

## 2.5.4 Groundwater Quality

In 2012, the groundwater quality in the Rose Pit area was characterized from 15 wells and boreholes. A more detailed interpretation can be found in Stantec, 2012a. Analysis of groundwater geochemistry is an important component of hydrogeological modelling, providing a better understanding of the conceptual model. A preliminary assessment of groundwater chemistry is also required to evaluate the potential effects of mine-related seepages, and the potential for the on-site development of water supply wells. Differentiation between the geochemical signature of groundwater and surface water could also help interpret water inflows during dewatering.

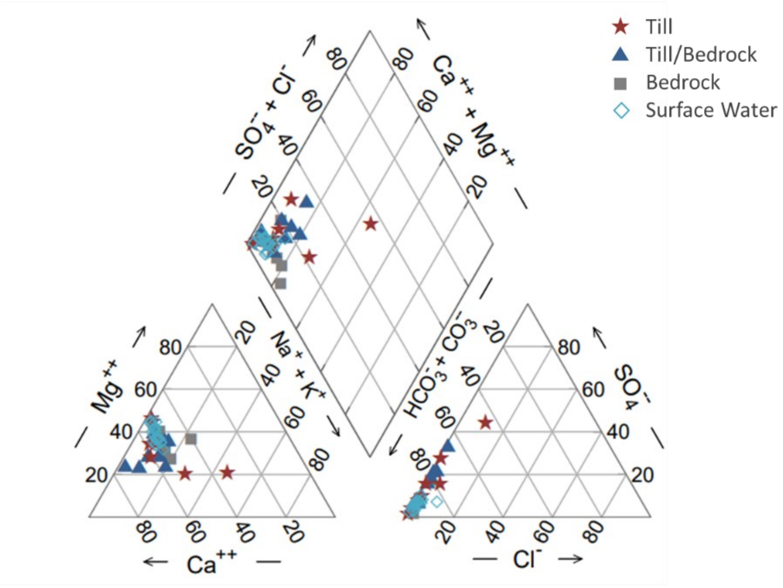
Based on the elevations of the saturated sand packs, 7 wells were screened across the till/bedrock interface (ROB-11-5A, 02, 10, 11, 12, 13A, 17 and 20), 3 wells were completed within the glacial till (ROB-11-5B, 8B and 13B), and 4 wells were installed in the fractured bedrock units (ROB-11-8A and boreholes K-11-108, 113 and 163).

The major ion concentrations of all 14 sampled wells were similar, and generally described as a clear to slightly coloured, moderately soft (average hardness 62.3 mg/L), neutral to slightly acidic (average alkalinity 72.4 mg/L, average pH 7.9, average calcite saturation index -0.7 at 4 degrees Celsius), calcium-bicarbonate water type of low TDS (average 95.5 mg/L). Chloride is notably low (average 1.3 mg/L; maximum 5.4 mg/L) in these groundwater samples.

Groundwater quality was analyzed for the till, the till/bedrock, and the bedrock:

- In the till, all parameters except manganese (average concentration of 297 µg/L) meet GCDWQ (Guidelines for Canadian Drinking Water Quality, Health Canada, 2010). In contrast to the deeper till/bedrock and bedrock chemistry, the overburden chemistry appears to be slightly higher in sodium, chloride, and TDS concentrations, and lower in alkalinity, organic carbon, and trace metals concentrations.
- In the till/bedrock, all parameters except iron (average 517 µg/L) and manganese (average 442 µg/L) meet GCDWQ. The till/bedrock chemistry typically has a higher total organic carbon concentration (mean 27.5 mg/L, maximum 120 mg/L) than the other units.
- In the bedrock, GCDWQ are typically exceeded for iron (average 1469 µg/L) and manganese (mean 286 µg/L). In comparison to the overburden wells, the bedrock typically has higher concentrations of alkalinity, pH, copper, iron, and zinc.

During field investigations carried out by AtkinsRéalis in September 2023, 18 new samples were collected to analyze the general groundwater chemistry of the pit area. The locations of water samples collected in 2012 and 2023 are presented in Figure B7 and a graphic Piper diagram of the 2012 water chemistry data is presented in **Figure 2-3**. The results of the 2023 field sampling program will be considered in a subsequent report, as field investigations were ongoing at the time of writing this report. Laboratory results for 2012 are available in Appendix G.



2012

**Figure 2-3: Piper Diagram for 2012 Samples**

## 2.5.5 Hydraulic Conductivity

### 2.5.5.1 Overburden

In the study area, the hydraulic conductivity (K) of the overburden (till) was measured at 6 wells (Figure B8), including 2 in the pit footprint (ROB-11-05B and ROB-11-13B). The hydraulic conductivities estimated from in situ hydraulic tests (slug tests) are presented in **Table 2-5**. An average hydraulic conductivity of 1.2x$10^{-6}$ m/s was obtained for the till, by calculating the geometric mean of the measurements. The deepest wells where the hydraulic conductivity was measured are BH-GE-03 and BH-GE-06, with the base of the screened interval at a depth of 15.5 m.

The hydraulic conductivity of till/bedrock was also estimated at 4 wells screened at the till/shallow bedrock contact. The geometric mean of the till/bedrock hydraulic conductivity (1.8x$10^{-7}$ m/s) is about an order of magnitude lower than the till, indicating a probable drop in hydraulic conductivity in the lower till or in the surface bedrock. A difference of one order of magnitude for minimum and maximum values was also observed between the till and the till/bedrock. The deepest well where hydraulic conductivity was measured is ROB-11-17, for which the base of the screened interval is at a depth of 47.7 m.

Hydraulic conductivity values for the overburden were also estimated from grain size distribution curves by empirical methods. The results were relatively similar to the slug tests and can be found in the Stantec report (2012a).

**Table 2-5: Hydraulic Conductivities Estimated Through Slug Tests in the Overburden (Stantec, 2012)**

| ID | Screened HSU* | K (m/s) | Geometric Mean K (m/s) | Min. K (m/s) | Max. K (m/s) |
|---|---|---|---|---|---|
| **ROB-11-05B** | till | 1.8E-06 | 1.2E-06 | 2.4E-07 | 2.6E-05 |
| **ROB-11-13B** | till | 1.9E-06 | | | |
| **BH-GE-03** | till | 6.8E-07 | | | |
| **BH-GE-06** | till | 2.6E-05 | | | |
| **BH-GE-09** | till | 7.3E-07 | | | |
| **BH-GE-10** | till | 2.6E-07 | | | |
| **BH-GE-18** | till | 2.4E-07 | | | |
| **BH-TF-07** | till/bedrock | 2.7E-07 | 1.8E-07 | 3.2E-08 | 1.2E-06 |
| **ROB-11-02** | till/bedrock | 9.5E-08 | | | |
| **ROB-11-17** | till/bedrock | 3.2E-08 | | | |
| **ROB-11-20** | till/bedrock | 1.2E-06 | | | |

### 2.5.5.2 Bedrock

In the study area, bedrock hydraulic conductivity (K) was measured in 24 wells (Figure B8), mostly located south of Long Lake. The hydraulic conductivities estimated from in situ hydraulic tests (slug tests) are presented in **Table 2-6**. An average hydraulic conductivity of $1.2x10^{-7}$ m/s was obtained for the bedrock, by calculating the geometric mean of the measurements. The deepest well where hydraulic conductivity was measured is BH-TF-01A, for which the base of the screened interval is at a depth of 23.6 m.

**Table 2-6: Hydraulic Conductivities Estimated Through Slug Tests in the Bedrock (Stantec, 2012)**

| ID | Screened HSU* | K (m/s) | Geometric Mean K (m/s) | Min. K (m/s) | Max. K (m/s) |
|---|---|---|---|---|---|
| **BH-TF-01A** | Bedrock | 8.4E-07 | 1.2E-07 | 1.0E-08 | 2.8E-06 |
| **BH-TF-04A** | Bedrock | 1.1E-07 | | | |
| **BH-TF-05A** | Bedrock | 1.8E-07 | | | |
| **BH-TF-07** | Deep till/bedrock | 2.7E-07 | | | |
| **BH-TF-08A** | Bedrock | 5.5E-07 | | | |
| **BH-TF-09A** | Bedrock | 2.2E-08 | | | |
| **BH-TF-19A** | Bedrock | 1.7E-06 | | | |
| **BH-TF-21A** | Bedrock | 2.8E-06 | | | |
| **BH-TF-22A** | Bedrock | 6.3E-08 | | | |
| **BH-TF-23A** | Bedrock | 6.0E-08 | | | |
| **BH-TF-30** | Bedrock | 6.2E-08 | | | |
| **BH-TF-36A** | Bedrock | 5.6E-08 | | | |
| **BH-TF-39A** | Bedrock | 3.7E-07 | | | |
| **BH-TF-47A** | Bedrock | 8.0E-08 | | | |
| **BH-TF-48A** | Bedrock | 4.7E-08 | | | |
| **BH-TF-50A** | Bedrock | 2.4E-08 | | | |
| **BH-TF-52A** | Bedrock | 1.4E-07 | | | |
| **BH-TF-53A** | Bedrock | 4.0E-08 | | | |
| **BH-TF-55A** | Bedrock | 1.0E-08 | | | |
| **BH-TF-56A** | Bedrock | 5.2E-08 | | | |
| **BH-TF-60A** | Bedrock | 1.0E-07 | | | |
| **BH-12-145A** | Bedrock | 8.9E-07 | | | |
| **ROB-11-02** | Deep till/bedrock | 9.5E-08 | | | |
| **ROB-11-17** | Deep till/bedrock | 3.2E-08 | | | |

### 2.5.5.3 Faults

In the study area, deep bedrock hydraulic conductivity (K) was measured through a series of packer injection tests in 2 inclined boreholes: RBR-12-01 and RBR-12-02 (**Table 2-7**). The packer tests were performed by Stantec in 2012 within the proposed pit footprint (Figure B8).

**Table 2-7: RBR-12-01 and RBR-12-02 Coordinates**

| ID | X NAD27 Zone 19 UTM | Y NAD27 Zone 19 UTM | Ground Elevation (masl) | Dip | Azimuth | Overburden Thickness (m) | Down Hole Depth (m) |
|---|---|---|---|---|---|---|---|
| RBR-12-01 | 632774 | 5855885 | 573 | -60 | 270 | 39 | 225 |
| RBR-12-02 | 632131 | 5855010 | 581 | -60 | 270 | 14 | 300 |

The injection limit (1x10$^{-5}$ m/s) was reached during RBR-12-01 testing, at a vertical depth in the bedrock of approximately 100 m (about 160 m along the borehole) revealing an interval of pulverized sandy bedrock in the Sokoman formation (**Figure 2-4**). Core photos of the entire length of each borehole are presented in Appendix E. These photos show a bedrock with intense weathering intervals. Histogram summary plots, geological logs and basic geotechnical logs are also presented for each borehole in Appendix H.

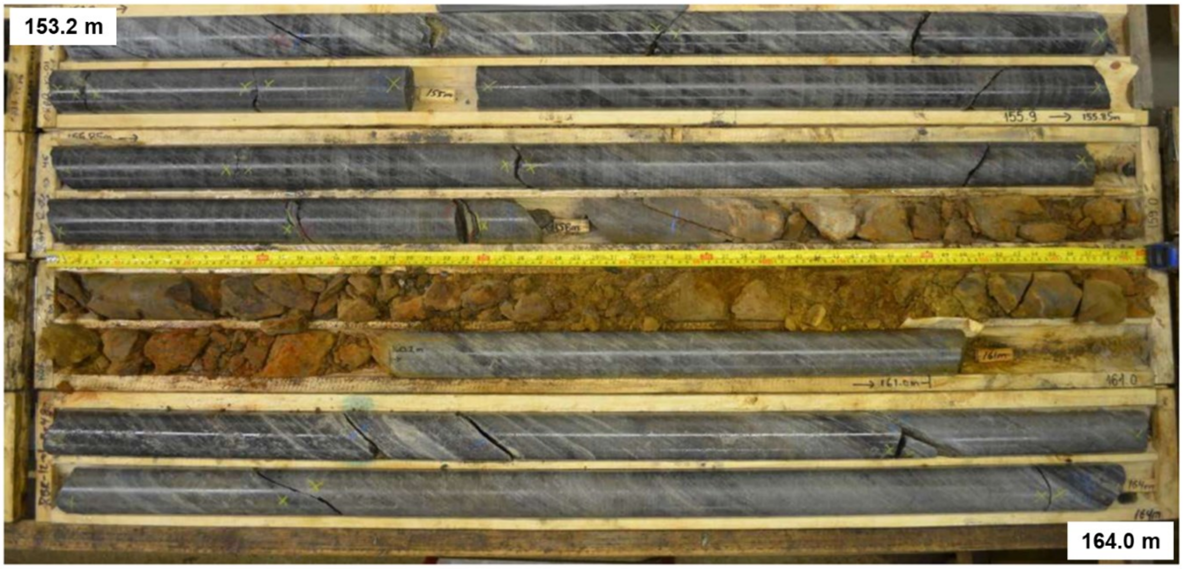


**Figure 2-4: Intense Weathering Interval at RBR-12-01 (from Stantec, 2012)**

As shown in Figure B8, RBR-12-01 and RBR-12-02 are both located in the center of the proposed pit. Average hydraulic conductivities of 2.4 x10$^{-6}$ and 1.5 x10$^{-6}$ m/s were obtained for the RBR-12-01 and RBR-12-02 respectively, by calculating the geometric mean of the measurements. Packer tests results tables for each borehole are presented in Appendix I and variations of hydraulic conductivity with depth (along borehole and vertical) are presented in **Figure 2-5**.

Local high hydraulic conductivities (in comparison to the geometric average) intervals from the packer tests are attributable to the presence of the Central fault, within the Sokoman formation. Consequently, an estimate of fault hydraulic conductivity can be made on the basis of the highest values estimated in packers, i.e., above 1x10$^{-5}$ m/s. For all calculations and estimations (and production of **Figure 2-5**), a hydraulic conductivity of 5x10$^{-5}$ m/s was assumed for these intervals.

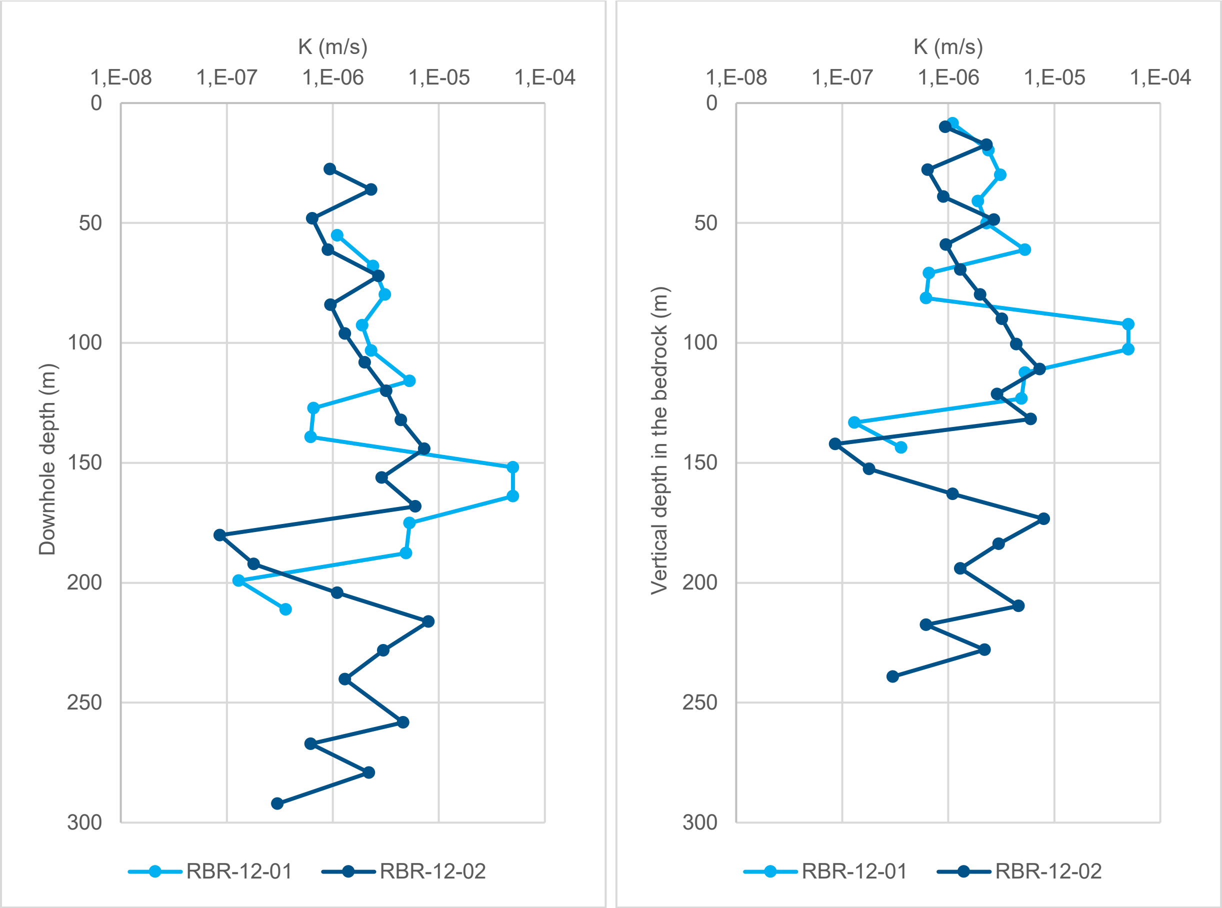


**Figure 2-5: Borehole Packer Permeability Tests with Depth at RBR-12-01 and 02 (Stantec, 2012)**

### 2.5.6 Hydrostratigraphy

Figures B9 and B10 present geological cross-sections through the Rose Pit that illustrate the interpreted overburden thickness, faults, bedrock geology and the proposed mine (pit shell) near RBR-12-01 and RBR-12-02, where the bedrock hydraulic conductivity variations with depth are the best known. Based on the data available, the hydrostratigraphy of the conceptual model was divided into 4 units: the till, the bedrock surrounding the total pit depth, the faults, and the deep bedrock beneath the maximum pit depth. The hydraulic conductivity of each unit is based on the geometric mean data of the measured values and is summarized in **Table 2-8**.

**Table 2-8: Hydraulic Conductivity of Each Hydrostratigraphic Unit**

| Hydrostratigraphic Units | Approximate Depth Interval (m) | Geometric Mean of Hydraulic ConductivityK (m/s) |
|---|---|---|
| Overburden | 0-60 | 1.2E-06 |
| Bedrock | 0-450[1] | 1.2E-07 |
| Deep Bedrock | 450-650 | 1.0E-08 |
| Faults | 0-450 | ≥1.0E-05 |

*Note:*

*1: The separation between bedrock and deep bedrock is based on the maximum pit depth of 450 m.*

A cross-section showing the hydrostratigraphic units in the hydrogeological model (Feflow model) is presented in Figures B9 and B10 for each geological cross-section. For mesh simplification purposes, the Katsao-Wishart and the Central fault are represented as vertical zones of higher hydraulic conductivity with constant thicknesses of 50 and 30 m, respectively. Since the thickness and hydraulic conductivity of the lake-bottom sediments are unknown, it was assumed that the faults were hydraulically connected to the lakes, crossing the overburden layer.

Although the hydraulic conductivity of the bedrock is not known below 250 m vertical depth, the hydraulic conductivity of the bedrock unit was attributed to the entire bedrock surrounding the pit in a conservative approach (from the surface to the maximum pit depth, 450 m). A value of 1x10$^{-8}$ m/s was assumed for the deep bedrock unit (below the pit), since bedrock generally decreases in permeability with depth (Stober and Bucher, 2007).

# 3. Groundwater Flow Model

A preliminary estimate of groundwater open pit mine inflows was made using a numerical model of the area. The following sections describe the steps involved in building and calibrating the model before dewatering.

## 3.1 Software Description

The modelling was conducted using the FEFLOW software, developed by WASY Institute in Germany (DHI, 2005). FEFLOW is a robust numerical groundwater model capable of considering all aspects including mining, processing, mine waste management, and the management (diversion, impoundment, treatment) of groundwater. In this study, the groundwater flow was simulated via Richard's equation representing unsaturated or variably saturated media.

## 3.2 Model Mesh

The hydrogeological FEFLOW model domain covers an area of approximately 200 km$^2$. This area was discretized using a mesh composed of 816,312 triangular prismatic elements of variable dimensions (Figure B11).

Horizontally, meshing and cell sizes have been adapted to adequately represent the local site infrastructure and anticipated hydraulic gradients. Average cell sizes are about 40 m inside the pit area and 5 m around the faults. Vertically, the model is composed of 29 layers of variable thicknesses. The mesh was also refined vertically for the overburden and along the pit depth. The overburden is discretized into 3 layers with an average thickness of 4.5 m. The bedrock surrounding the pit is discretized into 23 layers with an average thickness of less than 25 m. The deep bedrock under the pit is discretized into 5 layers with an average thickness of 25 m.

## 3.3 Boundary Conditions

The boundary conditions applied to the hydrogeological model are presented in Figure B11. The model domain is bound by physical boundaries that extend from the topographic highs west of Daviault Lake, where a no flow condition is applied, to Wahnahnish Lake in the east, where fixed head conditions are applied to represent the natural flow from Wahnahnish Lake to Labrador City.

To the north, the model boundary follows a hydrographic limit to a topographic low near Labrador City. To the south, the model boundary follows a succession of topographic highs (no flow boundary condition) which correspond to the catchment basin limits, then joins Wahnahnish Lake.

Major lake water elevations are assumed to represent groundwater levels. Based on topographic data and punctual lake water level measurements, a fixed head boundary condition was applied on Daviault, Molar, Pike, Mills, Long and Riordan lakes. Fixed head values used for each lake are presented in **Section 2.4**.

The natural surface drainage due to the hydrographic network was represented by drain boundary conditions (seepage face). These boundary conditions correspond to constant head boundaries with a value equal to the elevation of the surface and with a flow constraint which only allows water to exit the model. Drain boundary conditions were applied to topographic lows and valley floors where streams normally form.

Different recharge rates were used based on the topography of the area: from 35 to 150 mm/year on the topographic highs and no recharge on the topographic lows or steep slopes.

## 3.4 Model Calibration

During the model calibration process, the numerical model parameters, hydraulic conductivity and recharge, and boundary conditions are adjusted within reasonable ranges to obtain an acceptable match between measured and simulated heads (ASTM D5981-96, 2002).

The hydrogeological model was calibrated in steady state against water levels from 29 piezometers, measured between November 2011 and June 2012. The piezometers are located on the topographic highs at the periphery of the pit and in the topographic low in the center of the pit. The piezometers screens intercept the till, the till/bedrock, and the bedrock.

The normalized root mean squared error (NRMSE) method was chosen to quantitatively evaluate the goodness-of-fit between the measured and simulated heads. The following equation was used to calculate the NRMSE:

$$NRMSE\ (\%) = \frac{1}{(h_{max} - h_{min})} \times \left[\frac{1}{N}\sum_{i=1}^{N}(h_s - h_m)^2\right]^{\frac{1}{2}}$$

Where:

N: Number of observations

$h_s$: Simulated head (m)

$h_m$: Measured head (m)

$h_{max}$: Maximum measured head (m)

$h_{min}$: Minimum measured head (m)

Mainly, during the calibration process, the hydraulic conductivity of the bedrock unit was reduced by half an order of magnitude to raise simulated hydraulic heads in topographic high areas (**Table 3-1**). The hydraulic conductivity from other units remained relatively intact. The recharge was also increased to 130 mm/year on the topographic highs in the Rose Pit area (Figure B11). Calibrated hydraulic conductivities for each of the units in the model are presented in Figure B12.

**Table 3-1: Estimated and Calibrated Hydraulic Conductivity**

| Hydrostratigraphic Units | Hydraulic Conductivity K (m/s) | |
|---|---|---|
| | Mean selected value estimated through slug tests and packer tests | Calibrated values |
| Overburden | 1.2E-06 | 1.0E-06 |
| Bedrock | 1.0E-07 | 5.0E-08 |
| Deep Bedrock | 1.0E-08 | 1.0E-08 |
| Faults | ≥1.0E-05 | 1.0E-05 |

In general, the model calibration is satisfactory, as shown by the alignment of points on the calibration line (**Figure 3-1**). The measured and simulated heads, as well as their residuals are presented in Appendix J. An NRMSE of 9.5% was obtained for the calibrated model, which is below the generally accepted target of 10% (Robertson GeoConsultants Inc. and SRK Consulting, 2012).

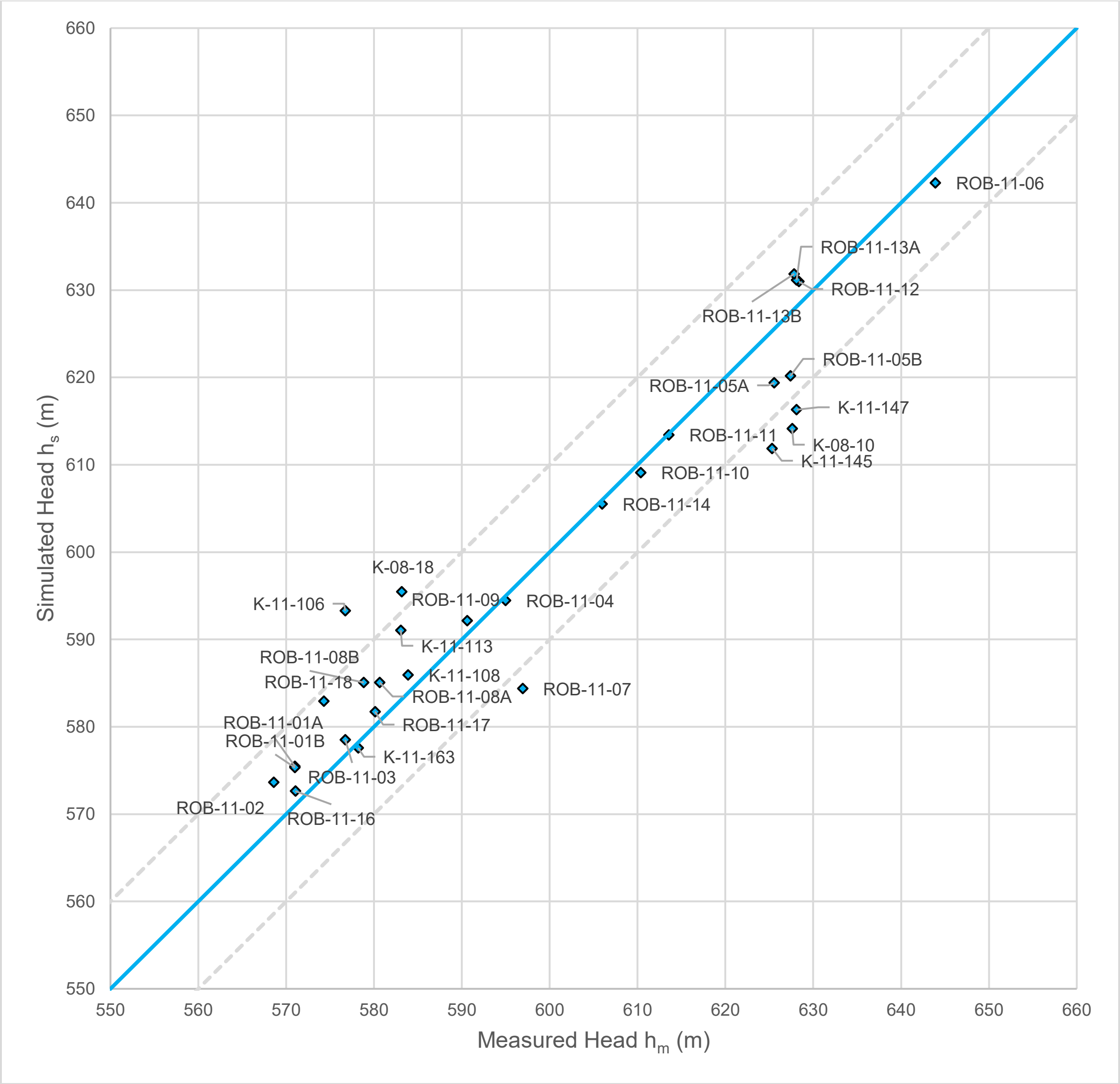


**Figure 3-1: Hydrogeological Model Calibration Line**

As shown in **Figure 3-1**, simulated hydraulic heads are underestimated by approximately 10 m at K-08-10, K-11-145, and K-11-147. Those wells are all located on the topographic high, in the eastern part of the pit. Simulated heads are also underestimated at ROB-11-07, which is located on a steep slope in the southwestern part of the pit.

Simulated heads are overestimated by 10 m at K-08-18, located hydraulically downstream of the previous wells. To the west of the pit, on the hillside, simulated heads are also overestimated by 10 m at K-11-106 whereas heads at ROB-11-06, upstream, are perfectly calibrated.

The over- or underestimation of simulated hydraulic heads at certain wells demonstrates the difficulty of representing abrupt groundwater level variations associated with slopes and complex geology.

Another challenge for the model calibration is the fact that water levels data come from measurements taken at different times of the year, between November 2011 and April 2012. This means that a synchronous data set to calibrate all the wells is not available, which can lead to greater error in the calibration. It is worth noting that the mean average error (MAE) of the calibrated model is 4.5 m (Appendix J), which is less than the local groundwater fluctuation of 6.37 m, which was measured at ROB-11-06 between March and June 2012. The calibration will be refined subsequently, based on new data from level logger installed during 2023 field work.

The calibrated model represents what will subsequently be referred to as the base case scenario.

## 3.5 Simulated Piezometry

As shown in Figure B13, the simulated piezometry for the base case scenario satisfactorily reproduces the measured piezometry values. The simulated groundwater flow follows the topography and converges towards the valley center, where the flow direction is towards Pike Lake.

The simulated piezometry is also presented along a NW-SE cross-section across the pit (Figure B14). The section shows the flow direction from the topographic highs to the local lows, like Rose Lake and Elfie Lake, where the water level is at the surface or artesian.

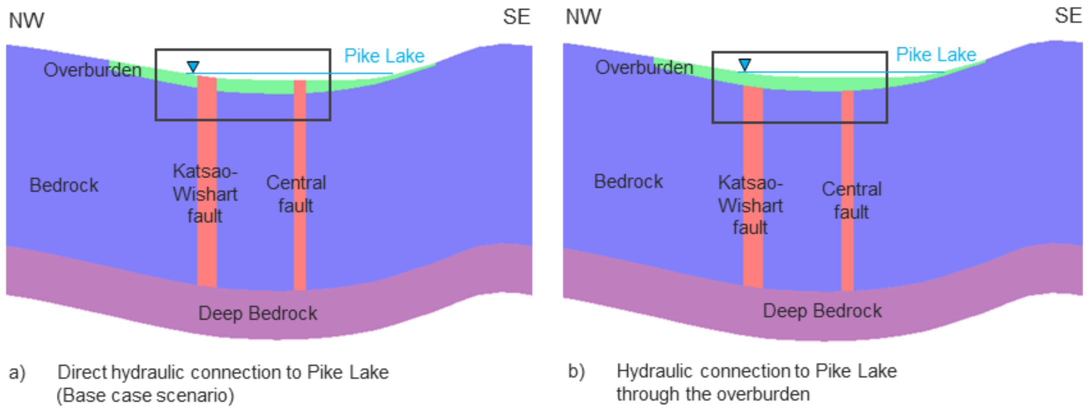
## 3.6 Sensitivity Analysis

A sensitivity analysis of a hydrogeological model is usually conducted to define which of the model parameters has the most influence on the modelling results. It can also be used to adapt the calibration strategy or to validate the impact of insufficient data on the modelling results. The parameters selected for this sensitivity analysis are:

- The hydraulic conductivity of each unit, which was increased and decreased by an order of magnitude;
- The recharge rate, which was increased by 50%;
- The water elevation of Pike Lake, considering that the lake is dried up; and
- The faults connection to Pike Lake through the overburden (**Figure 3-2**).

Following the variation of these parameters, different types of error (NRMSE, MAE, RMS, and Standard Deviation) were compared to the base case scenario as shown in **Table 3-2**. Based on this sensitivity analysis, the overburden and above all, the bedrock unit hydraulic conductivity, were determined to have a major impact on the calibration, as can be seen with the higher NRMSE values (SA3 and SA4). It should be noted that a less permeable deep bedrock value ($1x10^{-9}$ m/s) provides slightly better calibration statistics (SA6). However, to evaluate a conservative case, a more permeable deep bedrock value of $1x10^{-8}$ m/s was selected for future dewatering flow rate estimations.

Other parameters like the recharge rate (SA9), Pike Lake water level (SA10), and the faults connection through the overburden (SA11), seem to have a lesser impact on the calibration.



a) Direct hydraulic connection to Pike Lake (Base case scenario)

b) Hydraulic connection to Pike Lake through the overburden

**Figure 3-2: Conceptual Representation of the Faults Connection to Pike Lake through the Overburden in the Hydrogeological Model**

**Table 3-2: Groundwater Flow Sensitivity Analysis (SA) Results**

| Sensitivity Analysis (SA) Scenario | HSU Hydraulic Conductivity (m/s) | | | | Recharge Rate (mm/yr) | Pike Lake Water Elevation (m) | Faults Through Overburden | Normalized Root Mean Square Error NRMSE | Mean Absolute Error MAE (m) | Root Mean Square RMS (m) | Standart Deviation σ (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Overburden | Bedrock | Deep Bedrock | Faults | | | | | | | |
| **Base Case[1]** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | 0<R<130 | 568 | YES | 9.51% | 4.48 | 6.03 | 6.14 |
| **SA1** | 1.0E-05 | 5.0E-08 | 1.0E-08 | 1.0E-05 | 0<R<130 | 568 | YES | 16.96% | 9.95 | 12.99 | 13.22 |
| **SA2** | 1.0E-07 | 5.0E-08 | 1.0E-08 | 1.0E-05 | 0<R<130 | 568 | YES | 16.85% | 11.73 | 12.7 | 12.92 |
| **SA3** | 1.0E-06 | 5.0E-07 | 1.0E-08 | 1.0E-05 | 0<R<130 | 568 | YES | 34.72% | 18.84 | 26.25 | 26.71 |
| **SA4** | 1.0E-06 | 5.0E-09 | 1.0E-08 | 1.0E-05 | 0<R<130 | 568 | YES | 144.84% | 62.87 | 108.94 | 110.87 |
| **SA5** | 1.0E-06 | 5.0E-08 | 1.0E-07 | 1.0E-05 | 0<R<130 | 568 | YES | 9.12% | 5.53 | 7.13 | 7.25 |
| **SA6** | 1.0E-06 | 5.0E-08 | 1.0E-09 | 1.0E-05 | 0<R<130 | 568 | YES | 7.50% | 4.36 | 5.9 | 6.01 |
| **SA7** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-04 | 0<R<130 | 568 | YES | 9.79% | 4.78 | 7.74 | 7.88 |
| **SA8** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-06 | 0<R<130 | 568 | YES | 8.85% | 5.24 | 6.69 | 6.81 |
| **SA9** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R +50% | 568 | YES | 12.90% | 8.41 | 9.69 | 9.87 |
| **SA10** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | 0<R<130 | DRY | YES | 7.66% | 4.48 | 6.03 | 6.13 |
| **SA11** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | 0<R<130 | 568 | NO | 7.83% | 4.76 | 6.11 | 6.22 |

*Notes:*

*1. The base case represents the calibrated scenario, with fault connection through the overburden and Kfaults = $1x10^{-5}$ m/s*

*Change from the Base Case*

# 4. Rose Pit Dewatering

## 4.1 Dewatering Results at the End of Operations (Y26)

### 4.1.1 Analytical Results

In 2012, Stantec estimated pit dewatering rates Q ($m^3$/day) at the end of Operations using an analytical solution, the "Darcy Approach":

$$Q = K \cdot i \cdot A$$

where inflow is proportional to hydraulic conductivity K (m/s), hydraulic gradient i (m/m) and a cross-sectional area of porous medium, A ($m^2$).

These estimates assume a pit perimeter of 8,627 m, an average seepage face height of 10 m during operations and a conservative hydraulic gradient of 0.5 towards the pit wall. These values reflect potential inflows under final pit development as the perimeter chosen for this exercise represents the maximum pit footprint at ground surface and thus provides an upper bound value of estimated pit inflow (Stantec, 2012a).

- The estimated potential inflow to the pit through the silty sand glacial till overburden material ranges from 1,886 $m^3$/day to 7,156 $m^3$/day with an average of 4,472 $m^3$/day (Stantec, 2012a).
- Using similar pit morphology assumptions and the K values from two packer tests in bedrock (RBR-12-01 and RBR-12-02), the estimated inflow to the pit through bedrock could theoretically range from 321 $m^3$/day to 29,815 $m^3$/day with an average of 6,187 $m^3$/day (Stantec, 2012a).

The above results are summarized in **Table 4-1**.

**Table 4-1: Pit Dewatering Rate Based on Darcy Approach (Stantec, 2012a)**

| Analytical Dewatering Scenario | Hydraulic Conductivity (m/s)[1] | | | Pit Outflow Rate ($m^3$/day)[2] | | |
|---|---|---|---|---|---|---|
| | Min. | Max. | Average | Min. | Max. | Average |
| **Till** | 5.1E-07 | 1.9E-06 | 1.2E-06 | 1,886 | 7,156 | 4,472 |
| **Bedrock** | 8.6E-08 | 8.0E-06[3] | 1.7E-06[4] | 321 | 29,815 | 6,187 |
| **Till + Bedrock** | na | na | na | 2,207 | 36,971 | 10,659 |

*Notes:*

*1: K data for till and bedrock are from ROB-11-05B, 13B and 20 completed in the upper silty sand, and the bedrock is represented by two inclined boreholes RBR-12-01 and RBR-12-02 in bedrock, and ROB-11-01 and ROB-11-02 completed across the deep till/bedrock interface (Stantec, 2012a).*

*2: Minimum, maximum, and average pit outflow rates are based on minimum, maximum and geometric average of the hydraulic conductivity for the till and the bedrock, estimated by Stantec (2012a).*

*3: This value was measured at RBR-12-02 at a vertical depth of around 190 m. However, this maximum does not consider the two RBR-12-01 intervals where the injection limit of $1x10^{-5}$ m/s was reached (Appendix I).*

*4: The average bedrock hydraulic conductivity is only based on the packer tests results realized at RBR-12-01 and 02. However, based on current understanding of the site, some hydraulic conductivity intervals of these boreholes are more representative of fault zones, but the distinction between bedrock and fault zones is not considered with the analytical approach.*

Stantec's estimates, derived from Darcy's analytical approach, represent a first-order preliminary estimate of potential pit inflows for overburden and bedrock. Analytical models are typically used to represent simple systems or to illustrate broad, generalized effects of different parameter assumptions whereas numerical models are typically used to represent more complex systems (Robertson GeoConsultants Inc. and SRK Consulting, 2012). Groundwater numerical models are powerful tools to conceptualize and quantify current conditions (synthesize existing information), and in this case, understand system dynamics to identify and quantify controlling and significant processes (Robertson GeoConsultants Inc. and SRK Consulting, 2012). Among other things, the existence of the following gives the hydrogeological system its complex character and justifies the need of a numerical model for the rest of the project:

- A highly folded and metamorphosed bedrock geology, with sub-vertical formations;
- A variable thickness of overburden that could present preferential flowpaths (piping);
- Identification of 2 sub-vertical faults, potentially intercepting nearby lakes;
- The presence of nearby lakes, which could lead to significant dewatering flow rates on the one hand, and the potential drying up of the lakes on the other;
- Potential drawdowns or groundwater quality impacts on receptors (such as Duley Lake Provincial Park to the north of the site);
- Impacts of the interactions between all the components of this complex system;
- Future 3D data acquisition.

Given the limited amount of data available in 2012, the Darcy approach used by Stantec was reasonable at that time. However, the Darcy approach is unable to consider the complexity of the site. In addition, the availability of a 3D geological Leapfrog model offers a unique opportunity to support the construction of a 3D groundwater numerical model.

The dewatering results of the 3D numerical Feflow model are presented in the following section.

### 4.1.2 Numerical Results

To estimate dewatering rates, a steady-state simulation was carried out using the pit's maximum depth (450 m) at the end of operations (Year 26). In a conservative approach, a baseline scenario was selected for infrastructure design purposes (selected case), assuming the faults hydraulic conductivity was 5 times higher than the base case (i.e., 5x10$^{-5}$ m/s). The hydraulic conductivity of the faults in the base case (1x10$^{-5}$ m/s) corresponds to the injection limit reached during packer tests in RBR-12-01.

The other assumptions and parameters, like constant lake levels during dewatering operations, the fault connection through the overburden or other units' hydraulic conductivity, remain identical to the base case.

Based on the above assumptions, the simulated pit dewatering flow rate for the selected case would be 40,849 m$^3$/day, while that of the base case would be 12,432 m$^3$/day (**Table 4-2**). It was observed that of the estimated 40,849 m$^3$/day, 29,460 m$^3$/day would originate directly from Pike Lake, which is located north of the pit. The dewatering rate for the selected case is higher than for the base case, due to the increased hydraulic conductivity of the faults. Because of its proximity to the pit and hydraulic connection to the fault, Pike Lake's contribution would be greater than that of the other lakes. The second largest inflow rate would be from Daviault Lake (7,017 m$^3$/day), which in the model, is hydraulically connected to the pit by the Katsao-Wishart fault.

Water contributions during dewatering (inflow rate) from lakes Daviault, Mills and Molar for the base and the selected case are presented in **Table 4-2**.

**Table 4-2: Pit Dewatering Rate and Lakes Contribution (Y26)**

| Numerical Dewatering Scenario (Y26) | Pit Outflow Rate (m$^3$/day) | Inflow Rate (m$^3$/day) | | | |
|---|---|---|---|---|---|
| | | Pike Lake | Mills Lake | Daviault Lake | Molar Lake |
| **Base Case**[1] | 12,432 | 7,051 | 520 | 1,133 | 84 |
| **Selected Case**[2] | 40,849 | 29,460 | 525 | 7,017 | 110 |

*Notes:*

*1: The base case represents the calibrated scenario, with faults connection through the overburden and $K_{faults}$ = 1x10$^{-5}$ m/s.*

*2: The selected case represents a conservative scenario (higher dewatering flow rate) selected for the water infrastructure design, with faults connection through the overburden and $K_{faults}$ = 5x10$^{-5}$ m/s.*

A simulated piezometric map, representing the final phase of pit dewatering (final depth of the mine pit) and assuming steady state conditions, is presented in Figure B15. The influence of dewatering would extend preferentially in a NE-SW alignment, along the more permeable fault zones. Simulated hydraulic heads are also presented at Y26 in a NW-SE cross-section in Figure B16 showing that the drawdown could be significant, especially in topographic highs areas.

The estimation of pit dewatering flow rates relies on a set of conservative conceptual assumptions, such as:

- The representation of faults as homogeneous zones of high hydraulic conductivity ($5x10^{-5}$ m/s) directly connected to the lakes (Pike and Daviault);
- The representation of faults throughout the pit's depth (450 m);
- The extension of the Katsao-Wishart fault to Daviault lake, with a high hydraulic conductivity ($5x10^{-5}$ m/s). It is worth noting that, based on the regional geology, the Katsao-Wishart fault is interpreted to be continuous up to Daviault lake. However, the geological continuity of the fault does not necessarily translate to a high hydraulic conductivity zone that would extend over the 2.6 kilometres separating the lake from the pit. This hypothesis is therefore conservative with respect to dewatering rates;
- Maintaining constant water levels for Daviault and Pike lakes throughout dewatering, which maintains a high hydraulic gradient towards the pit.

## 4.2 Sensitivity Analysis

### 4.2.1 Dewatering at the End of Y26

Several dewatering sensitivity analyses (DSA) were carried out by varying the hydraulic conductivity of the hydrostratigraphic units, the recharge rate, as well as the faults' connection through the overburden and to the lakes (Daviault and Pike). For each scenario, the impact on the pit dewatering flow rate is shown in **Table 4-3**.

For comparison, Stantec results from an analytical solution (Darcy approach) have also been included in **Table 4-3**. The average (10,659 $m^3$/day) and the maximum (36,971 $m^3$/day) dewatering rates from the analytical solution are relatively similar to the base case (12,432 $m^3$/day) and the selected case (40,849 $m^3$/day) results from the numerical model, respectively. Two main facts explain these similarities: on one hand, the numerical model is based on the same 2012 data used in the analytical solution, since no new data was available at the time of this study; and on the other hand, the 3D numerical model has not been unnecessarily made more complex at this stage, with 4 hydrostratigraphic units represented in the model. New data acquisition would support the updating of a more complex model that would serve as the basis for a more detailed design.

The results of the sensitivity analysis (DSA1 to DSA13) confirm what had previously been established between the base case and the selected case: the hydraulic conductivity of the faults seems to be a major factor controlling pit dewatering rate. Indeed, in the DSA7 and DS8 scenarios, the faults' hydraulic conductivity varies by an order of magnitude around the base value. For the higher value of $1x10^{-4}$ m/s, the dewatering rate is increased by more than 6 times compared to the base case. On the contrary, the greatest reduction in dewatering rates is observed for DSA8, where the hydraulic conductivity of the faults is reduced to $1x10^{-6}$ m/s.

The bedrock surrounding the pit also seems to play a significant role (DSA3), with dewatering rates increased by a factor of 3 when the hydraulic conductivity of the bedrock is an order of magnitude higher ($5x10^{-7}$ m/s).

Sensitivity analyses DSA14 to 16 illustrate the influence of the system's interconnectivity and the impact of conceptual modelling choices on dewatering results. In the case where a high hydraulic conductivity value is considered for the faults ($1x10^{-4}$ m/s), the results of DSA7 show that the dewatering flow rate could reach 76,121 $m^3$/day. However, in the case where the overburden, with a lower hydraulic conductivity ($1x10^{-6}$ m/s), overlies the faults, thereby limiting the water inflow from Pike Lake (DSA14), the flow would be reduced by a factor of 3 (i.e., 25,553 $m^3$/day). This scenario limits the influence of the connection between faults and lakes by considering a buffer zone where flow is limited. Based on the overburden data in the pit area, it is likely that a certain thickness of till or lake-bottom sediment is overlying the fault zones or fractured bedrock beneath Pike Lake. However, the overburden properties (thickness and hydraulic conductivity) under the lake have not been studied.

Scenario DSA15 shows the influence of the hydraulic connection between the Katsao-Wishart fault and Daviault Lake on dewatering flow rates. When this fault is not hydraulically connected to the lake, the flow seems to decrease to 59,402 $m^3$/day.

Scenario DSA16 considers that the faults are not connected to Pike Lake through the overburden and that the Katsao-Wishart fault is not connected to the overburden. In contrast to DSA7, the pit dewatering flow rate would be considerably reduced. This simulation shows how the accumulation of different conceptual assumptions can lead to significant variations in pit dewatering flow. In this case, they reduce the initial flow rate by a factor of 4.

The sensitivity analysis highlights the flow dynamics during the final phase of pit dewatering, and the interactions between the various modelling parameters. This exercise also helps define the priority issues to be addressed during future fieldwork.

**Table 4-3: Dewatering Flow Rate Sensitivity Analysis (DSA) Results**

| Dewatering Sensitivity Analysis (DSA) Scenario | Hydraulic Conductivity K (m/s) | | | | 0<R<130 (mm/yr) | Pike Water Elevation (m) | Faults Through Overburden | K-W Fault Connected to Daviault | Y26 Pit Flow Rate (m3/day) |
|---|---|---|---|---|---|---|---|---|---|
| | Overburden | Bedrock | Deep Bedrock | Faults | | | | | |
| **Analytical Results (min.)[1]** | 5.1E-07 | 8.6E-08 | na | na | na | na | na | na | 2,207 |
| **Analytical Results (max.)[1]** | 1.9E-06 | 8.0E-06 | na | na | na | na | na | na | 36,971 |
| **Analytical Results (average)[1]** | 1.2E-06 | 1.7E-06 | na | na | na | na | na | na | 10,659 |
| **Base Case[2]** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R | 568 | YES | YES | 12,432 |
| **Selected Case[3]** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 5.0E-05 | R | 568 | YES | YES | 40,849 |
| **DSA1** | 1.0E-05 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R | 568 | YES | YES | 16,418 |
| **DSA2** | 1.0E-07 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R | 568 | YES | YES | 11,559 |
| **DSA3** | 1.0E-06 | 5.0E-07 | 1.0E-08 | 1.0E-05 | R | 568 | YES | YES | 35,303 |
| **DSA4** | 1.0E-06 | 5.0E-09 | 1.0E-08 | 1.0E-05 | R | 568 | YES | YES | 9,701 |
| **DSA5** | 1.0E-06 | 5.0E-08 | 1.0E-07 | 1.0E-05 | R | 568 | YES | YES | 13,834 |
| **DSA6** | 1.0E-06 | 5.0E-08 | 1.0E-09 | 1.0E-05 | R | 568 | YES | YES | 12,277 |
| **DSA7** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-04 | R | 568 | YES | YES | 76,121 |
| **DSA8** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-06 | R | 568 | YES | YES | 5,487 |
| **DSA9** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R +50% | 568 | YES | YES | 13,119 |
| **DSA10** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R | DRY | YES | YES | 6,385 |
| **DSA11** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R | 568 | NO | YES | 11,671 |
| **DSA12** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R | 568 | YES | NO | 10,975 |
| **DSA13** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-05 | R | 568 | NO | NO | 10,278 |
| **DSA14** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-04 | R | 568 | NO | YES | 25,553 |
| **DSA15** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-04 | R | 568 | YES | NO | 59,402 |
| **DSA16** | 1.0E-06 | 5.0E-08 | 1.0E-08 | 1.0E-04 | R | 568 | NO | NO | 19,766 |

*Notes:*

*1: Analytical results are based on the Darcy approach (Stantec, 2012a).*

*2: The base case represents the calibrated scenario.*

*3: The selected case represents a conservative scenario (higher dewatering flow rate) for the water infrastructure design.*

*Change from the Base Case*

### 4.2.2 Yearly Dewatering, Y01 to Y26

Using the 3D numerical model, dewatering flow rates for each year of operation, from year 1 to year 26, for the base case and the selected case, were estimated (**Figure 4-1**). For each year, a steady-state simulation is run using the pit shell of the corresponding year. As a reminder, the dewatering rate results for the selected case are higher than those for the base case due to the hydraulic conductivity of the faults, which is 5 times higher for the selected case (from $1x10^{-5}$ to $5x10^{-5}$ m/s). The impact of fault hydraulic conductivity on dewatering flow is visible from the beginning of Operations since faults are represented as outcrops in the model.

Dewatering rates for one-quarter, one-half and three-quarters of the total pit depth were estimated based on the total pit depth. The surface elevation used to calculate pit depth is 570 masl, the approximate elevation of the centre of the valley. For each year, the dewatering results are presented in **Figure 4-1**, for the base case and the selected case, considering the following:

- Elevation 443 masl represents approximately ¼ of the pit's total depth, which is projected to be reached by Y05.
- Elevation 315 masl represents approximately ½ of the pit's total depth, which is projected to be reached by Y14.
- Elevation 188 masl represents approximately ¾ of the pit's total depth, which is projected to be reached by Y24.
- Elevation 60 masl represents approximately the final pit's depth, which is projected to be reached by Y26.

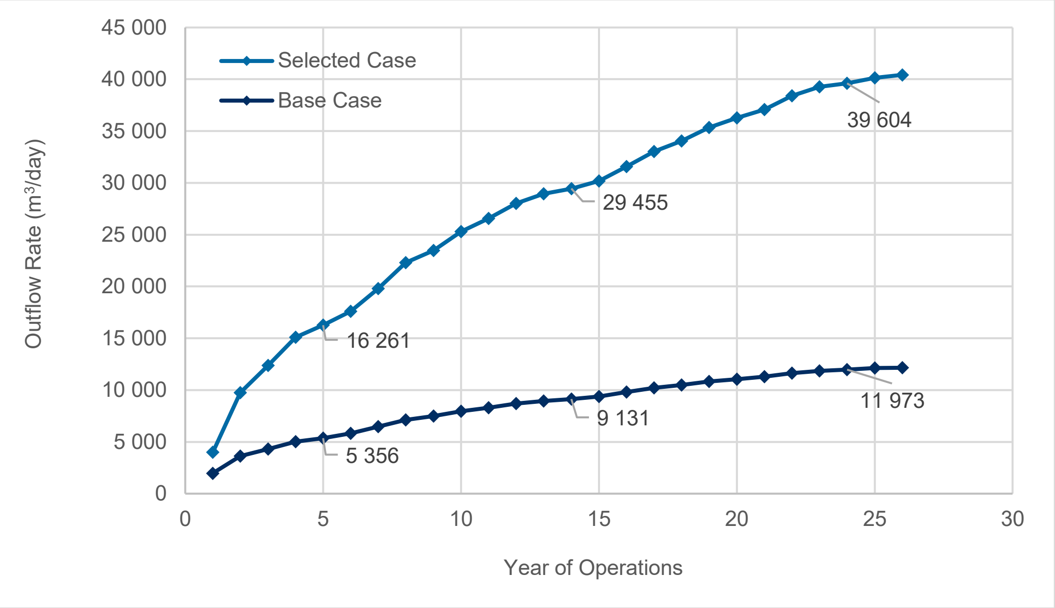


**Figure 4-1: Dewatering Rates During Operations Y01 to Y26**

An estimate of the pit outflow rate and lakes inflow rate was also evaluated in the first years of operation (Y05) for the base case and the selected case. Table 4-4 shows the results of this analysis.

**Table 4-4: Pit Dewatering Rate and Lakes Contribution (Y05)**

| Dewatering Scenario (Y05) | Pit Outflow Rate ($m^3$/day) | Inflow Rate ($m^3$/day) | | | |
|---|---|---|---|---|---|
| | | Pike Lake | Mills Lake | Daviault Lake | Molar Lake |
| **Base Case[1]** | 5,356 | 2,458 | 183 | 184 | 11 |
| **Selected Case[2]** | 16,261 | 10,924 | 187 | 2,418 | 13 |

*Notes:*

*1: The base case represents the calibrated scenario.*
*2: The selected case represents a conservative scenario (higher dewatering flow rate) selected for the water infrastructure design.*

# 5. Limitations

Groundwater models present a simplified version of the geological and hydrogeological systems represented, as such, the hydrogeological model is subject to the following limitations:

- The model is a simplification of the significant variability of the hydraulic conductivities and hydrostratigraphic units that are usually encountered in fluvial and glacial deposits.
- Groundwater flow into the pit: The assumed water infiltration rate of 40,000 m$^3$/day needs to be narrowed with supplemental hydrogeological field data. A campaign is ongoing (Q4 2023, with drilling and packer tests) and a pumping test is also planned later. These campaigns aim to acquire the following missing information:
  - Measurement of bedrock hydraulic conductivity at depth using packer tests.
  - Characterization of fractured bedrock and fault zones using acoustic and optical televiewers.
  - Groundwater head characterization using Vibrating Wire Piezometers (VWP).
- The calibration of the 3D hydrogeological model is based on water levels measured in boreholes at various dates, and some lake water elevations are based on Lidar data:
  - No synchronous piezometry measurements in all selected boreholes in the pit area.
  - No synchronous piezometry measurements in the pit area and outside (tailings and waste rock area).
  - Limited continuous water level (pressure transducer) data available (less than a year).
  - Limited number of multi-level piezometers to characterize vertical hydraulic gradients.
  - No seasonal measurement of lake level variations.
- Hydraulic conductivity of the bedrock: The current 3D hydrogeological model of the pit is based on the hydraulic conductivity of the bedrock as defined by only two (2) packer tests, with limited vertical depth (approximately 250 m). A drilling campaign is underway to fill these data gaps.
- Faults and fractured zones:
  - Katsao-Wishart fault: This fault was identified by Stantec (2012), who defined the Wishart as a unit of very poor-quality bedrock. However, the extent of this poor-quality unit is not defined outside of the pit area. In particular, the connection between the poor-quality bedrock and the surrounding lakes (especially Pike and Daviault) is unknown. Furthermore, no hydraulic conductivity measurements are available for this fault zone. A drilling campaign is underway to cover these data gaps.
  - Central fault/fractured zones: Based on the interpretation of the televiewer surveys conducted between 2008 and 2012, as well as on the analysis of certain drill core sections, a highly fractured zone has been defined in the center of the pit. However, the spatial continuity and potential connection to the lakes of this fractured zone (or fault) are unknown because it is based on a limited number of boreholes. Furthermore, no hydraulic conductivity measurements are available for this fault zone.
- Pike Lake sediment characteristics and underlying overburden: The thickness and hydraulic conductivity of sediments under the various surrounding lakes, and especially under Pike Lake, remain unknown. Characterization of these sediments is important for estimating the degree of hydraulic connection between the lakes and the proposed pit. For the moment, the hydrogeological model considers a direct connection between the fault zones and the lakes (zero sediment thickness). Sediment characterization in Elfie Lake, End Lake, and Mid Lake is also necessary to understand if the infiltration rate of water from these lakes to Rose Pit could be a potential issue.

A drilling campaign is underway for additional data collection and the hydrogeological model will be updated subsequently. The completion of the following steps will help reduce the uncertainty in predicting groundwater dewatering flow rates:

- Evaluate fault connectivity to Pike Lake by characterizing overburden and lakebed sediments with field investigations;
- Conduct a pumping test to evaluate the connectivity and extent of the fracture network;
- Install pressure transducers in the northern sector of the pit to assess potential groundwater drawdown in the direction of Pike Lake during the pumping test;
- Install pressure transducers in the central and southwestern sector of the pit to assess potential groundwater drawdown in the direction of Daviault lake during the pumping test.

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# APPENDICES

O/Ref.: 692696-7000-4WER-0001_01
April 30, 2024

# Appendix A. Scope of Report

# SCOPE OF REPORT

## 1. Use of report

a. Use of report

This report has been prepared, and the work mentioned herein was carried out by AtkinsRéalis Canada Inc. (AtkinsRéalis) exclusively for the client (the Client), to whom the report is addressed, and who took part in developing the scope of work and understands the limitations. The methodology, findings, recommendations and results cited in this report are based solely on the scope of work and are subject to the requirements of time and budget, as described in the offer of services and/or the contract under which this report was issued. Use of this report or any decision based on its content by third parties is the sole responsibility of the third parties. AtkinsRéalis is not responsible for any damage incurred by third parties due to the use of this report or of any decision based on its content. The findings, recommendations and results cited in this report (i) have been prepared in accordance with the skill level normally demonstrated by professionals operating in similar conditions in the sector, and (ii) are determined according to the best judgment of AtkinsRéalis, taking into account the information available at the time the report was prepared. The professional services provided to the Client and the findings, recommendations and results cited in this report are not subject to any guarantee, express or implied. The findings and results cited in this report are only valid on the date of the report and may be based in part on information provided by third parties. This report may require modifications in case of inaccurate information, discovery of new information or changes in project parameters. The results of this study are in no way a guarantee that the site in the study is free of contamination. This report must be considered as a whole and its parts or sections must not be taken out of context. If discrepancies were to appear between the draft and the final version of this report, the final version shall prevail. Nothing in this report is mentioned with the intention to provide or constitute legal advice. The content of this report is confidential and proprietary. It is prohibited for any person other than the Client to reproduce or distribute this report, to use or take a decision based on its content, in whole or in part, without the express written permission of the Client and AtkinsRéalis.

b. Modifications to project

The evidence, interpretations and recommendations contained in this report relate to the specific project as described in the report and do not apply to any other project or any other site. If the project is modified from a perspective of design, dimensioning, location or level, AtkinsRéalis must be consulted to confirm that the recommendations already given remain valid and enforceable.

c. Number of soundings

The recommendations in this report are intended only as a guide for the design engineer. The number of soundings to determine all subsurface conditions that may affect construction (costs, techniques, equipment, schedule) should normally be greater than that for the purpose of design. The number of sample sites and chemical analyzes as well as the sampling frequency and choice of parameters can influence the nature and extent of corrective actions as well as treatment or disposal technology and cost. Contractors bidding or subcontracting the work should rely on their own research and their own interpretations of the surveys' factual results to assess how underground conditions can affect their work and the cost of work.

d. Interpretation of data, comments and recommendations

Unless otherwise noted, data and results interpretation, comments and recommendations contained in this report are based, to the best of our knowledge, on environmental policies, criteria and regulations in force at the location of the project and on the production date of the report. If these policies, criteria and regulations are subject to change after submission of the report, AtkinsRéalis must be consulted to review the recommendations in the light of these changes. When no policy, criteria or regulation is available to allow for the interpretation of data and analytical results, comments or recommendations expressed by AtkinsRéalis are based on the best knowledge of the rules accepted in professional practice. The analyzes, comments and recommendations contained in this report are based on data and observations collected on the site, which come from sample work on the site. It is understood that only the data collected directly at the survey sites, sample sites and on the sample date are accurate and that any interpolation or extrapolation of these results to all or part of the site carries the risk of errors, which may themselves influence the nature and extent of the actions required on the site.

## 2. Sounding reports and interpretation of subsurface conditions

a. Soil and rock descriptions

The soil and rock descriptions given in this report are from classification and identification methods commonly accepted and used in the practice of geotechnical engineering. The classification and identification of soil and rock involves judgment. AtkinsRéalis does not guarantee that the descriptions will be identical in all respects to those made by another geotechnician possessing the same knowledge of geotechnical rules, but ensures accuracy only to what is commonly used in geotechnical practice.

b. Condition of soil and rock at sounding sites

The sounding reports only provide subsurface conditions and only at sounding sites. The boundaries between different layers on sounding reports are often approximate, rather corresponding to the transition zones and therefore subject to interpretation. The precision of subsurface conditions depends on the sounding method, frequency and method of sampling and consistency of the terrain encountered. The spacing between surveys, the sampling frequency and the type of sounding also reflect budgetary considerations and timelines that are outside the control of AtkinsRéalis.

c. Condition of soil and rock between sounding sites

The soil and rock formations are variable over a considerably large area. Subsurface conditions between sounding sites are interpolated and may vary significantly from the conditions encountered at sounding sites. AtkinsRéalis can guarantee the results at the site where sounding are conducted. Any interpretation of the conditions presented between sounding sites carries risks. These interpretations can lead to the discovery of conditions that are different from those that were expected. AtkinsRéalis cannot be held responsible for the discovery of different soil and rock conditions from those described elsewhere than at the site where soundings are conducted.

d. Groundwater levels

The groundwater levels provided in this report only correspond to those observed at the site and on the date indicated in the report and depends on the type of piezometric installation used. These conditions may vary based on the season or due to construction work on the site or on adjacent sites. These variations are beyond the control of AtkinsRéalis.

## 3. Contamination levels

The contamination levels described in this report (if within the scope) correspond to those detected at the site and on the date indicated in the report. These levels can vary based on the season or due to activities on the study site or on adjacent sites. These variations are beyond our control. Contamination levels are determined from the results of chemical analyzes of a limited number of soil, surface water or groundwater samples. The nature and degree of contamination between sample site may vary greatly. The chemical composition of groundwater at each sample site is likely to change due to groundwater flow, surface recharge conditions, stress of the formation investigated (i.e. pump or injection wells near the site) and natural seasonal variability. The accuracy of groundwater contamination levels depends on the frequency and the number of analyzes. The list of parameters analyzed is based on our best knowledge of the history of the site and the contaminants likely to be found on the site and is also a reflection of budgetary considerations and timelines. The fact that a parameter has not been analyzed does not exclude its presence at a concentration above the background noise or the detection limit of this parameter.

## 4. Study and work monitoring

a. Final phase verification

All design and construction details are not known at the time of issue of the report. It is therefore recommended that AtkinsRéalis's services be retained to provide light on the possible consequences of construction on the final work.

b. Inspection during execution

It is recommended that AtkinsRéalis's services be retained during construction to verify and confirm that groundwater conditions throughout the site do not differ from those given in the report and that the construction work will not have an adverse effect on the conditions of the site.

## 5. Changing conditions

The soil conditions described in this report are those observed during the study. Unless otherwise stated, these conditions are the basis for recommendations in the report. Soil conditions can be significantly affected by construction work (traffic, excavation, etc.) on the site or on adjacent sites. Excavation may expose the soil to changes due to humidity, drying or freezing. Unless otherwise indicated, the soil must be protected from these changes or rearrangements during construction. When conditions encountered at the site differ significantly from those provided in this report, due to the heterogeneous nature of the subsurface or due to construction work, it is the responsibility of the Client and the user of this report to notify AtkinsRéalis of changes and give AtkinsRéalis the opportunity to review the report's recommendations. Recognizing a change in ground conditions requires experience. It is therefore recommended that an experienced geotechnical engineer be dispatched to the site to see if conditions have changed significantly.

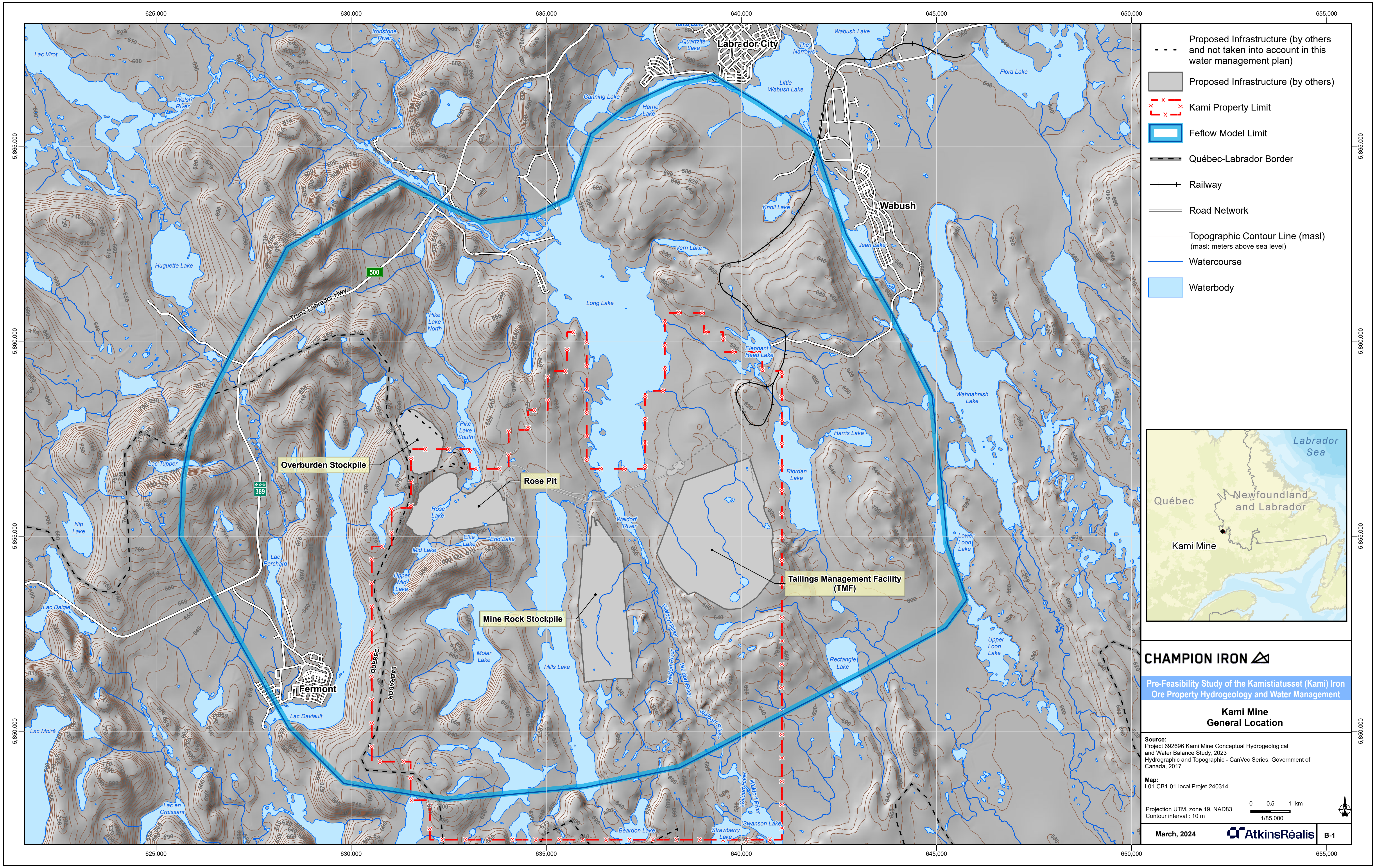
## 6. Drainage

Groundwater drainage is often required for both temporary and permanent project facilities. An incorrect drainage design or execution can have serious consequences. AtkinsRéalis cannot under any circumstance take responsibility for the effects of drainage unless AtkinsRéalis is specifically involved in the detailed design and monitoring of the drainage system's construction.

## 7. Environmental characterization – Phase I

This report was written after diligent research and evaluation of point data sources or information obtained from third parties that may present uncertainties, gaps or omissions. These sources of information are subject to change over time, for example, according to the progress of activities on the site and surrounding area. Phase I includes no testing, sampling or characterization analysis by a laboratory. Subject to exceptions, Phase I is based on the observation of visible and accessible components on the property and those nearby and could bring environmental harm to the quality of the land in the study. The property titles mentioned in this report are used to identify the former owners of the study site and cannot under any circumstance be considered as an official document for reproduction or other uses. Finally, any sketch, plan view or diagram appearing in the report or any statement specifying dimensions, capacities, quantities or distances are approximate and are included to help the reader visualize the property.

# Appendix B. Figures



**CHAMPION IRON**

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

**Kami Mine**
**General Location**

**Source:**
Project 692696 Kami Mine Conceptual Hydrogeological and Water Balance Study, 2023
Hydrographic and Topographic - CanVec Series, Government of Canada, 2017

**Map:**
L01-CB1-01-localiProjet-240314

Projection UTM, zone 19, NAD83
Contour interval : 10 m

0 0.5 1 km
1/85,000

**March, 2024**

AtkinsRéalis

**B-1**

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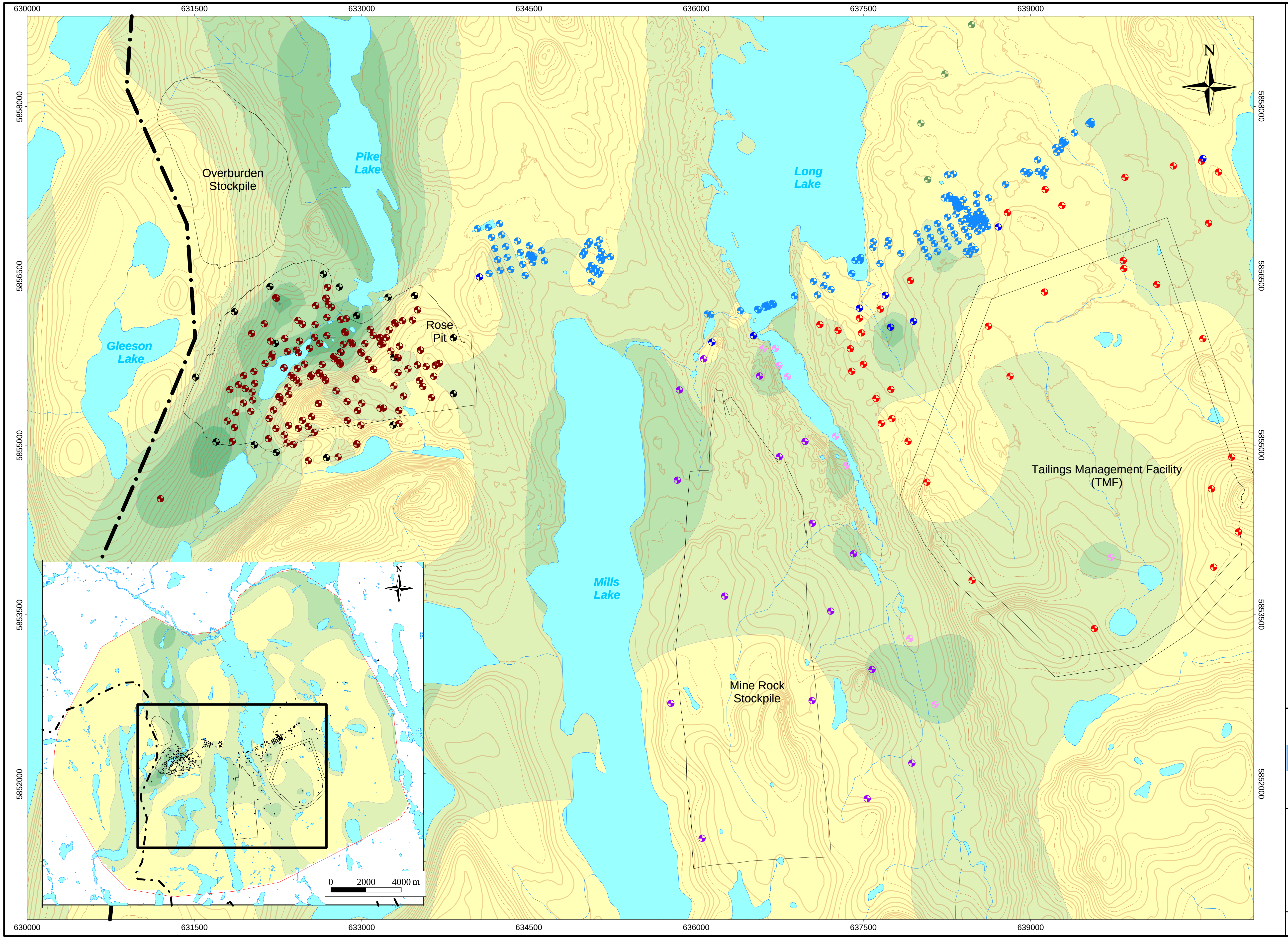


## NOTES

In the pit and tailings area, interpolation is based on data from exploration and geotechnical drilling. Outside this area, on the periphery of the study zone, control points were added to compensate for the lack of information. Till thickness was estimated based on topography (between 1 and 5 m on the topographic highs and 20 m in the valleys)

## LEGEND

**Boreholes and wells used for the overburden interpolation:**

- ● ROB-11-series
- ● K-series
- ● BH-12-series
- ● BH-AS-series
- ● BH-EPL-series
- ● BH-GE-series
- ● BH-RS / RSD-series
- ● BH-TF / TMF-series
- QUÉBEC -LABRADOR BOUNDARY
- ☐ HYDROGEOLOGICAL MODEL LIMIT
- ☐ PROPOSED INFRASTRUCTURES
- TOPOGRAPHIC CONTOUR (5 m INTERVAL)
- 50 / 0 TILL THICKNESS (10 m INTERVAL)

CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

## Estimated Overburden Thickness

**Source :**

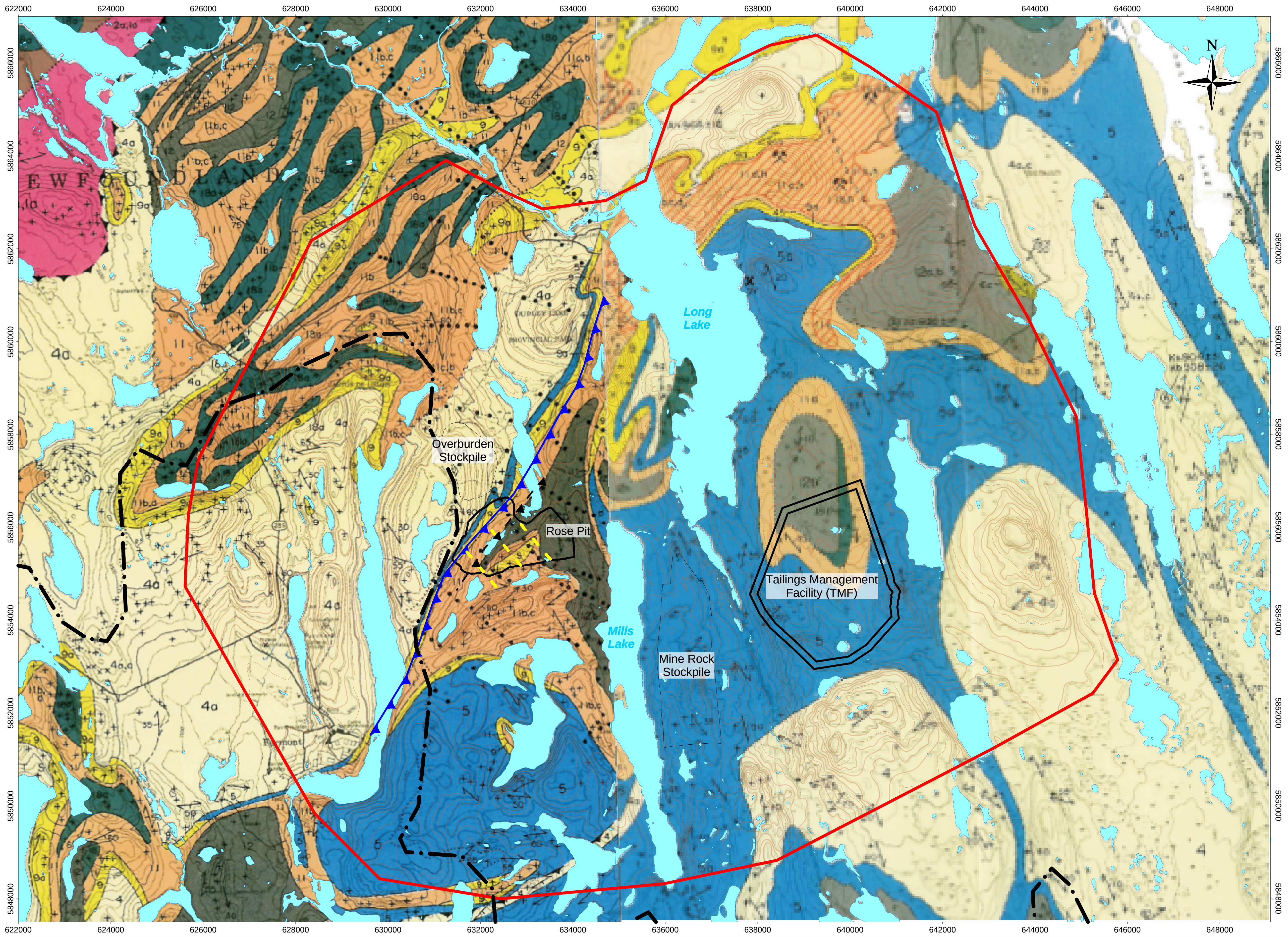
Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection NAD83 UTM Zone 19N

0 2000 4000 m

March 2024

AtkinsRéalis

B-2



## NOTES

Fault locations are approximative and fault continuity is uncertain outside Rose pit area.

A major thrust fault, parallel to the strike of the deposit, has been interpreted at the Wishart and Katsao Formation contact in the northwest portion of the North Rose deposit (Katsao-Wishart fault).

A second fault (or fractured zone) have been interpreted in the Sokoman Formation, in the center of the pit (Central fault).

Three interpreted sub-vertical dip-slip faults bisect the deposits, trending roughly northwest-southeast. However, it is understood that more structures may be present based on review of aerial imagery. As a result of directional bias of the exploration boreholes, these structures are rarely intersected and are at present interpreted only through 3D geological interpolation.

Stantec's Pit Slope Design report (2012a) mentions the presence of a potential fault in the Menihek unit (syncline axis), however the existence or location of this fault was not confirmed during this study.

## BEDROCK GEOLOGY

🟩 SHABOGAMO FORMATION
Gabbro, metagabbro and amphibolite

■ MENIHEK FORMATION
Mica Schist

🟧 SOKOMAN FORMATION
Silicate-carbonate and oxide iron formation

🟨 WISHART
Quartzite sandstone

🟦 DENAULT
Dolomite and calcitic marble

■ KATSAO
Archean gneiss

🟪 GRANITOID INTRUSIONS

## LEGEND

- - SUB-VERTICAL DIP-SLIP FAULT

▲ KATSAO-WISHART FAULT

▲-▲- CENTRAL FAULT

🟥 HYDROGEOLOGICAL MODEL LIMIT

☐ PROPOSED INFRASTRUCTURES

— TOPOGRAPHIC CONTOUR
(5 m INTERVAL)

CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

# Regional Geology

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Rivers, T. 1985: Geology of the Lac Virot area, Labrador/Quebec. Map 85-025. Scale 1:100,000. Government of Newfoundland and Labrador, Department of Mines and Energy, Mineral Development Division, GS#LAB/0696
Projection NAD83 UTM Zone 19N

0 1000 2000m

March 2024

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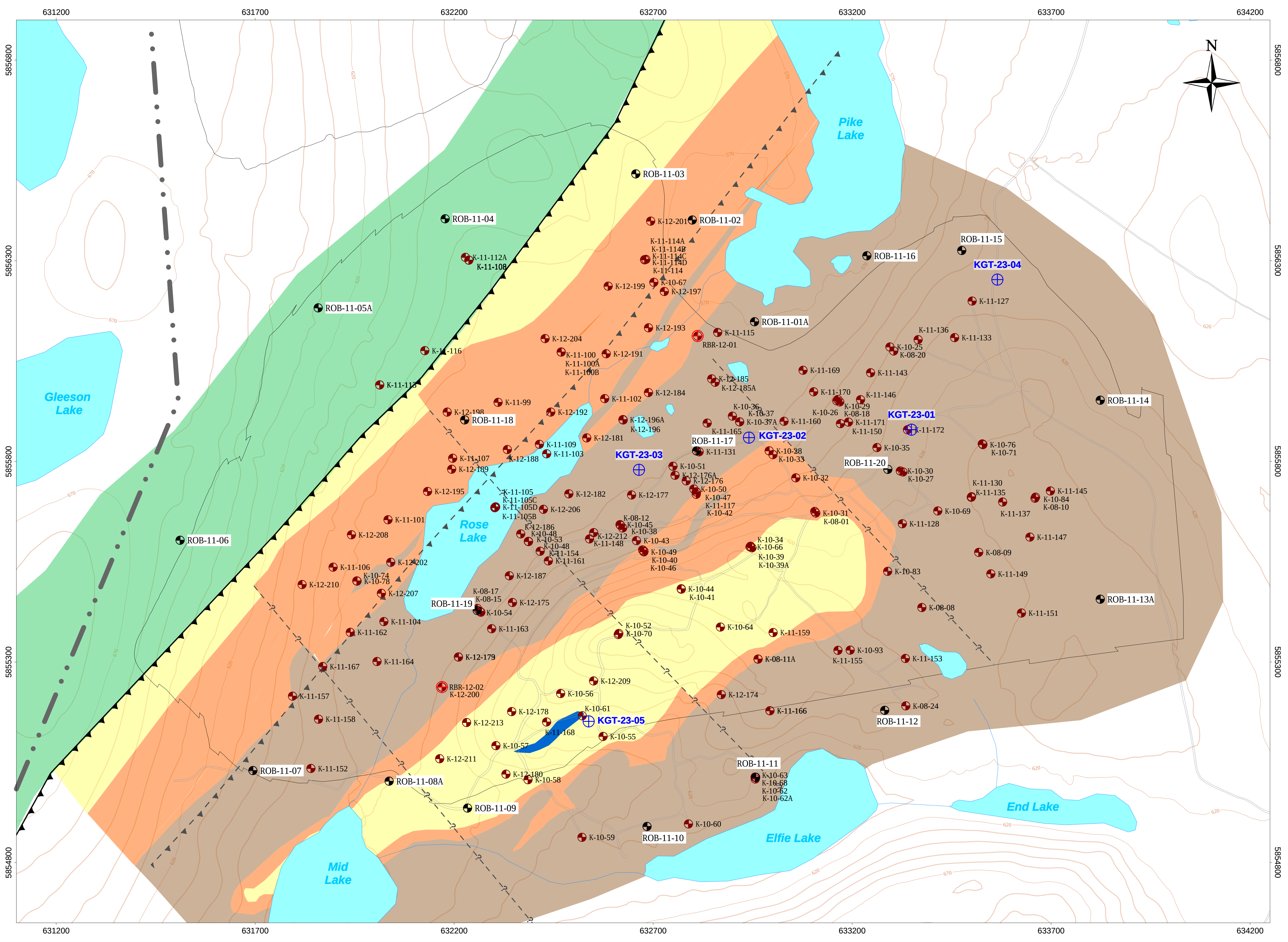
B-3



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Stantec's Pit Slope Design report (2012a) mentions the presence of a potential fault in the Menihek unit (syncline axis), however the existence or location of this fault was not confirmed during this study.

## BEDROCK GEOLOGY

| | |
|---|---|
| 🟫 | MENIHEK FORMATION<br>Mudstone and clastic flysh |
| 🟧 | SOKOMAN FORMATION<br>Silicate-carbonate and oxide iron formation |
| 🟨 | WISHART<br>Quartzite with local beds of muddy sediments |
| 🟦 | DENAULT<br>Dolomite and calcitic marble |
| 🟩 | KATSAO<br>Granite gneiss |

## LEGEND

| | |
|---|---|
| — | TOPOGRAPHIC CONTOUR (10 m) |
| ═ | ACCES ROAD |
| ▬ ▬ | QUÉBEC - LABRADOR BOUNDARY |
| - - -?- - - | SUB-VERTICAL DIP-SLIP FAULT |
| ▲▲▲ | KATSAO-WISHART FAULT |
| ▲ – ▲ – | CENTRAL FAULT |
| ◐ | K-series (Exploration Borehole) |
| ◐ | ROB-11-series (Overburden Borehole) |
| ⊕ | PROPOSED BEDROCK BOREHOLE<br>(2023 Field Work) |
| ⊕ | RBR-12-01 & RBR-12-02 |

CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

# Rose Pit Bedrock Surface Geology

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Geology from Geological Interpretation carried out by Alderon and presented in Stantec report (2012a)
Projection NAD83 UTM Zone 19N

0 100 200m

March 2024

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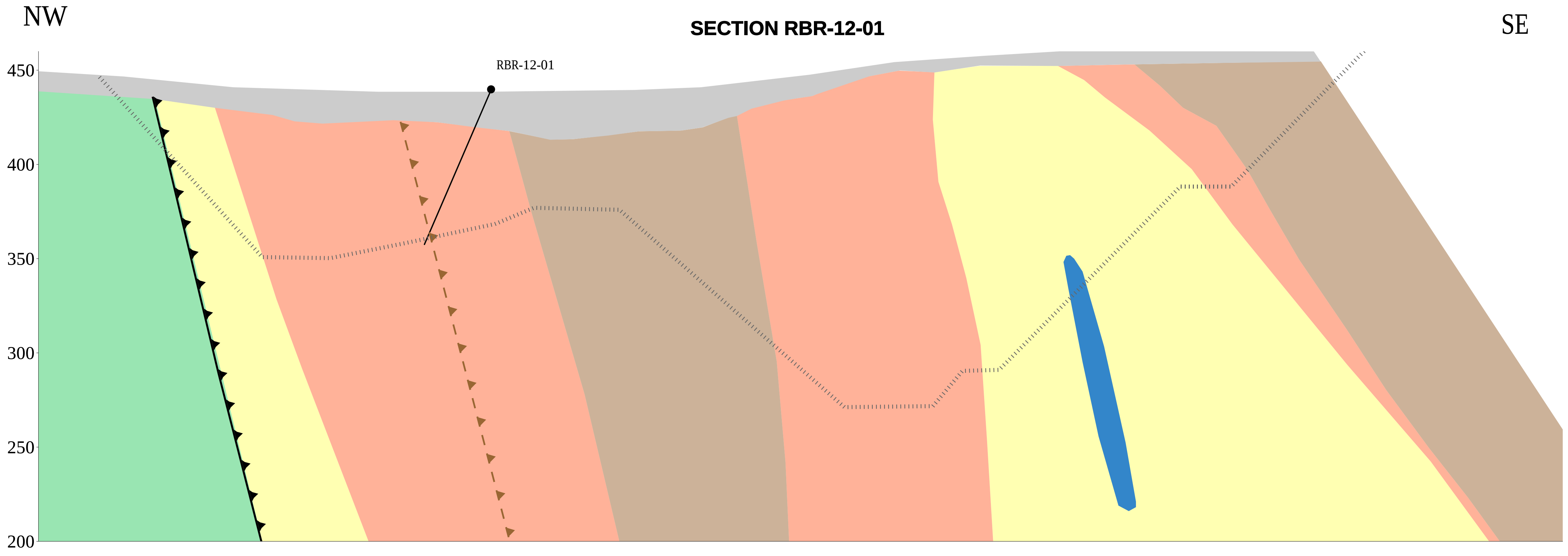
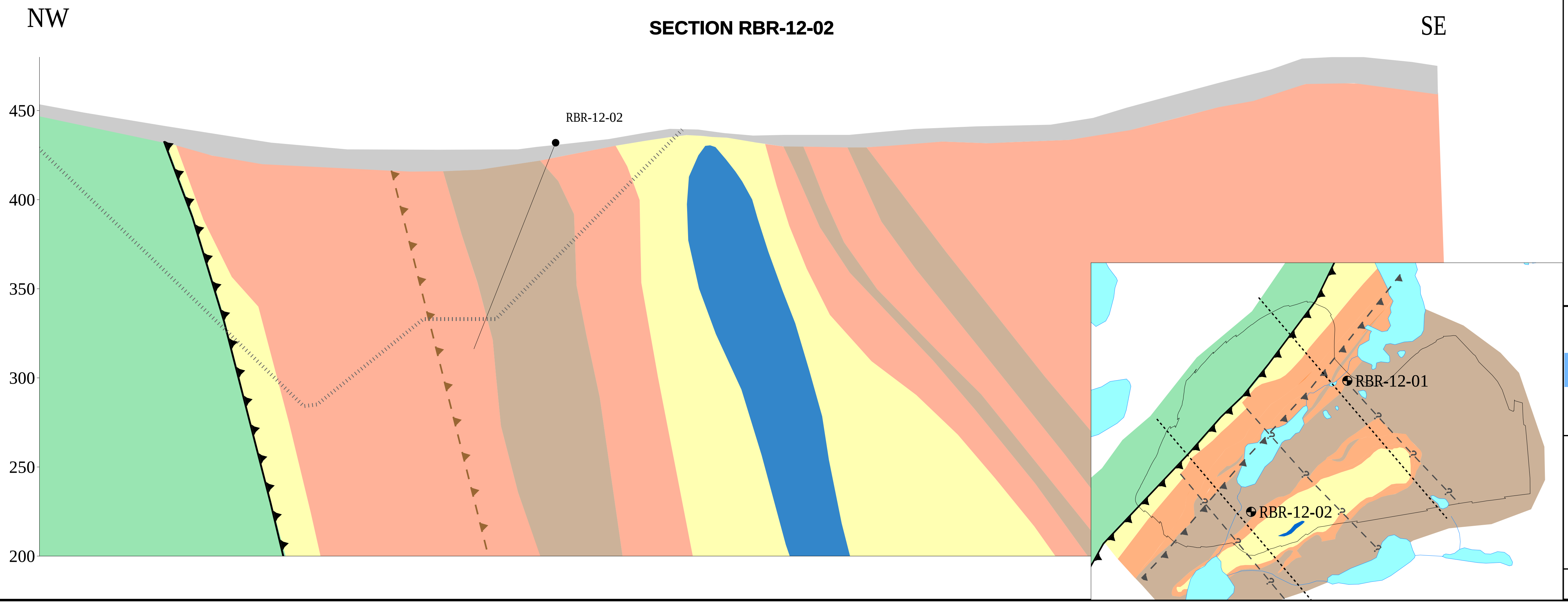
B-4





## NOTES

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Stantec's Pit Slope Design report (2012a) mentions the presence of a potential fault in the Menihek unit (syncline axis), however the existence or location of this fault was not confirmed during this study.

## BEDROCK GEOLOGY

| | |
|---|---|
| ⬜ | OVERBURDEN<br>Till |
| 🟫 | MENIHEK FORMATION<br>Mudstone and clastic flysh |
| 🟧 | SOKOMAN FORMATION<br>Silicate-carbonate and oxide iron formation |
| 🟨 | WISHART<br>Quartzite with local beds of muddy sediments |
| 🟦 | DENAULT<br>Dolomite and calcitic marble |
| 🟩 | KATSAO<br>Granite gneiss |

## LEGEND

| | |
|---|---|
| ¦¦¦¦¦¦¦¦ | PITSHELL |
| ▲▲▲ | KATSAO-WISHART FAULT |
| ▲ – ▲ – | CENTRAL FAULT |
| - - - - - - - | RBR-12-01 & RBR-12-02 SECTIONS |

**CHAMPION IRON**

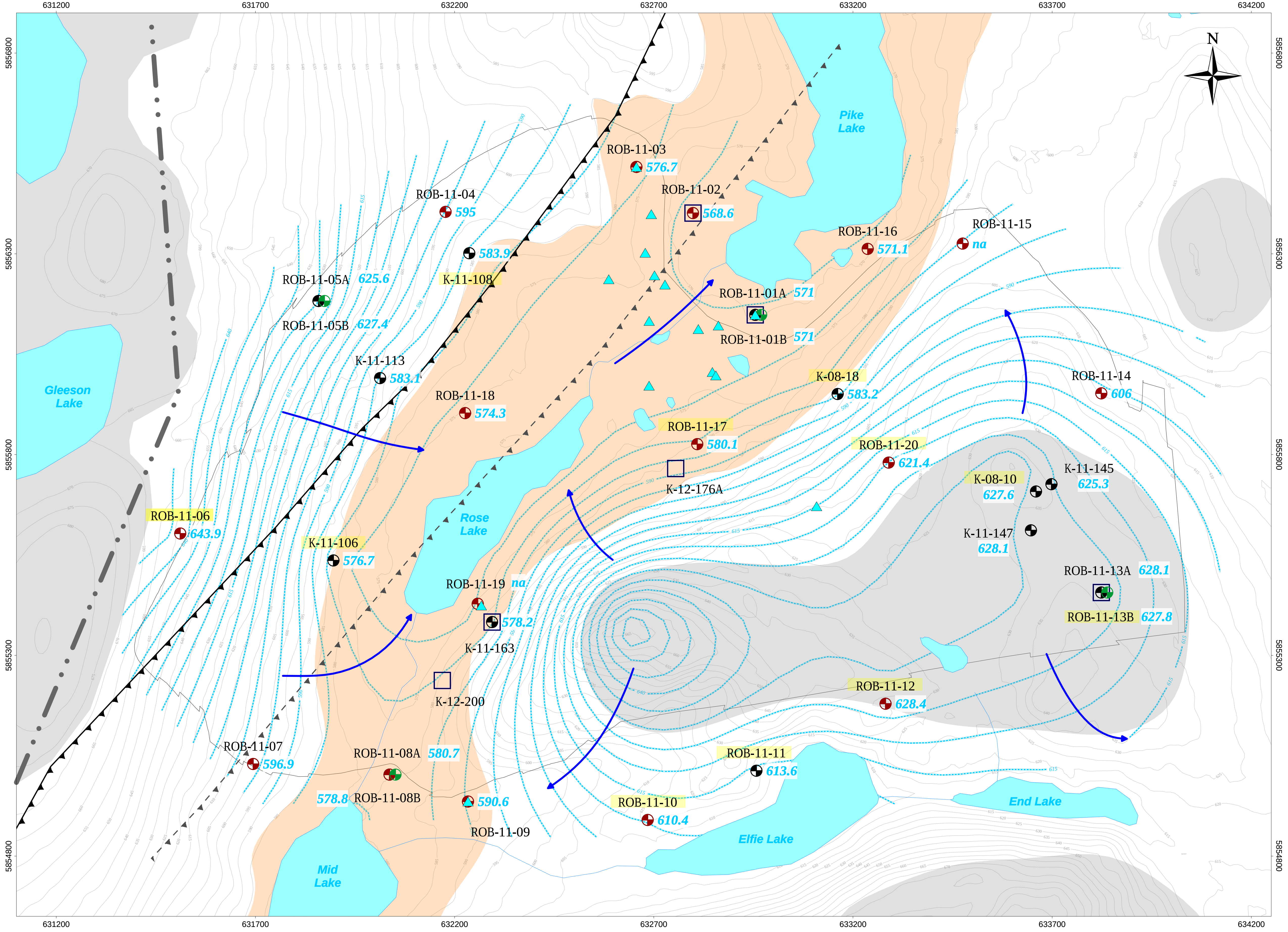
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

## Rose Pit Geological Sections

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Geology from Geological Interpretation carried out by GMining (2023)

0 150 300 m

**March 2024** AtkinsRéalis **B-5**



## NOTES

Strong gradients are seen on slopes, in the bedrock, between K-08-10 and K-08-18 (0.08 m/m) and ROB-11-05A and K-11-113 (0.17 m/m). More gentle gradients were estimated in the center of the valley, at the till/bedrock interface, between ROB-11-07 and ROB-11-02 (0.02 m/m) and between ROB-11-04 and ROB-11-02 (0.03 m/m).

A vertical downwards gradient of 0.06 m/m was estimated at ROB-11-06A/B, in the western part of the pit, on a topographic high; vertical upwards gradients were estimated at ROB-11-08A/B (0.17 m/m) in the local discharge area in the valley center; and vertical upwards gradients were also estimated at ROB-11-13A/B (0.04 m/m) located on a topographic high in the eastern part of the pit.

During the May and September 2023 field investigations by SNCL, some exploration boreholes and wells showed artesian conditions. The presentation of artesian wells on the map is not exhaustive, as only certain areas were checked.

## LEGEND

LOCAL RECHARGE AREA

LOCAL DISCHARGE AREA

QUÉBEC - LABRADOR BOUNDARY

KATSAO-WISHART FAULT

CENTRAL FAULT

ARTESIAN WELL (May & Sep. 2023)

PRESSURE TRANSDUCER INSTALLED (May 2023)

Location ID PRESSURE TRANSDUCER INSTALLED (2011-2012)

Location ID Measured water level OBSERVATION WELL (Till)

Location ID Measured water level OBSERVATION WELL (Till/Bedrock)

Location ID Measured water level OBSERVATION WELL (Bedrock)

536 INTERPOLATED PIEZOMETRIC ELEVATION (5m INTERVAL)

GROUNDWATER FLOW DIRECTION

**CHAMPION IRON**

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

## 2011-2012 Measured Groundwater Elevation in the Pit Area

**Source :**

Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection UTM Zone 19N

0 100 200m

March 2024

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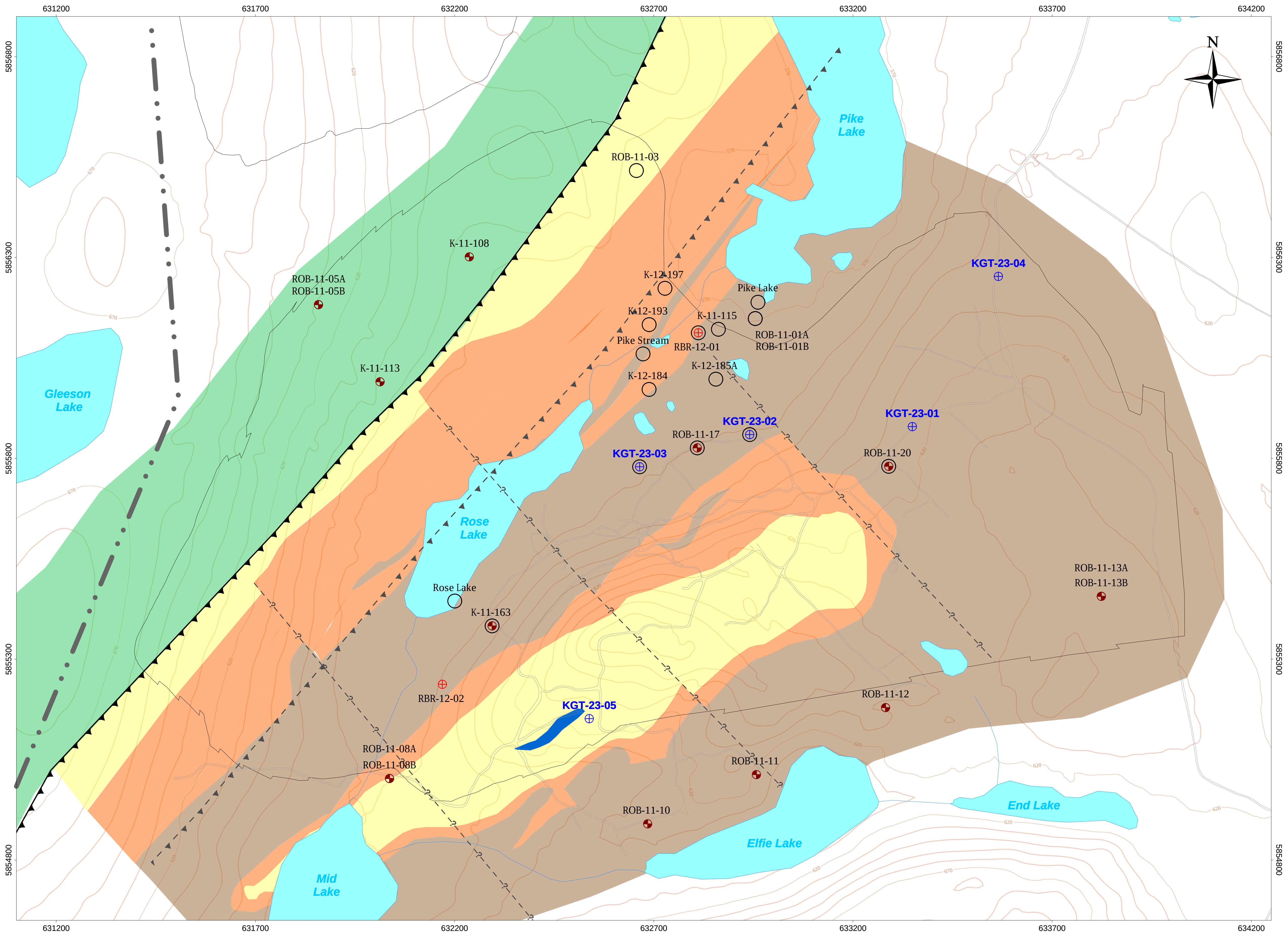

## NOTES

Fault locations are approximative and fault continuity is uncertain outside Rose pit area.

A major thrust fault, parallel to the strike of the deposit, has been interpreted at the Wishart and Katsao Formation contact in the northwest portion of the North Rose deposit (Katsao-Wishart fault).

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Stantec's Pit Slope Design report (2012a) mentions the presence of a potential fault in the Menihek unit (syncline axis), however the existence or location of this fault was not confirmed during this study.

## BEDROCK GEOLOGY

| | |
|---|---|
| 🟫 | MENIHEK FORMATION<br>Mudstone and clastic flysh |
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| 🟨 | WISHART<br>Quartzite with local beds of muddy sediments |
| 🟦 | DENAULT<br>Dolomite and calcitic marble |
| 🟩 | KATSAO<br>Granite gneiss |

## LEGEND

| | |
|---|---|
| — | TOPOGRAPHIC CONTOUR (10 m) |
| ═ | ACCES ROAD |
| ▬ ▬ | QUÉBEC - LABRADOR BOUNDARY |
| - - ?- - | SUB-VERTICAL DIP-SLIP FAULT |
| ▲▲▲ | KATSAO-WISHART FAULT |
| ▲ - ▲ - | CENTRAL FAULT |
| ◐ | WATER SAMPLE COLLECTED (2012) |
| ○ | WATER SAMPLE COLLECTED (2023) |
| ⊕ | PROPOSED BEDROCK BOREHOLE (2023 Field Work) |
| ⊕ | RBR-12-01 & RBR-12-02 |

CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

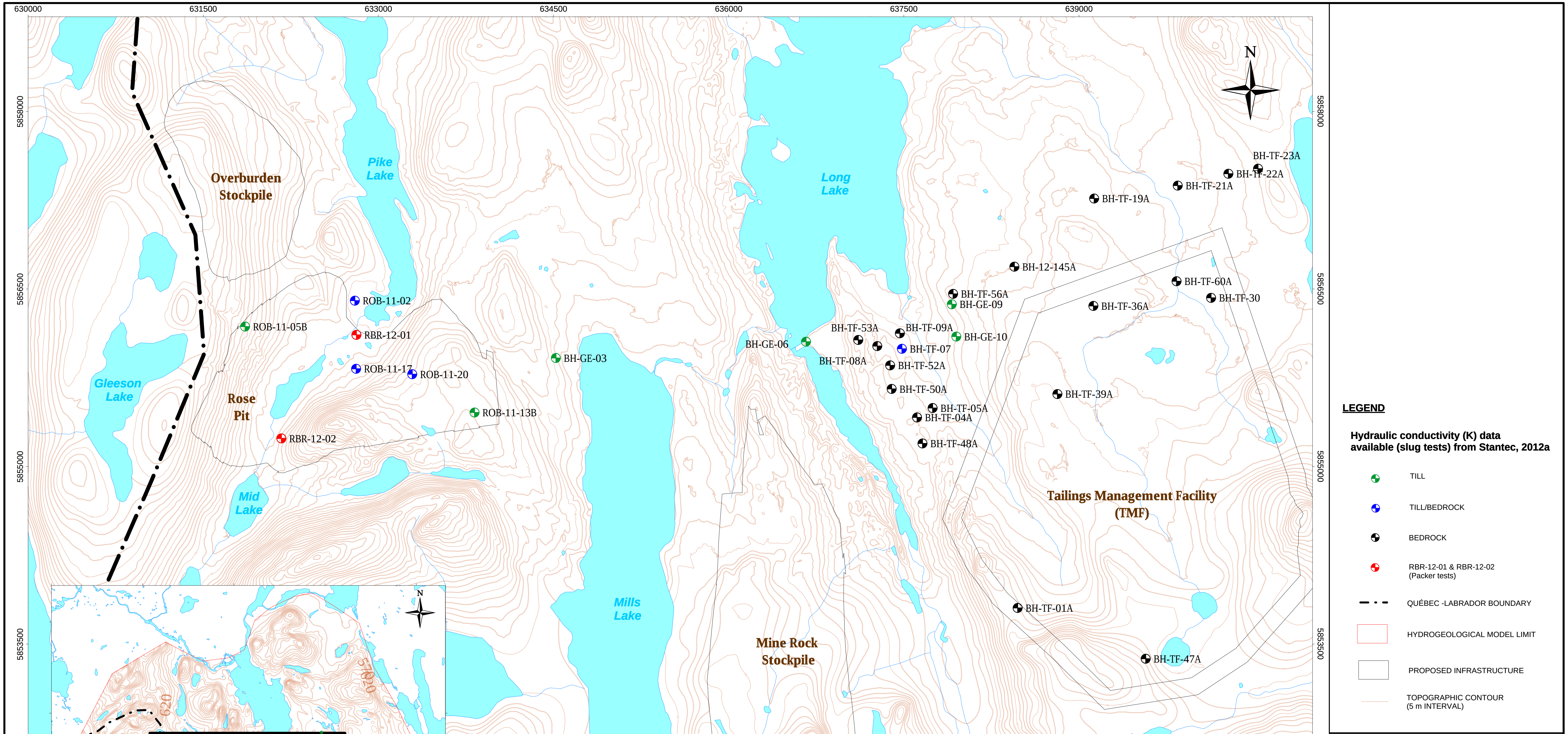
# Groundwater Wells and Boreholes Sampled for Quality

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Geology from Geological Interpretation carried out by Alderon and presented in Stantec report (2012a)
Projection UTM Zone 19N

0 100 200m

March 2024

AtkinsRéalis



CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

## Available Hydraulic Conductivity Data

**Source :**

Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection NAD83 UTM Zone 19N

0 2000 4000 m

March 2024

AtkinsRéalis

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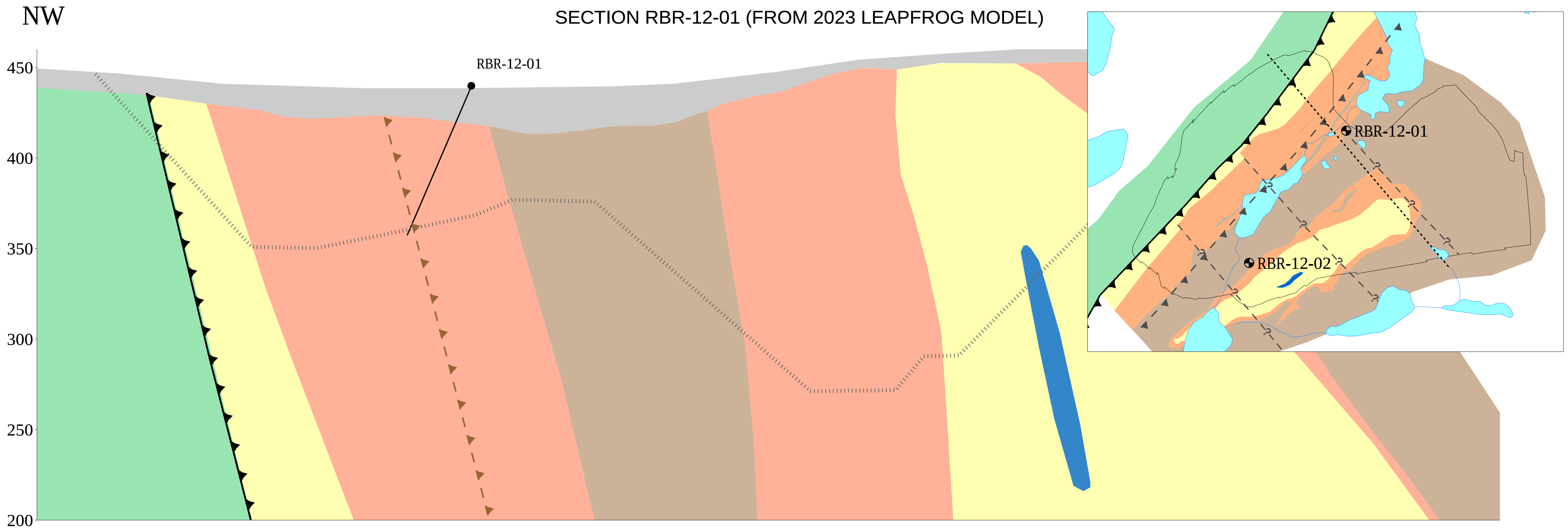
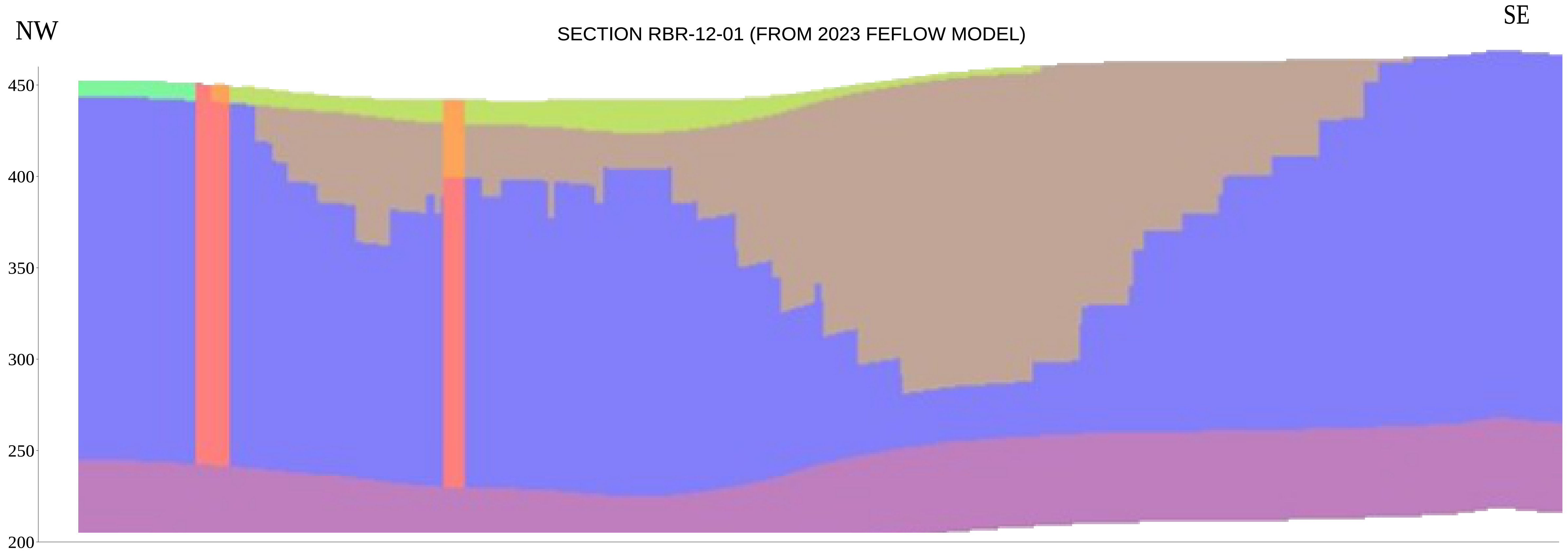
SECTION RBR-12-01 (FROM 2023 LEAPFROG MODEL)



SECTION RBR-12-01 (FROM 2023 FEFLOW MODEL)



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the Sokoman Formation, in the center of the pit (Central fault).

## BEDROCK GEOLOGY (LEAPFROG)

| | |
|---|---|
| ⬜ | OVERBURDEN<br>Till |
| 🟫 | MENIHEK FORMATION<br>Mudstone and clastic flysh |
| 🟧 | SOKOMAN FORMATION<br>Silicate-carbonate and oxide iron formation |
| 🟨 | WISHART<br>Quartzite with local beds of muddy sediments |
| 🟦 | DENAULT<br>Dolomite and calcitic marble |
| 🟩 | KATSAO<br>Granite gneiss |

## HYDROSTRATIGRAPHY

Based on the geometric mean
of measured data (slug tests & packer tests)

| | |
|---|---|
| 🟩 | OVERBURDEN (K = 1.2 x10$^{-6}$ m/s) |
| 🟦 | BEDROCK (K = 1.0 x10$^{-7}$ m/s) |
| 🟪 | DEEP BEDROCK (K = 1.0 x10$^{-8}$ m/s) |
| 🟥 | FAULT (K = 1.0 x10$^{-5}$ m/s) |
| 🟧 | PIT SHELL 2023 |

## LEGEND

| | |
|---|---|
| - - - - - - - | SECTION RBR-12-01 |
| ıııııııı | PITSHELL 2023 |
| ▲▲▲ | KATSAO-WISHART FAULT |
| ▲ – ▲ – | CENTRAL FAULT |

CHAMPION IRON

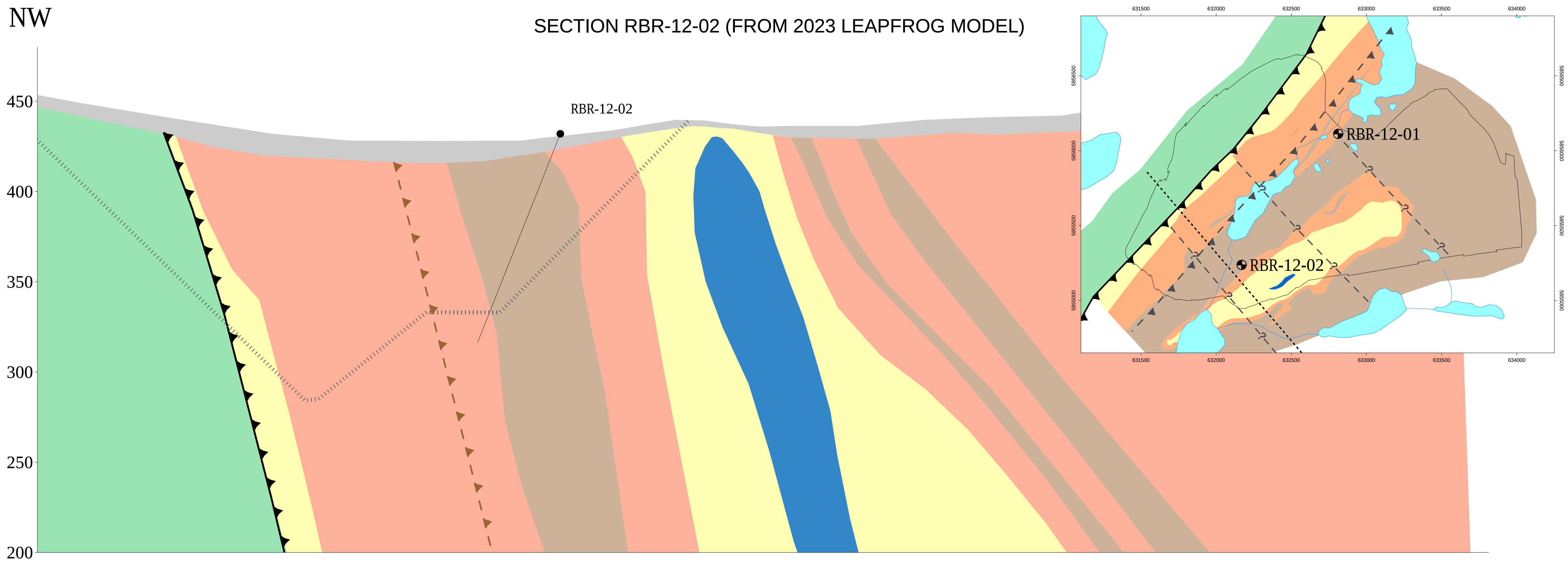
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

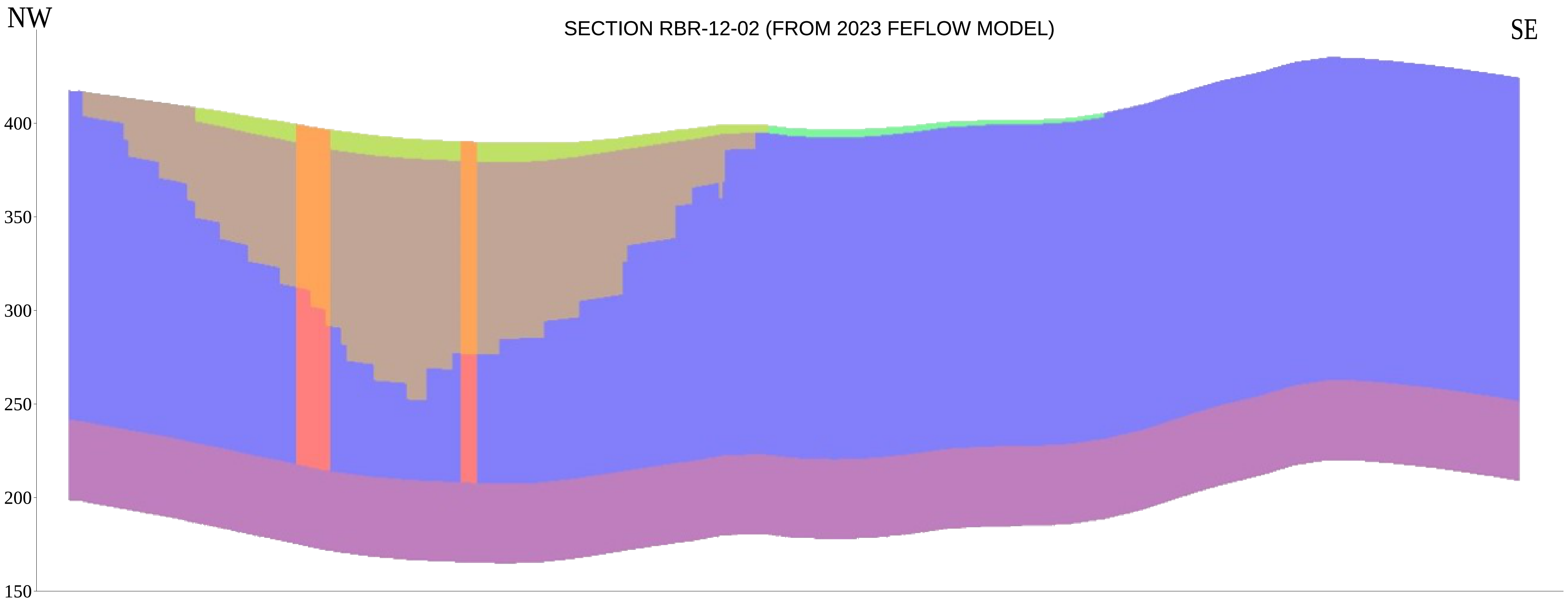
# Conceptual Hydrogeological Model
# Hydrostratigraphy - Section RBR-12-01

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological
and Water Blance Study
Geology from Geological Interpretation carried out
by GMining (2023)

0 75 150 m

March 2024 AtkinsRéalis B-9


SECTION RBR-12-02 (FROM 2023 LEAPFROG MODEL)


SECTION RBR-12-02 (FROM 2023 FEFLOW MODEL)

## NOTES

Fault locations are approximative and fault continuity
is uncertain outside Rose pit area.

A major thrust fault, parallel to the strike of the deposit,
has been interpreted at the Wishart and Katsao Formation
contact in the northwest portion of the North Rose deposit
(Katsao-Wishart fault).

A second fault (or fractured zone) has been interpreted in
the Sokoman Formation, in the center of the pit (Central fault).

## BEDROCK GEOLOGY (LEAPFROG)

| | |
|---|---|
| ⬜ | OVERBURDEN<br>Till |
| 🟫 | MENIHEK FORMATION<br>Mudstone and clastic flysh |
| 🟧 | SOKOMAN FORMATION<br>Silicate-carbonate and oxide iron formation |
| 🟨 | WISHART<br>Quartzite with local beds of muddy sediments |
| 🟦 | DENAULT<br>Dolomite and calcitic marble |
| 🟩 | KATSAO<br>Granite gneiss |

## HYDROSTRATIGRAPHY

Based on the geometric mean
of measured data (slug tests & packer tests)

| | |
|---|---|
| 🟩 | OVERBURDEN (K = 1.2 x10$^{-6}$ m/s) |
| 🟦 | BEDROCK (K = 1.0 x10$^{-7}$ m/s) |
| 🟪 | DEEP BEDROCK (K = 1.0 x10$^{-8}$ m/s) |
| 🟥 | FAULT (K = 1.0 x10$^{-5}$ m/s) |
| 🟧 | PIT SHELL 2023 |

## LEGEND

| | |
|---|---|
| - - - - - - - | SECTION RBR-12-02 |
| ıııııııı | PITSHELL 2023 |
| ▲▲▲ | KATSAO-WISHART FAULT |
| ▲ – ▲ – | CENTRAL FAULT |

**CHAMPION IRON**

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

# Conceptual Hydrogeological Model
# Hydrostratigraphy - Section RBR-12-02

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological
and Water Blance Study
Geology from Geological Interpretation carried out
by GMining (2023)

0 75 150 m

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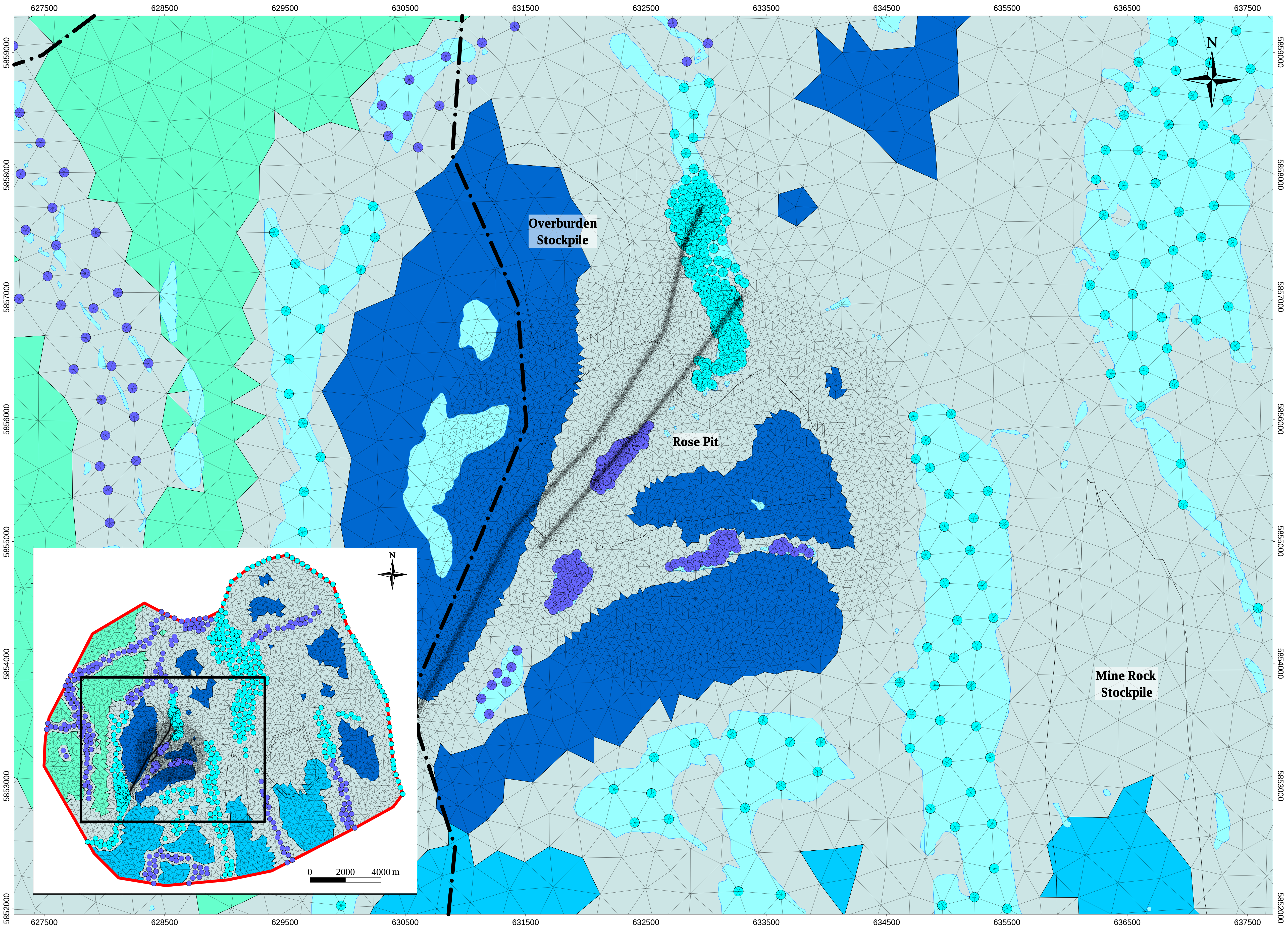

**BOUNDARY CONDITIONS**

● CONSTANT HEAD BOUNDARY

● SEEPAGE FACE BOUNDARY

**RECHARGE**

| | |
|---|---|
| ▭ | 0 mm/year |
| 🟩 | 35 mm/year |
| ▭ | 50 mm/year |
| 🟦 | 150 mm/year |

**LEGEND**

-·- QUÉBEC -LABRADOR BOUNDARY

▭ HYDROGEOLOGICAL MODEL LIMIT

▭ PROPOSED INFRASTRUCTURE

CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

## Boundary Conditions and Model Mesh

**Source :**

Project 692696 Kami Mine Conceptual Hydrogeological
and Water Blance Study
Topographic Data of Canada - CanVec Series,
Governement of Canada, 2019
Projection NAD 1983 UTM Zone 19N

0 500 1000m

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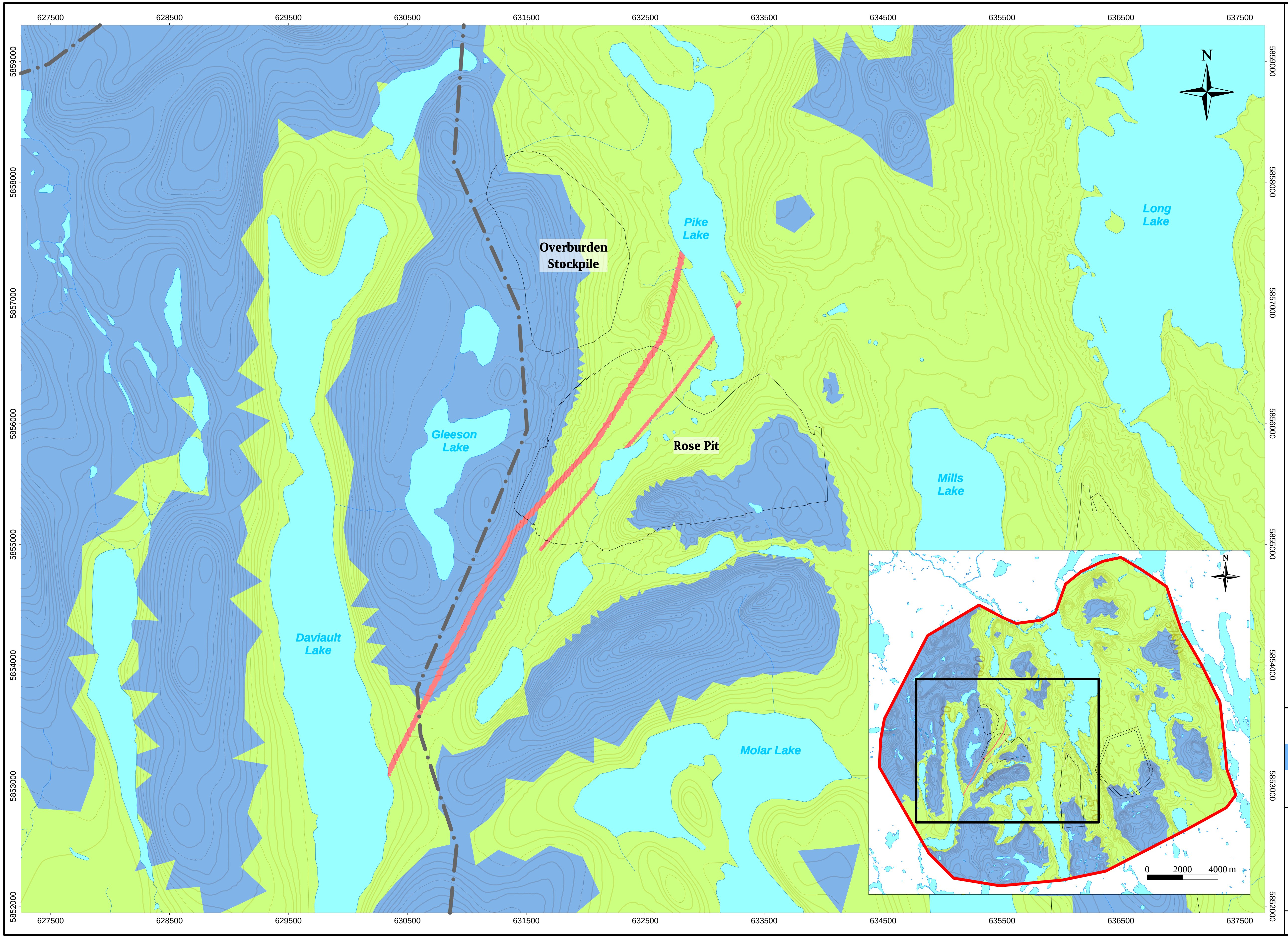


## NOTES

Hydraulic conductivity zones shown in this figure are representative of slices 1 to 3 of the model. Below slice 3 is a zone of uniform bedrock (K = 5 x10$^{-8}$ m/s) with the extension of the two faults at pit depth (slices 4 to 24). Below the pit is a zone of deep bedrock with a hydraulic conductivity of K = 1 x10$^{-8}$ m/s (slices 24 to 28).

## CALIBRATED HYDRAULIC CONDUCTIVITY

| | |
|---|---|
| 🟩 | OVERBURDEN (1.0 x10$^{-6}$ m/s) |
| 🟦 | BEDROCK (5.0 x10$^{-8}$ m/s) |
| 🟥 | FAULT (1.0 x10$^{-5}$ m/s) |

## LEGEND

| | |
|---|---|
| — · — | QUÉBEC -LABRADOR BOUNDARY |
| ☐ | HYDROGEOLOGICAL MODEL LIMIT |
| ☐ | PROPOSED INFRASTRUCTURE |
| — | TOPOGRAPHIC CONTOUR (5 m) |

**CHAMPION IRON**

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

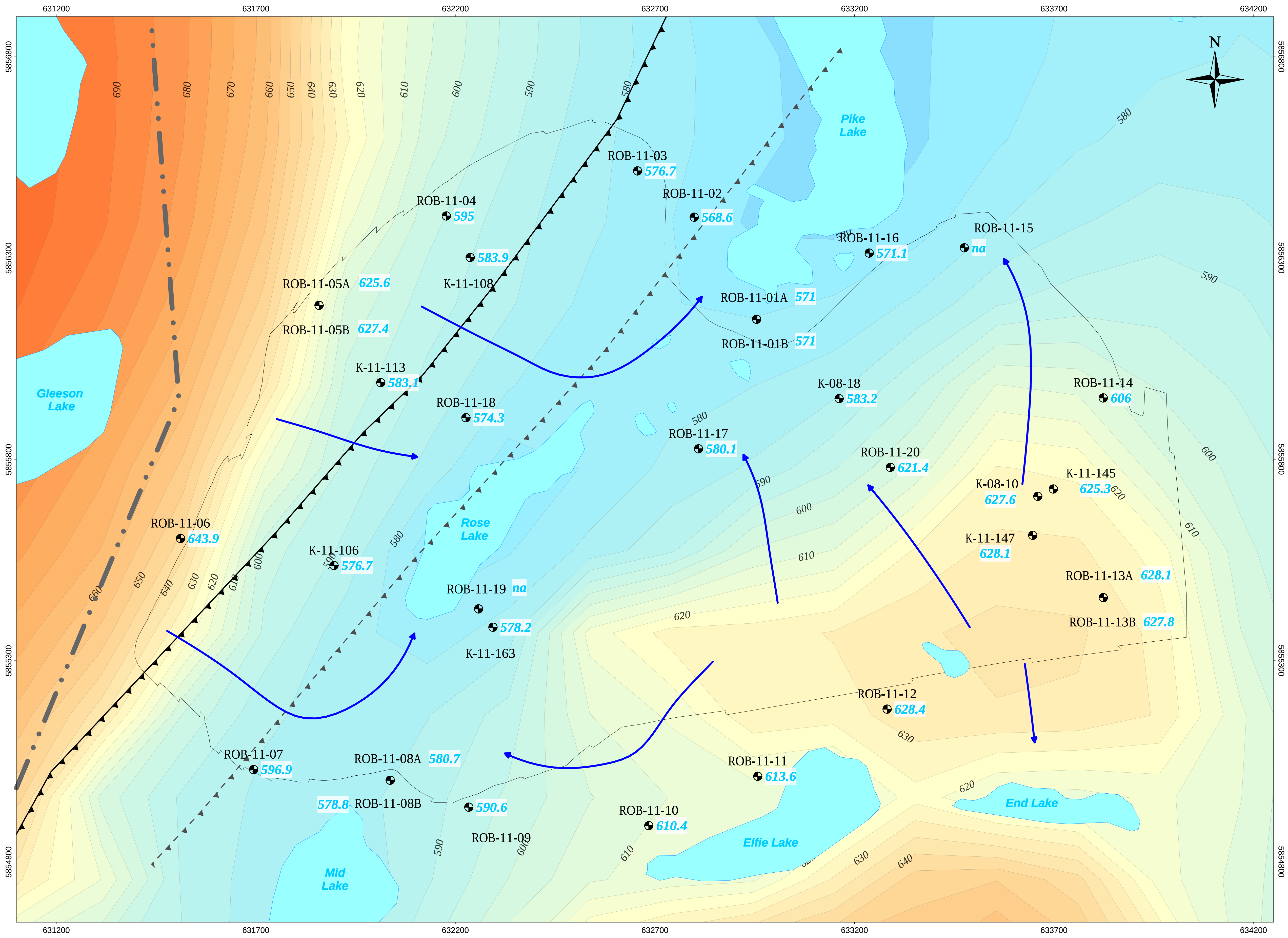
# Calibrated Hydraulic Conductivity (Slice 1 to 3)

**Source :**

Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection NAD 1983 UTM Zone 19N

0 500 1000 m

March 2024 AtkinsRéalis B-12



## NOTES

Fault locations are approximative and fault continuity is uncertain outside Rose pit area.

Strong gradients are seen on slopes, in the bedrock, between K-08-10 and K-08-18 (0.08 m/m) and ROB-11-05A and K-11-113 (0.17 m/m). More gentle gradients were estimated in the center of the valley, at the till/bedrock interface, between ROB-11-07 and ROB-11-02 (0.02 m/m) and between ROB-11-04 and ROB-11-02 (0.03 m/m).

A vertical downwards gradient of 0.06 m/m was estimated at ROB-11-06A/B, in the western part of the pit, on a topographic high; vertical upwards gradients were estimated at ROB-11-08A/B (0.17 m/m) in the local discharge area in the valley center; and vertical upwards gradients were also estimated at ROB-11-13A/B (0.04 m/m) located on a topographic high in the eastern part of the pit.

## LEGEND

- QUÉBEC - LABRADOR BOUNDARY
- KATSAO-WISHART FAULT
- CENTRAL FAULT
- Location ID ● OBSERVATION WELL
  *Measured water level*
- ← GROUNDWATER FLOW DIRECTION
- 720 / 620 / 520 SIMULATED PIEZOMETRIC LEVELS (5 m INTERVAL)

CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

# Simulated vs Measured Piezometric Elevation in the Pit Area

**Source :**

Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection UTM Zone 19N

0 100 200m

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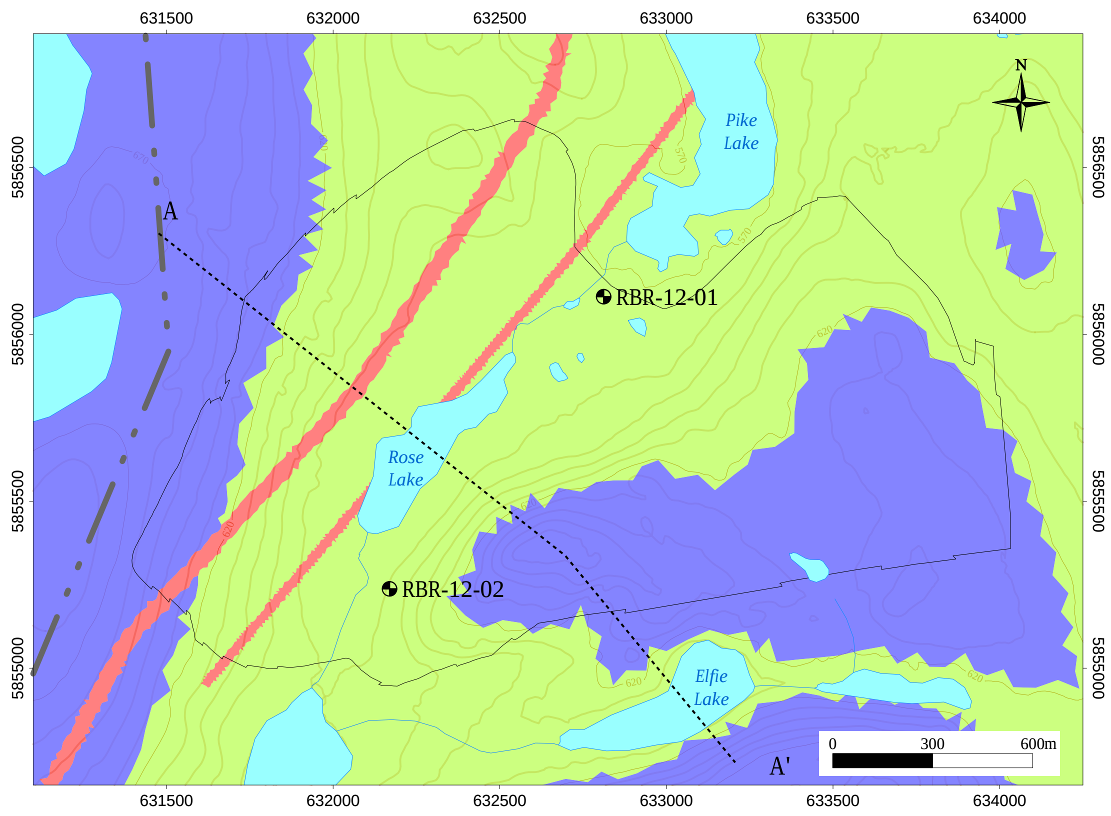
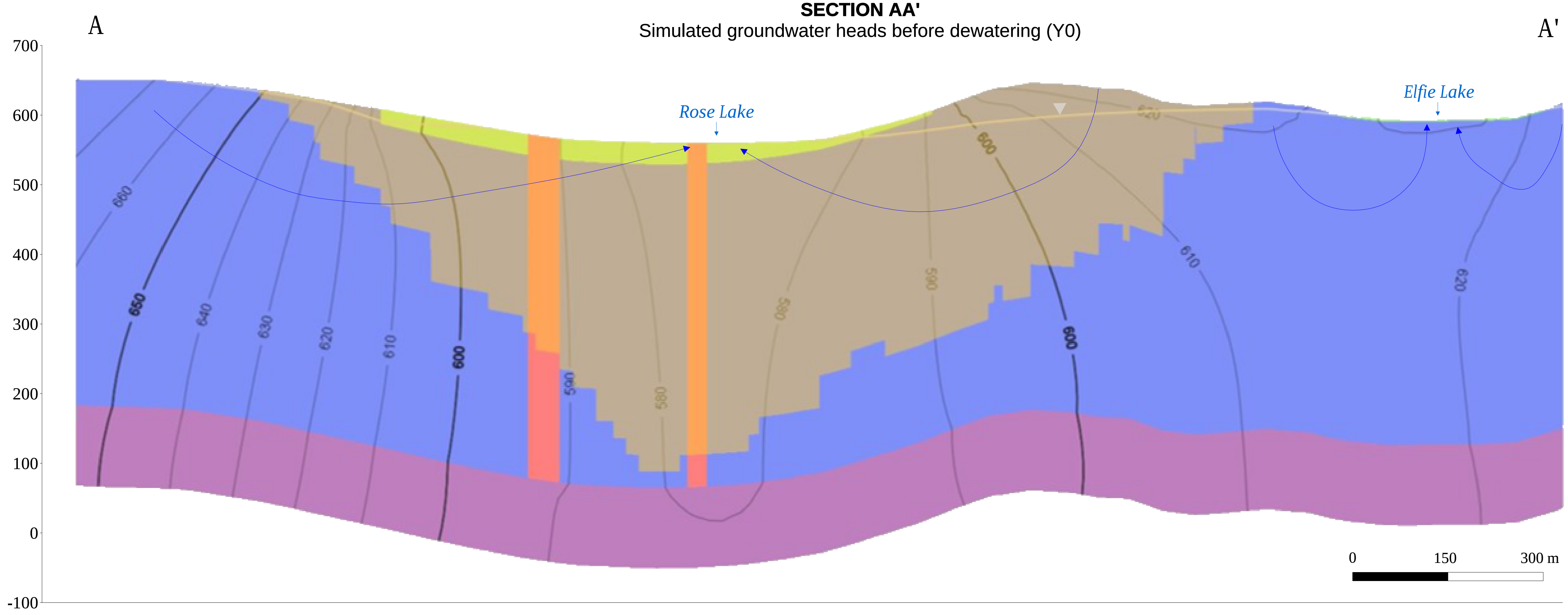


## SECTION AA'

Simulated groundwater heads before dewatering (Y0)



## NOTES

Fault locations are approximative and fault continuity is uncertain outside Rose pit area.

The maximum pit depth will extend to approximately 450 m below existing grade at the end of exploitation (Year 26).

## HYDROSTRATIGRAPHY

Calibrated hydraulic conductivities
K (m/s) - Slice 1

- 🟩 OVERBURDEN (K = 1.0 x$10^{-6}$ m/s)
- 🟦 BEDROCK (K = 5.0 x$10^{-8}$ m/s)
- 🟪 DEEP BEDROCK (K = 1.0 x$10^{-8}$ m/s)
- 🟥 FAULT (K = 1.0 x$10^{-5}$ m/s)
- 🟧 PIT SHELL 2023

## LEGEND

- ← GROUNDWATER FLOW DIRECTION
- 500 PIEZOMETRIC ELEVATION (50 m)
- ▽ WATER TABLE
- — TOPOGRAPHIC CONTOUR (10 m)
- ------ SECTION AA'
- — PIT SHELL
- ▬ ▬ QUÉBEC - LABRADOR BOUNDARY

**CHAMPION IRON**

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

Simulated Groundwater Heads
Section AA' (Y0)

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection UTM Zone 19N

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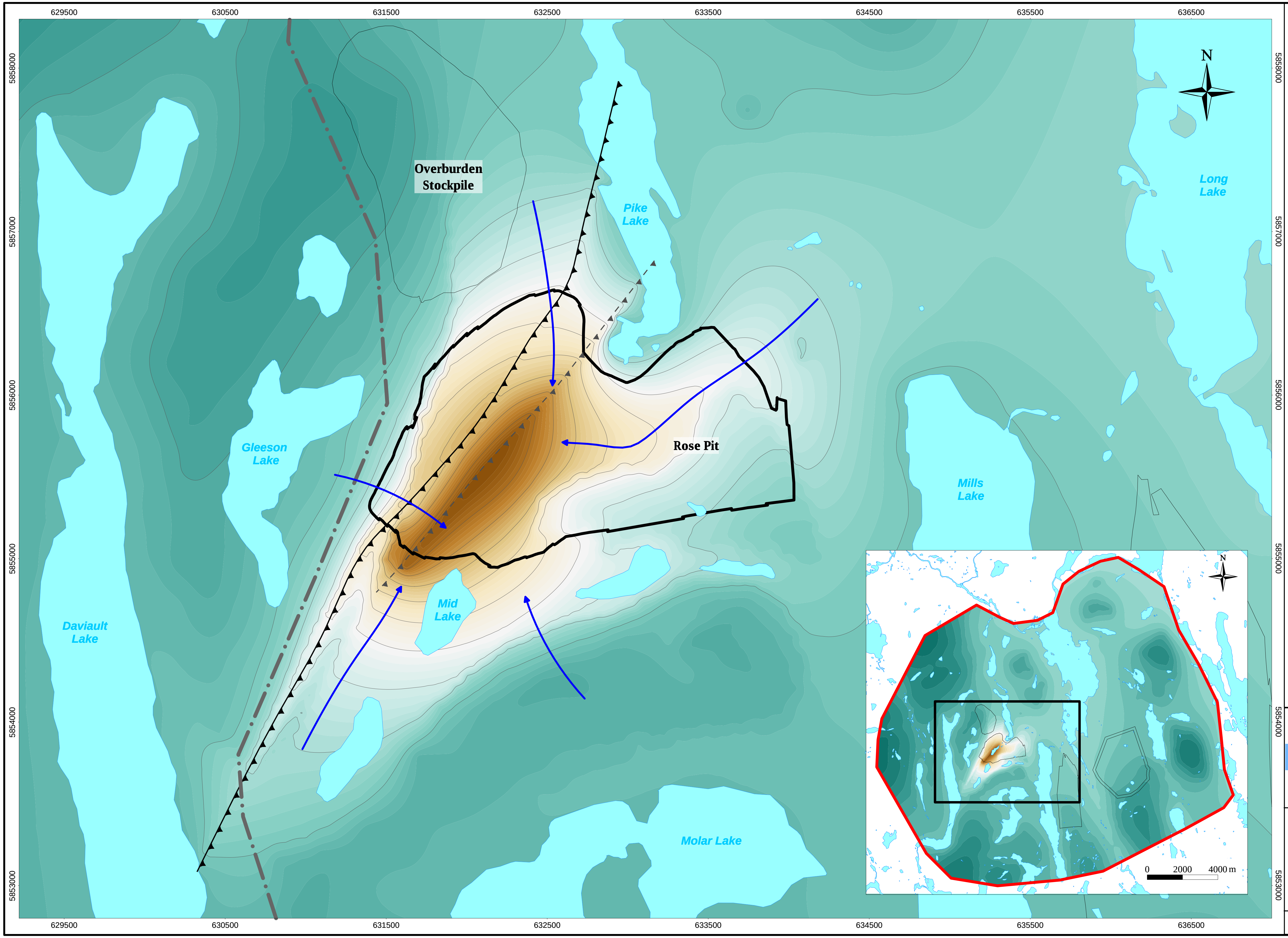


## NOTES

In a conservative approach, a selected scenario was represented assuming the faults were connected to the lakes and that their hydraulic conductivity (5x10$^{-5}$ m/s) was five times higher than the injection limit reached during packer tests.

It was also assumed that lake levels of Pike, Daviault, Molar and Mills would remain constant during dewatering operations.

## LEGEND

- QUÉBEC -LABRADOR BOUNDARY
- HYDROGEOLOGICAL MODEL LIMIT
- PROPOSED INFRASTRUCTURE
- KATSAO-WISHART FAULT
- CENTRAL FAULT
- GROUNDWATER FLOW DIRECTION
- SIMULATED PIEZOMETRIC LEVELS (10 m INTERVAL)

720
620
520
420
320
220
120

CHAMPION IRON

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

## Dewatering Simulation Results
## (Selected Case - Final Pit Shell)

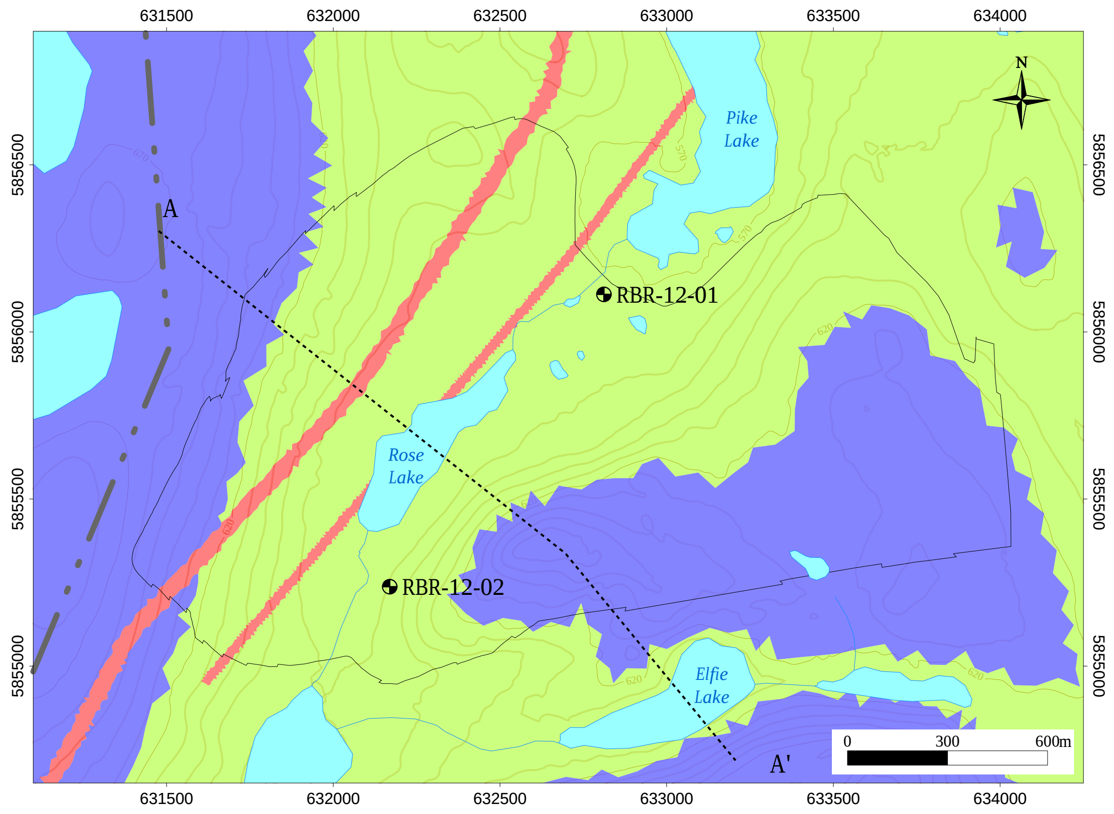
**Source :**

Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection NAD 1983 UTM Zone 19N

0 400 800 m

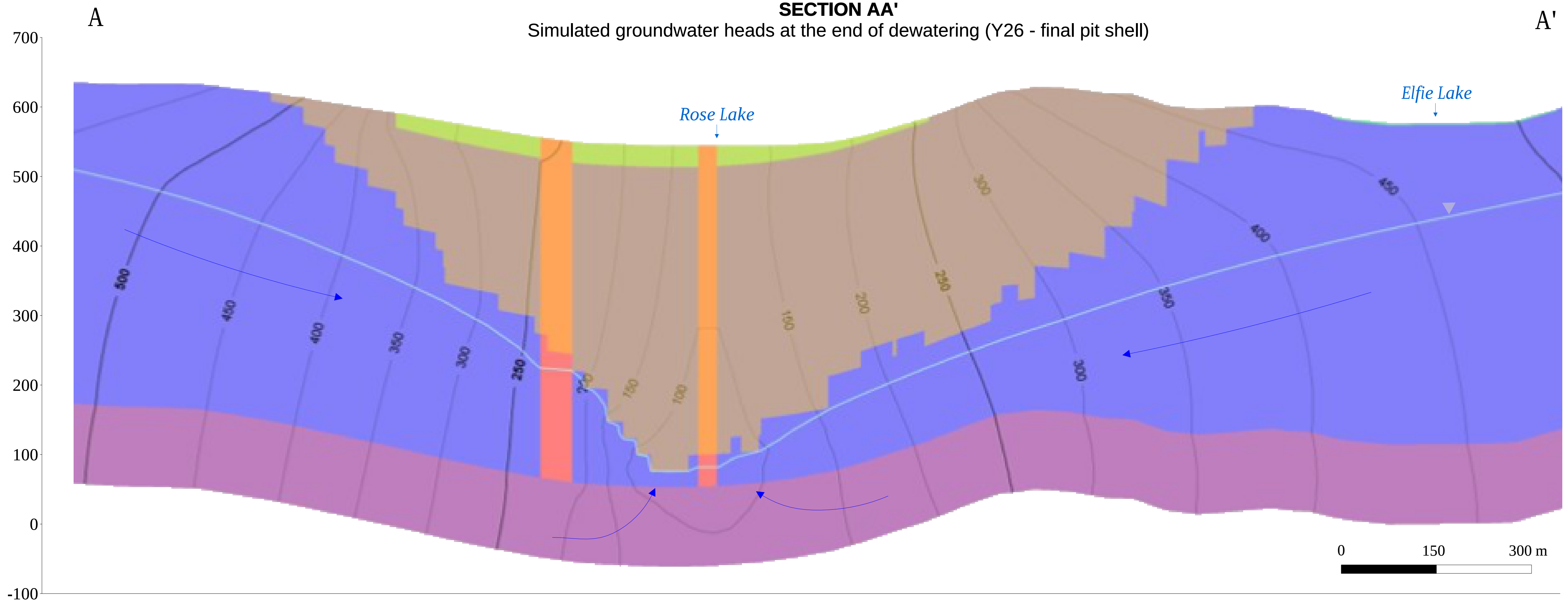
March 2024

AtkinsRéalis



## SECTION AA'

Simulated groundwater heads at the end of dewatering (Y26 - final pit shell)



## NOTES

Fault locations are approximative and fault continuity is uncertain outside Rose pit area.

The maximum pit depth will extend to approximately 450 m below existing grade at the end of exploitation (Year 26).

## HYDROSTRATIGRAPHY

Calibrated hydraulic conductivities
K (m/s) - Slice 1

🟩 OVERBURDEN (K = 1.0 x10$^{-6}$ m/s)

🟦 BEDROCK (K = 5.0 x10$^{-8}$ m/s)

🟪 DEEP BEDROCK (K = 1.0 x10$^{-8}$ m/s)

🟥 FAULT (K = 1.0 x10$^{-5}$ m/s)

🟧 PIT SHELL 2023

## LEGEND

← GROUNDWATER FLOW DIRECTION

500 PIEZOMETRIC ELEVATION (50 m)

▽ WATER TABLE

— TOPOGRAPHIC CONTOUR (10 m)

----- SECTION AA'

— PIT SHELL

▬ ▬ QUÉBEC - LABRADOR BOUNDARY

**CHAMPION IRON**

**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property Hydrogeology and Water Management**

## Simulated Groundwater Heads
## Section AA' (Y26)

**Source :**
Project 692696 Kami Mine Conceptual Hydrogeological and Water Blance Study
Topographic Data of Canada - CanVec Series, Governement of Canada, 2019
Projection UTM Zone 19N

March 2024 AtkinsRéalis B-16

# Appendix C. ROB-11-Series Logs

**Stantec**

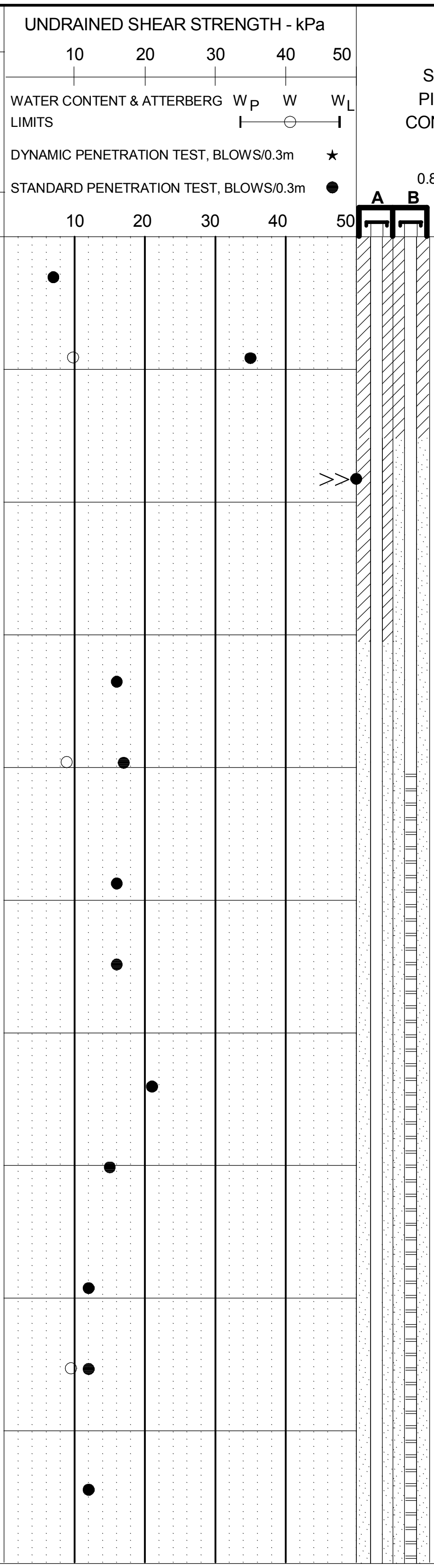
# BOREHOLE RECORD

BOREHOLE No. ROB-11-01
PAGE 1 of 6
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/NW/NQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855920.66 m E 632914.75 m
DATES (mm-dd-yy): BORING 9/29/2011 to 10/6/2011 WATER LEVEL -0.06 m 11/3/2011

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 570.40 | |
| | 570.20 | PEAT |
| | | Compact, grey, silty SAND (SM); trace to locally some gravel: TILL<br>-occasional cobbles to 4.5 m depth. |

| SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 330 | 7 | |
| SS | 2 | 510 | 35 | S |
| SS | 3 | 175 | 57 | |
| SS | 4 | 0 | 50/75 | |
| SS | 5 | 25 | 16 | |
| SS | 6 | 255 | 17 | S |
| SS | 7 | 25 | 16 | |
| SS | 8 | 205 | 16 | S H |
| SS | 9 | 50 | 21 | |
| SS | 10 | 100 | 15 | |
| SS | 11 | 125 | 12 | |
| SS | 12 | 610 | 12 | S |
| SS | 13 | 100 | 12 | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

**ARTESIAN CONDITIONS IN WELLS (A,B). WATER LEVELS AT 0.6 m ABOVE GROUND SURFACE.**

**BENTONITE**

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B)**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

Stantec

BOREHOLE No. ROB-11-01
PAGE 2 of 6
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/NW/NQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855920.66 m E 632914.75 m
DATES (mm-dd-yy): BORING 9/29/2011 to 10/6/2011 WATER LEVEL -0.06 m 11/3/2011

Continued from Previous Page

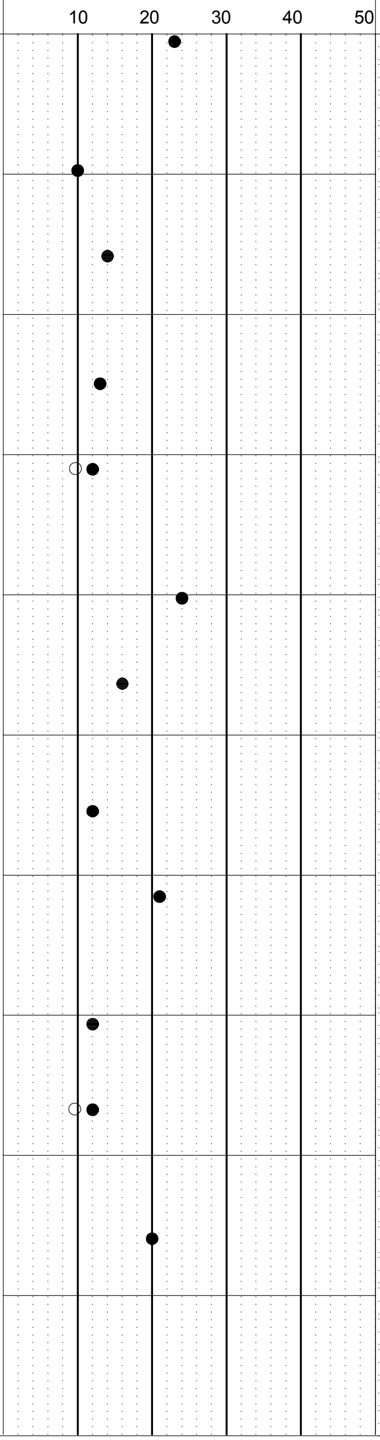
| DEPTH (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|
| 10 | Compact, grey, silty SAND (SM); trace to locally some gravel: TILL | SS | 14 | 175 | 23 | |
| 11 | | SS | 15 | 150 | 10 | |
| | | SS | 16 | 240 | 14 | |
| 12 | | SS | 17 | 205 | 13 | |
| 13 | | SS | 18 | 480 | 12 | S |
| 14 | | SS | 19 | 230 | 24 | |
| | | SS | 20 | 125 | 16 | |
| 15 | | SS | 21 | 0 | 12 | |
| 16 | | SS | 22 | 205 | 21 | |
| 17 | | SS | 23 | 255 | 12 | |
| | | SS | 24 | 430 | 12 | S |
| 18 | | SS | 25 | 125 | 20 | |
| 19 | | | | | | |
| 20 | | | | | | |

UNDRAINED SHEAR STRENGTH - kPa
10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B)**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

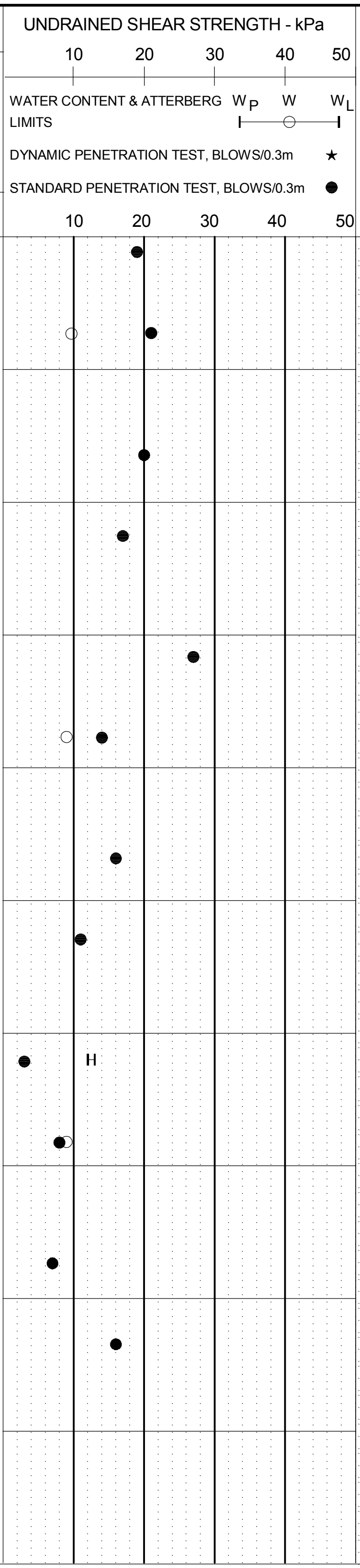
# BOREHOLE RECORD

BOREHOLE No. ROB-11-01
PAGE 3 of 6
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/NW/NQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855920.66 m E 632914.75 m
DATES (mm-dd-yy): BORING 9/29/2011 to 10/6/2011 WATER LEVEL -0.06 m 11/3/2011

Continued from Previous Page

| ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|
| | Compact, grey, silty SAND (SM); trace to locally some gravel: TILL | SS | 26 | 230 | 19 | |
| | | SS | 27 | 560 | 21 | S |
| | | SS | 28 | 25 | 20 | |
| | | SS | 29 | 205 | 17 | S H |
| | | SS | 30 | 230 | 27 | |
| | | SS | 31 | 305 | 14 | S |
| | | SS | 32 | 230 | 16 | |
| | | SS | 33 | 255 | 11 | |
| | -very loose to loose from 26.0 m to 28.0 m: Proportion of gravel and sand decreases from 26.0 to 29.0 m | SS | 34 | 405 | 3 | S H |
| | | SS | 35 | 610 | 8 | S |
| | | SS | 36 | 330 | 7 | |
| | | SS | 37 | 480 | 16 | |
| | | SS | 38 | 255 | 90/250 | |
| 540.50 | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B)**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

Stantec

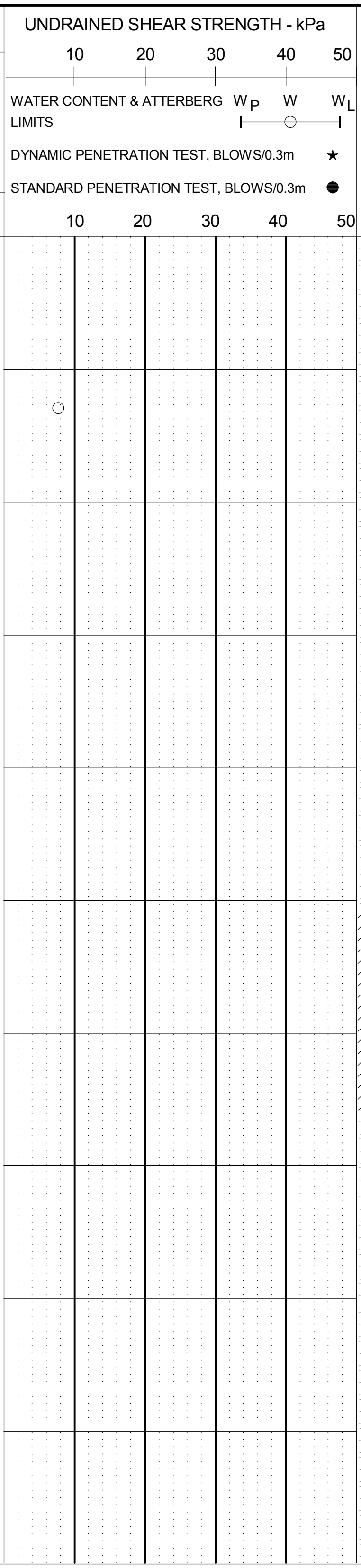
# BOREHOLE RECORD

BOREHOLE No. ROB-11-01
PAGE 4 of 6
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/NW/NQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855920.66 m E 632914.75 m
DATES (mm-dd-yy): BORING 9/29/2011 to 10/6/2011 WATER LEVEL -0.06 m 11/3/2011

Continued from Previous Page

| DEPTH (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| 30 | Very dense, dark grey, silty SAND (SM); trace gravel; trace cobbles and boulders: TILL | SS | 39 | 75 | 100/75 | | |
| | | BS | 40 | - | - | | |
| 31 | | BS | 41 | 96% | - | S | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B) |
| 32 | | SS | 42 | 100 | 50/100 | | |
| | | BS | 43 | 87% | - | | |
| 34 | Coring required due to cobbles and boulders. | HQ | 44 | 100% | - | | |
| 35 | | HQ | 45 | 98% | - | | BENTONITE (A) |
| 37 | | HQ | 46 | 55% | - | | |
| 39 | | HQ | 47 | 30% | - | | |
| 40 | | HQ | 48 | 89% | - | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

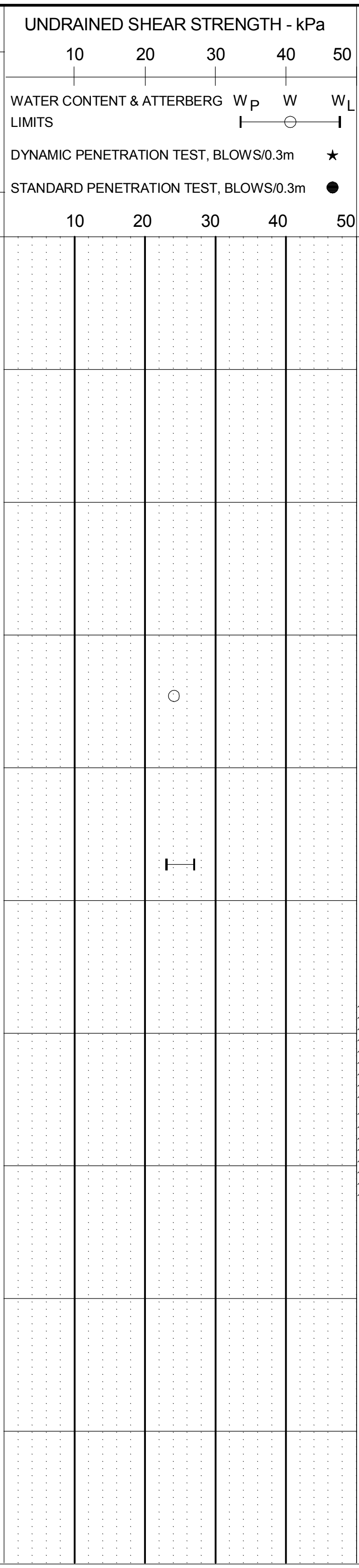
**Stantec**

# BOREHOLE RECORD

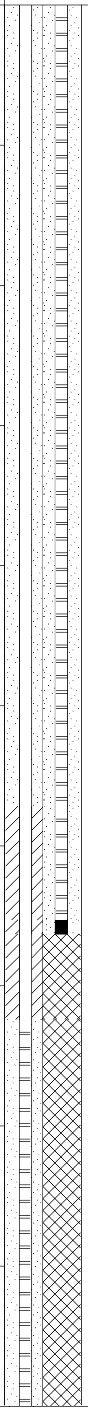
BOREHOLE No. ROB-11-01
PAGE 5 of 6
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855920.66 m E 632914.75 m
SIZE HW/NW/NQ
DATES (mm-dd-yy): BORING 9/29/2011 to 10/6/2011
WATER LEVEL -0.06 m 11/3/2011
DATUM Geodetic (NAD-27)

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 40 | | Very dense, dark grey, silty SAND (SM); trace gravel; trace cobbles and boulders: TILL | | | | | |
| 41 | | | SS | 49 | 0 | 50/50 | |
| 43 | 527.40 | Very dense, grey, SILT with sand (ML); trace gravel: TILL | SS | 50 | 355 | 128/360 | S |
| 44 | | | BS | 51 | 150 | - | S H |
| 46 | | | BS | 52 | 150 | - | |
| 47 | 523.40 | Moderately jointed to intact, medium strong, dark grey, biotite muscovite quartz schist (Menihek Formation): BEDROCK | NQ | 53 | 100% | 79% | |
| 49 | | | NQ | 54 | 100% | 96% | |
| 50 | | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B)

BENTONITE (A)

END CAP (B)

50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (A)

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

Stantec

# BOREHOLE RECORD

BOREHOLE No. **ROB-11-01**
PAGE **6** of **6**
CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL**
N **5855920.66 m**
E **632914.75 m**
SIZE **HW/NW/NQ**
DATES (mm-dd-yy): BORING **9/29/2011 to 10/6/2011**
WATER LEVEL **-0.06 m 11/3/2011**
DATUM **Geodetic (NAD-27)**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | SAMPLES NUMBER | SAMPLES RECOVERY(mm) OR TCR % | SAMPLES N-VALUE OR RQD % | SAMPLES OTHER TESTS | UNDRAINED SHEAR STRENGTH - kPa | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | | | |
| 50 | 519.50 | Moderately jointed to intact, medium strong, dark grey, biotite muscovite quartz schist (Menihek Formation): BEDROCK | | | | | | | | | END CAP (A) |
| 51 | | End of Borehole<br>- Artesian water condition flowing at approx. 0.6m above ground surface. | | | | | | | | | |
| 52 | | | | | | | | | | | |
| 53 | | | | | | | | | | | |
| 54 | | | | | | | | | | | |
| 55 | | | | | | | | | | | |
| 56 | | | | | | | | | | | |
| 57 | | | | | | | | | | | |
| 58 | | | | | | | | | | | |
| 59 | | | | | | | | | | | |
| 60 | | | | | | | | | | | |

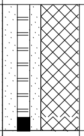
UNDRAINED SHEAR STRENGTH - kPa: 10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

Stantec

BOREHOLE No. ROB-11-02
PAGE 1 of 3
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5856169.85 m E 632818.65 m
DATES (mm-dd-yy): BORING 2/14/2012 to 2/23/2012 WATER LEVEL 1.12 m 04/01/2012

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|
| 0 | 569.00 | PEAT | SS | 1 | 125 | 1 | | BENTONITE |
| | | | SS | 2 | 0 | 1 | | |
| 1.12 | | ▼ | | | | | | |
| | | | SS | 3 | 255 | 0 | | |
| 2.13 | 566.87 | Loose to dense, grey, silty SAND (SM); trace gravel, cobbles and boulders: TILL | SS | 4 | 330 | 8 | | |
| | | | SS | 5 | 430 | 8 | | |
| | | | SS | 6 | 330 | 7 | | |
| | | | SS | 7 | 230 | 21 | | |
| | | | SS | 8 | 255 | 23 | S | |
| | | | SS | 9 | 280 | 27 | | |
| | | | SS | 10 | 150 | 22 | | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| | | | SS | 11 | 0 | 33 | | |
| | | | SS | 12 | 100 | 49 | | |

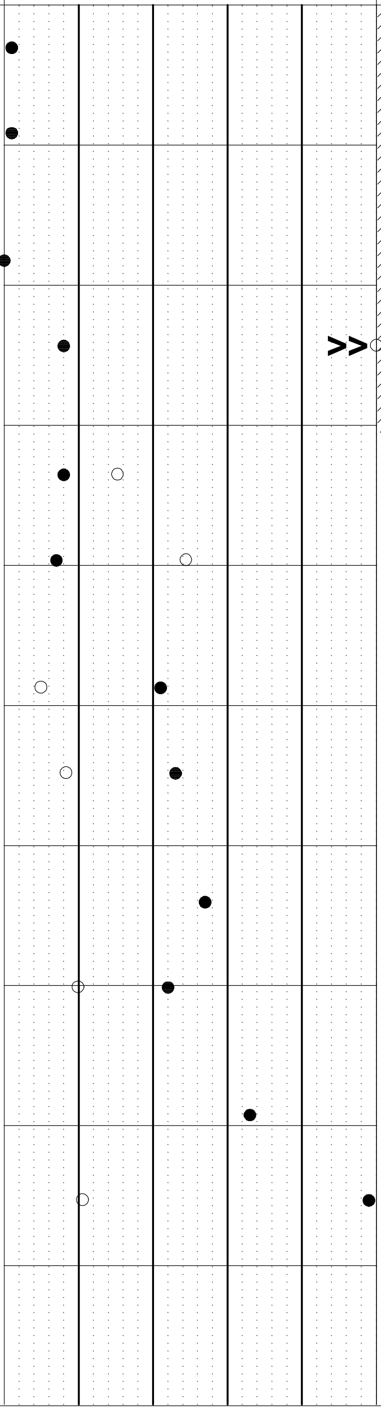
UNDRAINED SHEAR STRENGTH - kPa
10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

Stantec

# BOREHOLE RECORD

BOREHOLE No. ROB-11-02
PAGE 2 of 3
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5856169.85 m E 632818.65 m
DATES (mm-dd-yy): BORING 2/14/2012 to 2/23/2012 WATER LEVEL 1.12 m 04/01/2012
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES | UNDRAINED SHEAR STRENGTH - kPa | STANDPIPE/PIEZOMETER CONSTRUCTION DETAILS

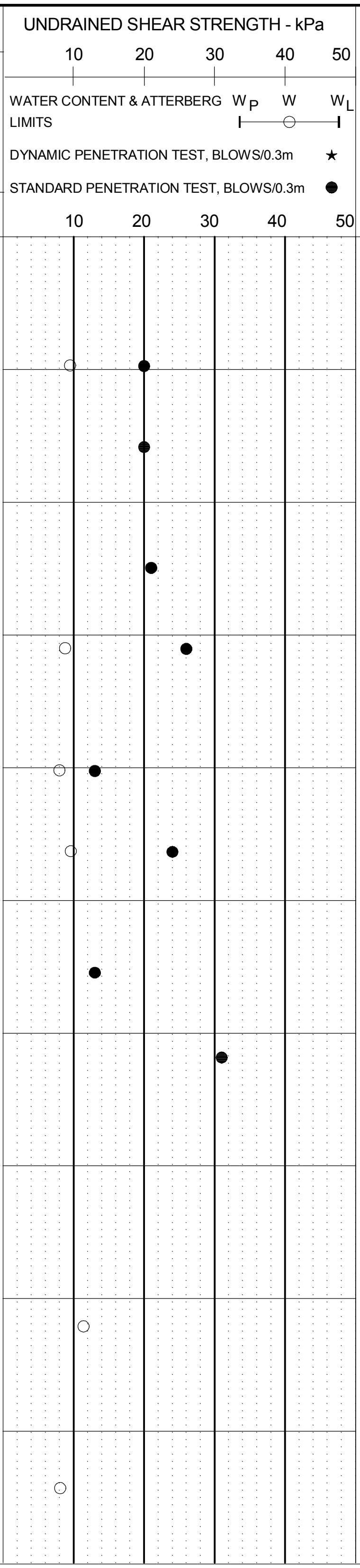
Continued from Previous Page

10 – 17.68: Loose to dense, grey, silty SAND (SM); trace gravel, cobbles and boulders: TILL

551.32

Very dense, grey to brown, silty SAND (SM); trace gravel, cobbles and boulders: TILL

| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 13 | 175 | 20 | |
| SS | 14 | 355 | 20 | |
| SS | 15 | 150 | 21 | |
| SS | 16 | 330 | 26 | |
| SS | 17 | 175 | 13 | |
| SS | 18 | 280 | 24 | |
| SS | 19 | 75 | 13 | |
| SS | 20 | 75 | 31 | |
| ~~SS~~ | ~~21~~ | ~~-~~ | ~~50/0~~ | |
| BS | 22 | 100% | - | |
| BS | 23 | 100% | - | S |



Depth scale (m): 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

# BOREHOLE RECORD

Stantec

BOREHOLE No. ROB-11-02
PAGE 3 of 3
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project - Pit Slope Design
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5856169.85 m
E 632818.65 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 2/14/2012 to 2/23/2012
WATER LEVEL 1.12 m 04/01/2012
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | UNDRAINED SHEAR STRENGTH - kPa | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | | | |
| 20 | | Very dense, grey to brown, silty SAND (SM); trace gravel, cobbles and boulders: TILL | | | BS | 24 | 100% | - | | ○ | |
| 21 | 547.56 | | | | | | | | | | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| 22 | | Fractured to intact, medium strong, grey, MIF (Magnetite Iron Formation), Sokoman Formation: BEDROCK | | | HQ | 25 | 93% | 85% | | | |
| 23 | | | | | HQ | 26 | 100% | 93% | | | |
| 25 | 543.09 | | | | HQ | 27 | 100% | 70% | | | END CAP |
| 26 | | End of Borehole | | | | | | | | | |
| 27 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 29 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

UNDRAINED SHEAR STRENGTH - kPa: 10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50

△ Unconfined Compression Test
□ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

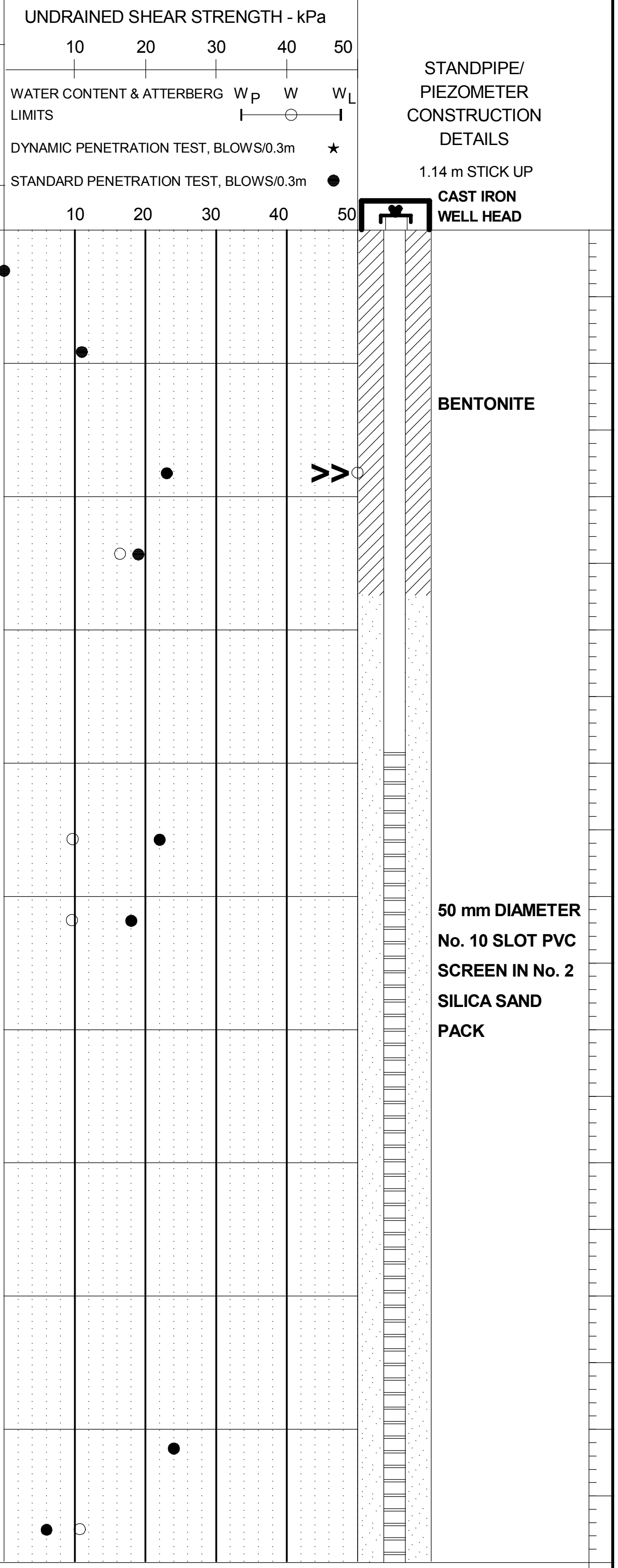
# BOREHOLE RECORD

BOREHOLE No. ROB-11-03
PAGE 1 of 3
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5856169.85 m E 632636.22 m
DATES (mm-dd-yy): BORING 2/6/2012 to 2/9/2012 WATER LEVEL -0.83 m 03/01/2012

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 575.90 | PEAT |
| 1 | 574.88 | Compact, brown, silty SAND (SM); trace gravel and boulders: TILL |
| 4 | 571.94 | Compact to very dense, grey, silty SAND (SM); trace gravel, cobbles and boulders: TILL<br>-locally loose from 9.5 m to 10.1 m depth |

| SAMPLES | | | | |
|---|---|---|---|---|
| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
| SS | 1 | 75 | 0 | |
| SS | 2 | 380 | 11 | |
| SS | 3 | 75 | 23 | |
| SS | 4 | 205 | 19 | S |
| SS | 5 | 205 | 22 | |
| SS | 6 | 175 | 18 | |
| SS | 7 | 0 | 68/380 | |
| SS | 8 | 230 | 24 | |
| SS | 9 | 305 | 6 | S H |



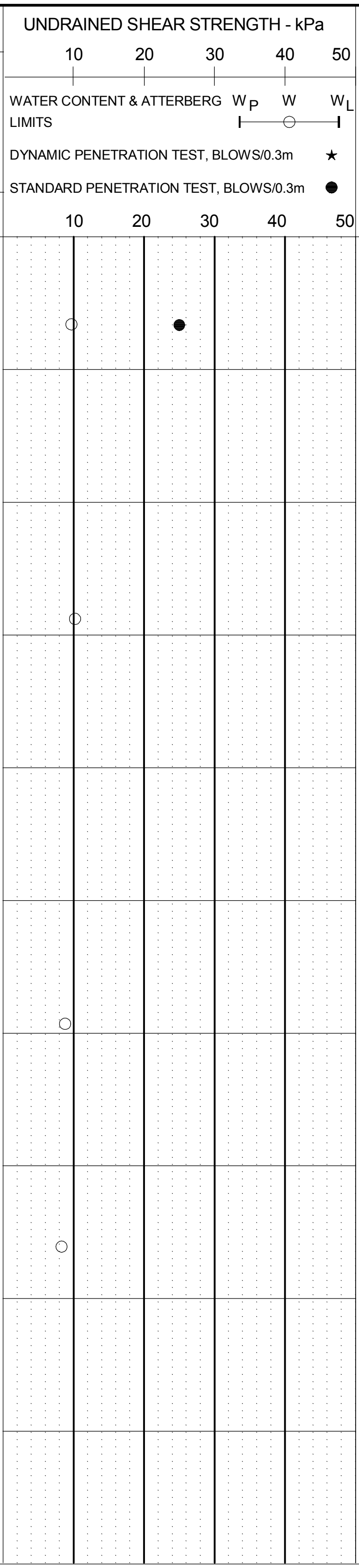
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

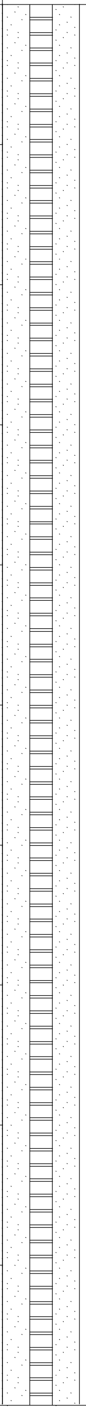
BOREHOLE No. ROB-11-03
PAGE 2 of 3
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5856169.85 m E 632636.22 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 2/6/2012 to 2/9/2012
WATER LEVEL -0.83 m 03/01/2012
DATUM Geodetic (NAD-27)

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 10 | | Compact to very dense, grey, silty SAND (SM); trace gravel, cobbles and boulders: TILL | | | | | | | |
| | | | | | SS | 10 | 75 | 25 | |
| 11 | | | | | SS | 11 | 305 | 110/300 | |
| 12 | | | | | SS | 12 | 255 | 88/300 | |
| | 563.40 | Very dense, brown, silty SAND (SM); trace gravel and cobbles: TILL | | | | | | | |
| | | | | | BS | 13 | 100% | - | |
| 14 | | | | | BS | 14 | 100% | - | |
| 16 | | | | | BS | 15 | 100% | - | |
| | | | | | BS | 16 | 100% | - | |
| 19 | | | | | BS | 17 | 100% | - | |
| 20 | | | | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-03
PAGE 3 of 3
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5856169.85 m E 632636.22 m
DATES (mm-dd-yy): BORING 2/6/2012 to 2/9/2012 WATER LEVEL -0.83 m 03/01/2012

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | SAMPLES NUMBER | SAMPLES RECOVERY(mm) OR TCR % | SAMPLES N-VALUE OR RQD % | OTHER TESTS | UNDRAINED SHEAR STRENGTH - kPa | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | | | |
| 20 | 555.78 | Severely fractured, medium strong, tan to grey, quartzite (Wishart Formation): BEDROCK | | | HQ | 18 | 100% | 42% | | | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| 21 | | | | | HQ | 19 | 100% | 39% | | | |
| 22–23 | | | | | HQ | 20 | 100% | 49% | | | |
| | 552.25 | | | | | | | | | | END CAP |
| 24 | | End of Borehole<br>- Artesian water condition flowing at approx. 0.83m above ground surface. | | | | | | | | | |
| 25 | | | | | | | | | | | |
| 26 | | | | | | | | | | | |
| 27 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 29 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

UNDRAINED SHEAR STRENGTH - kPa: 10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

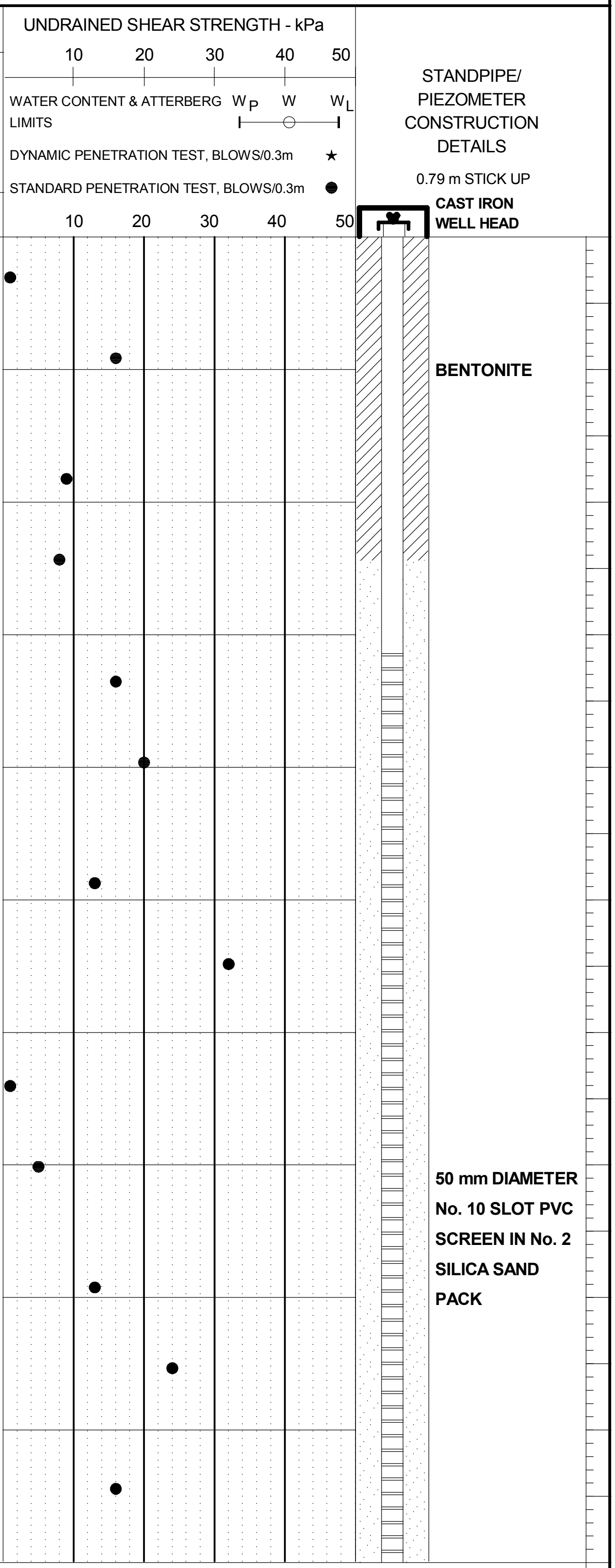
# BOREHOLE RECORD

BOREHOLE No. ROB-11-04
PAGE 1 of 3
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5856176.75 m E 632137.55 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 4/4/2012 to 4/6/2012
WATER LEVEL 0.12 m 06/14/2012
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 595.10 | PEAT |
| | 594.80 | Very loose to very dense, grey, silty SAND (SM); trace gravel: TILL |

SAMPLES

| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 305 | 1 | |
| SS | 2 | 355 | 16 | |
| SS | 3 | 150 | 9 | |
| SS | 4 | 150 | 8 | |
| SS | 5 | 305 | 16 | |
| SS | 6 | 125 | 20 | |
| SS | 7 | 0 | 13 | |
| SS | 8 | 305 | 32 | |
| SS | 9 | 510 | 1 | |
| SS | 10 | 510 | 5 | |
| SS | 11 | 255 | 13 | |
| SS | 12 | 305 | 24 | |
| SS | 13 | 330 | 16 | |



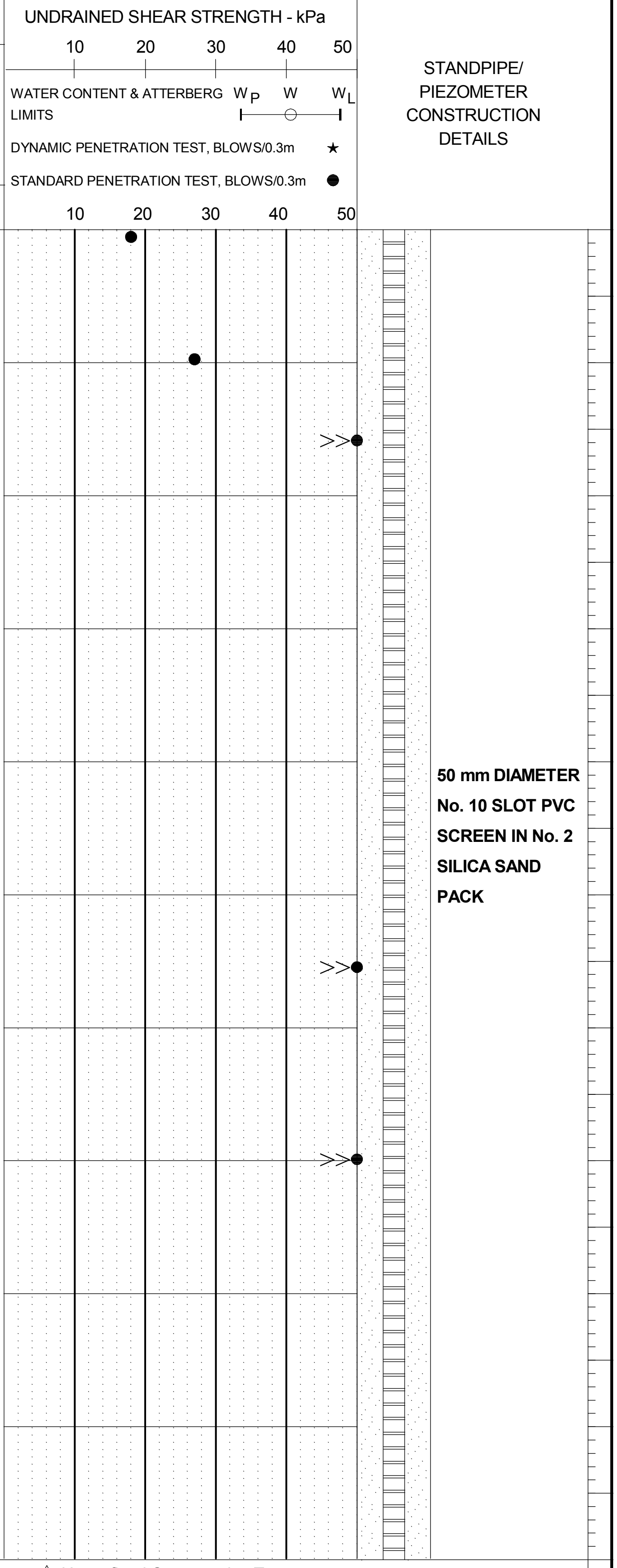
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-04
PAGE 2 of 3
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project - Pit Slope Design
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5856176.75 m
E 632137.55 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 4/4/2012 to 4/6/2012
WATER LEVEL 0.12 m 06/14/2012
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | |
| 10 | | Very loose to very dense, grey, silty SAND (SM); trace gravel: TILL | | | SS | 14 | 405 | 18 | |
| 11 | | | | | SS | 15 | 305 | 27 | |
| | | | | | SS | 16 | 380 | 83 | |
| 12 | | -trace cobbles below 11.9 m depth | | | | | | | |
| 13 | | | | | BS | 17 | 100% | - | |
| 14 | | | | | | | | | |
| 15 | | | | | SS | 18 | 355 | 54 | |
| 16 | | | | | | | | | |
| 17 | | | | | SS | 19 | 305 | 92 | |
| 18 | | | | | SS | 20 | 200 | 154/405 | |
| 19 | | | | | | | | | |
| 20 | | | | | SS | 21 | 175 | 79/255 | |



**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

BOREHOLE No. **ROB-11-04**
PAGE **3** of **3**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5856176.75 m** E **632137.55 m**
DATES (mm-dd-yy): BORING **4/4/2012 to 4/6/2012** WATER LEVEL **0.12 m 06/14/2012**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % |
|---|---|---|---|---|---|---|
| 20 | 575.04 | Intact, medium strong, grey, quartz muscovite biotite schist (Wishart Formation): BEDROCK | HQ | 22 | 100% | 100% |
| 21–22 | | | HQ | 23 | 100% | 100% |
| 23 | | | HQ | 24 | 100% | 100% |
| 24 | 570.72 | | | | | |
| | | End of Borehole | | | | |

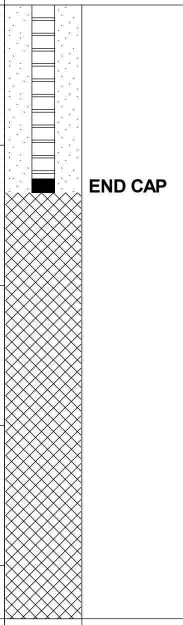
UNDRAINED SHEAR STRENGTH - kPa: 10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

Stantec

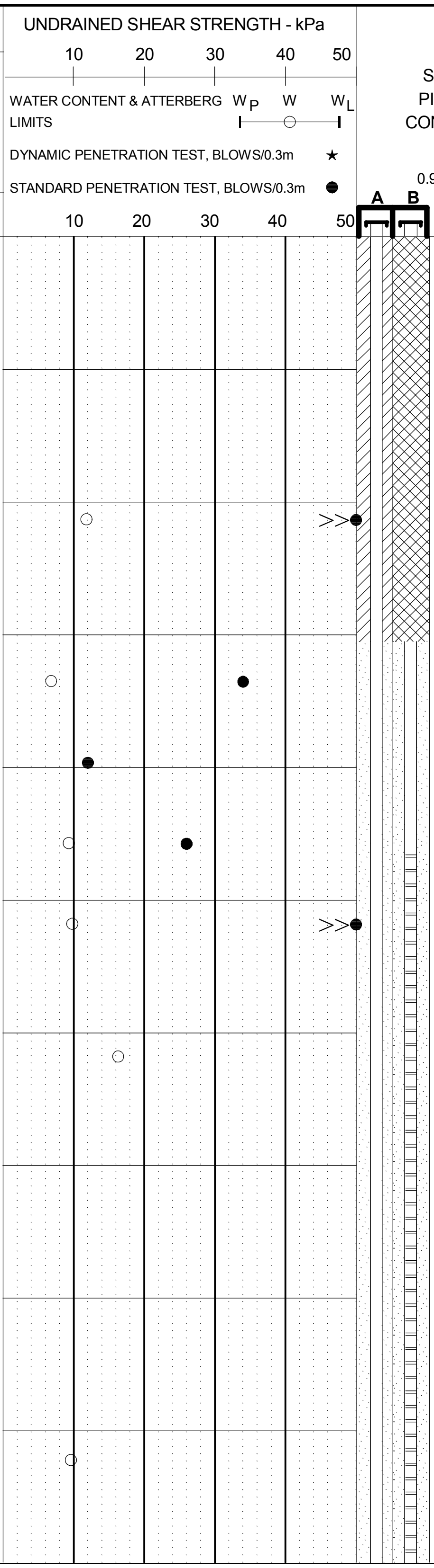
# BOREHOLE RECORD

BOREHOLE No. ROB-11-05
PAGE 1 of 2
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855954.78 m E 631819.27 m
DATES (mm-dd-yy): BORING 3/3/2012 to 3/9/2012 WATER LEVEL 2.12 m 06/14/2012

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 629.00 | |
| | 628.92 | PEAT |
| | | Compact to very dense, brown, silty SAND (SM); trace gravel, cobbles and boulders: TILL |
| | 623.21 | Very dense, grey, SILT with sand (ML); trace gravel, cobbles and boulders: TILL |
| | 620.77 | Very dense, brown, silty SAND (SM); trace gravel, cobbles and boulders: TILL |
| 10 | | |

| SAMPLES | | | | |
|---|---|---|---|---|
| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
| SS | 1 | 305 | 133/380 | |
| SS | 2 | 305 | 96 | S H |
| SS | 3 | 280 | 34 | |
| SS | 4 | 280 | 12 | |
| SS | 5 | 150 | 26 | |
| SS | 6 | 280 | 65 | |
| SS | 7 | 125 | 67/150 | |
| SS | 8 | 0 | 70/75 | |
| SS | 9 | 150 | 60/150 | S |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

0.94 m STICK UP

**BENTONITE (A)**

**SAND/BENTONITE (B)**

**WATER LEVEL:**
**(A) - 2.12 m**
**(B) - 1.57 m**

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B)**

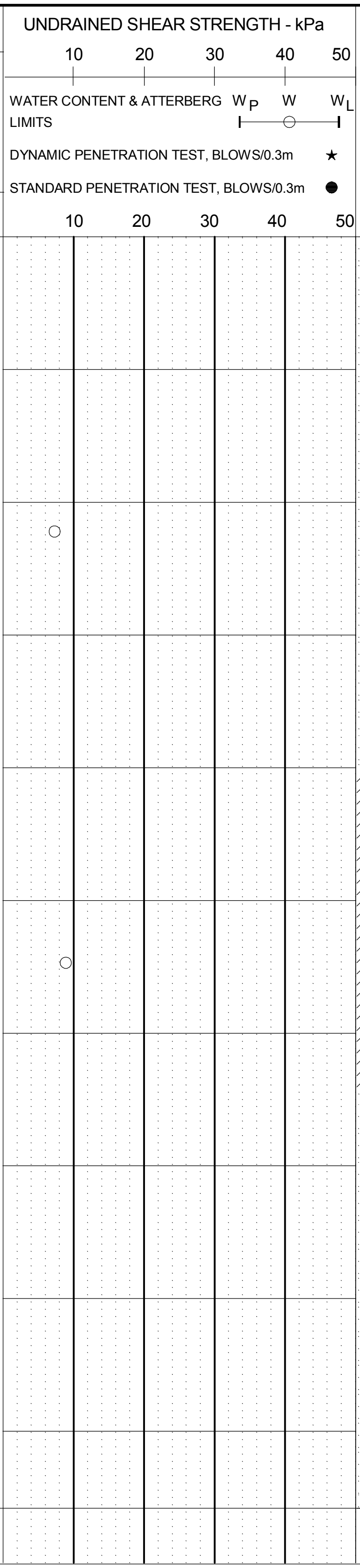
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

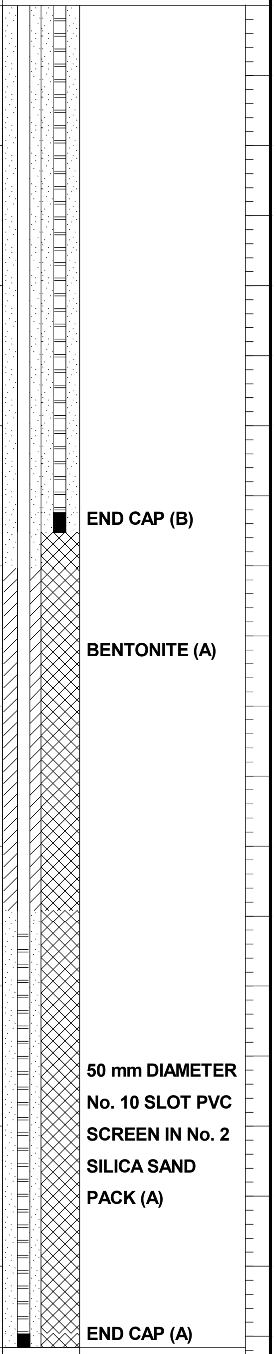
BOREHOLE No. **ROB-11-05**
PAGE **2** of **2**
PROJECT No. **121614000-305**
CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
METHOD **Wash/Dia**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL**
N **5855954.78 m** E **631819.27 m**
SIZE **HW/HQ**
DATES (mm-dd-yy): BORING **3/3/2012 to 3/9/2012**
WATER LEVEL **2.12 m 06/14/2012**
DATUM **Geodetic (NAD-27)**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 10 | | Very dense, brown, silty SAND (SM); trace gravel, cobbles and boulders: TILL | | | | | | | |
| | | | | | SS | 10 | 75 | 60/75 | |
| | 613.46 | | | | BS | 11 | 100% | - | |
| | | Fractured to intact, medium strong, white to green, quartz muscovite biotite calcite Schist (Wishart Formation): BEDROCK | | | HQ | 12 | 100% | 92% | |
| | | | | | HQ | 13 | 100% | 100% | |
| | | | | | HQ | 14 | 100% | 56% | |
| | 609.42 | End of Borehole | | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

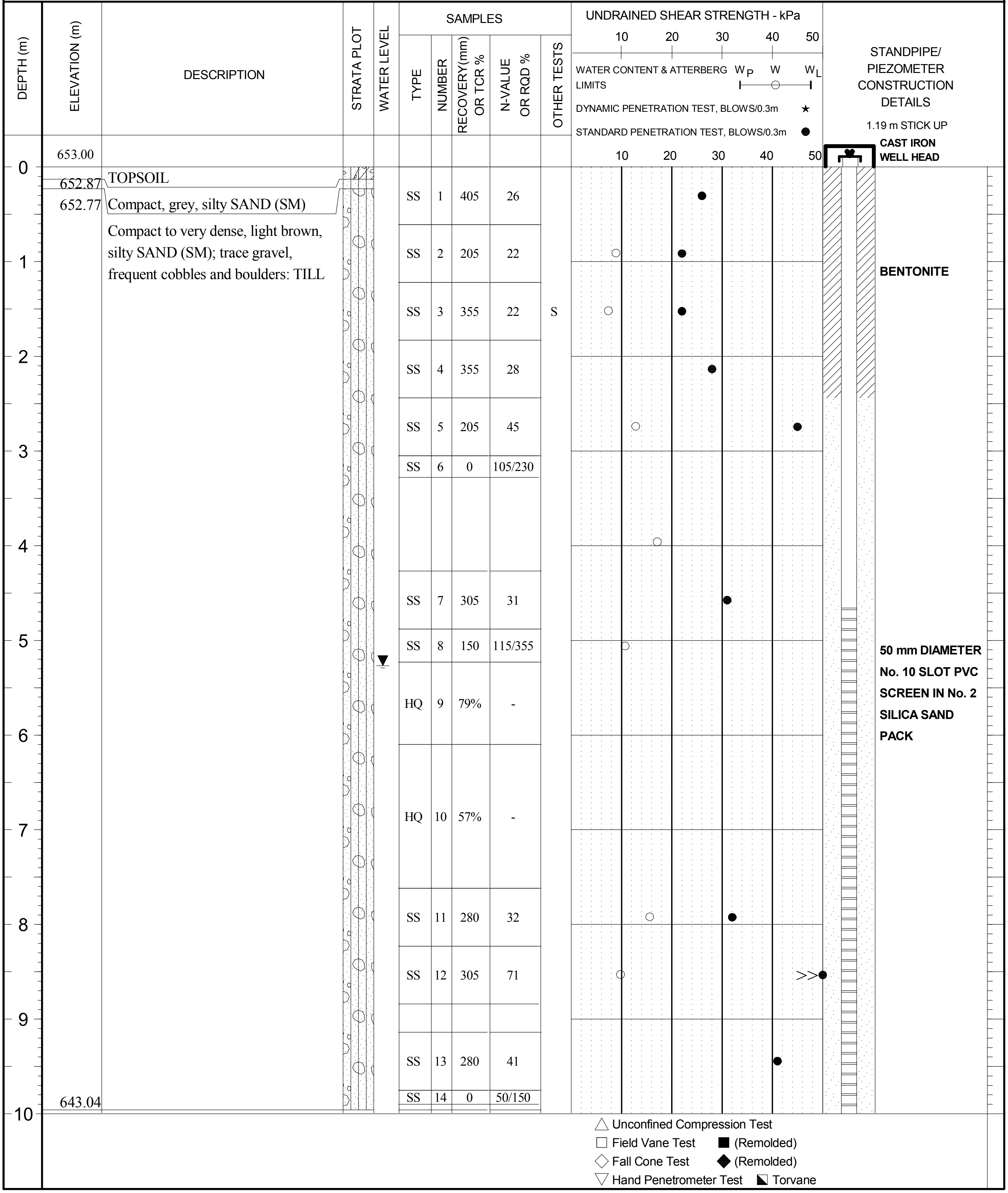
Stantec

# BOREHOLE RECORD

BOREHOLE No. ROB-11-06
PAGE 1 of 2
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project - Pit Slope Design
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855954.78 m
E 631471.79 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 2/26/2012 to 2/28/2012
WATER LEVEL 5.27 m 06/14/2012
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 653.00 | |
| | 652.87 | TOPSOIL |
| | 652.77 | Compact, grey, silty SAND (SM) |
| | | Compact to very dense, light brown, silty SAND (SM); trace gravel, frequent cobbles and boulders: TILL |
| 10 | 643.04 | |

| SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 405 | 26 | |
| SS | 2 | 205 | 22 | |
| SS | 3 | 355 | 22 | S |
| SS | 4 | 355 | 28 | |
| SS | 5 | 205 | 45 | |
| SS | 6 | 0 | 105/230 | |
| SS | 7 | 305 | 31 | |
| SS | 8 | 150 | 115/355 | |
| HQ | 9 | 79% | - | |
| HQ | 10 | 57% | - | |
| SS | 11 | 280 | 32 | |
| SS | 12 | 305 | 71 | |
| SS | 13 | 280 | 41 | |
| SS | 14 | 0 | 50/150 | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

Stantec

# BOREHOLE RECORD

BOREHOLE No. ROB-11-06
PAGE 2 of 2
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855954.78 m E 631471.79 m
DATES (mm-dd-yy): BORING 2/26/2012 to 2/28/2012 WATER LEVEL 5.27 m 06/14/2012

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | SAMPLES NUMBER | SAMPLES RECOVERY(mm) OR TCR % | SAMPLES N-VALUE OR RQD % | OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  | Continued from Previous Page |  |  |  |  |  |  |  |  |
| 10 |  | Moderately jointed to intact, strong, grey, quartz muscovite biotite schist (Wishart Formation): BEDROCK |  |  | HQ | 15 | 100% | 89% |  | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| 11 |  |  |  |  | HQ | 16 | 100% | 100% |  |  |
| 12–13 |  |  |  |  | HQ | 17 | 100% | 100% |  |  |
| 13.7 | 639.28 | End of Borehole |  |  |  |  |  |  |  | END CAP |

UNDRAINED SHEAR STRENGTH - kPa: 10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50

Depth scale: 10 11 12 13 14 15 16 17 18 19 20

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

# BOREHOLE RECORD

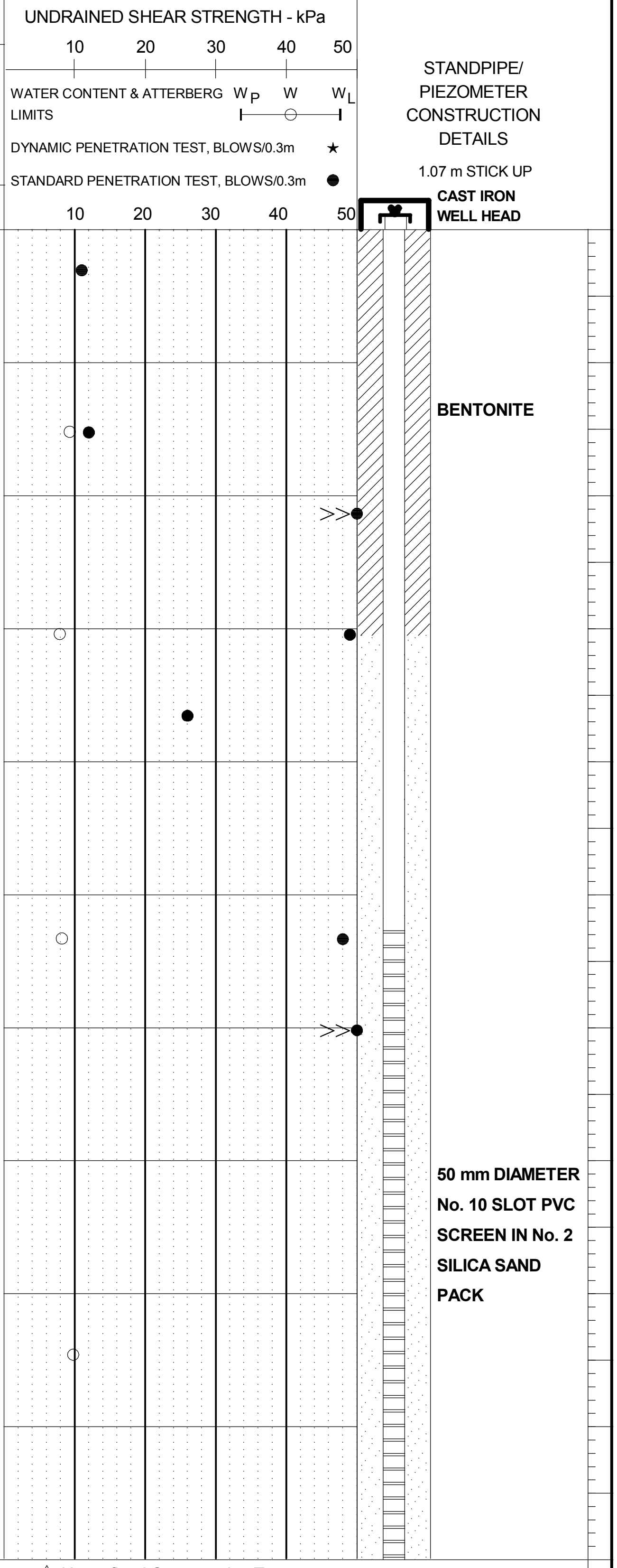
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5854802.17 m E 631655.16 m
DATES (mm-dd-yy): BORING 3/27/2012 to 4/3/2012 WATER LEVEL 5.78 m 06/14/2012

BOREHOLE No. ROB-11-07
PAGE 1 of 7
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 602.70 | |
| | 602.40 | PEAT |
| | | Compact to very dense, brown, silty SAND (SM); trace gravel, cobbles and boulders: TILL |

SAMPLES

| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 205 | 11 | |
| SS | 2 | 280 | 12 | S H |
| SS | 3 | 230 | 64 | |
| SS | 4 | 280 | 49 | |
| SS | 5 | 230 | 26 | |
| SS | 6 | 205 | 48 | |
| SS | 7 | 355 | 116 | |
| BS | 8 | 100% | - | |
| BS | 9 | 100% | - | |
| BS | 10 | 100% | - | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

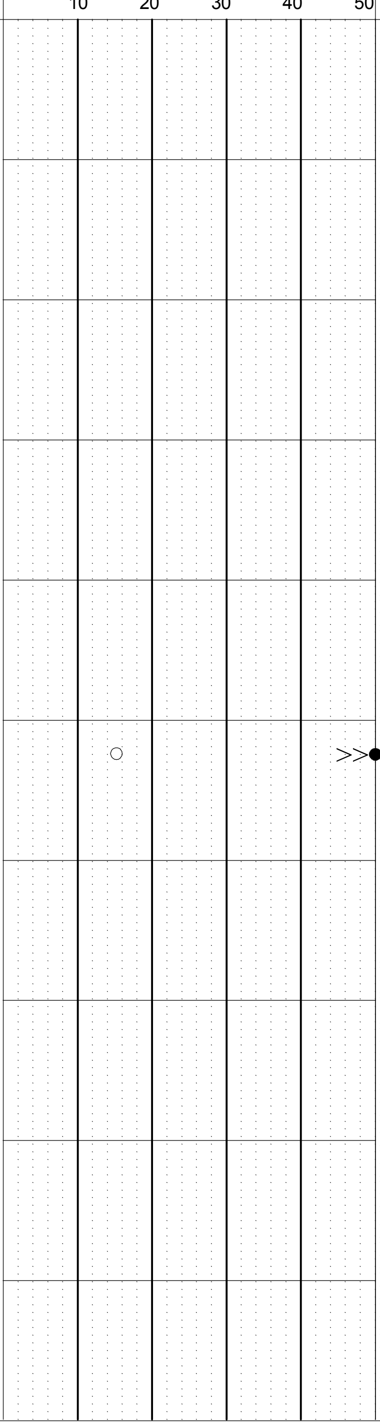
# Stantec BOREHOLE RECORD

BOREHOLE No. **ROB-11-07**
PAGE **2** of **7**
CLIENT **Alderon Iron Ore Corp.**
PROJECT No. **121614000-305**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
METHOD **Wash/Dia**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854802.17 m** E **631655.16 m**
SIZE **HW/HQ**
DATES (mm-dd-yy): BORING **3/27/2012 to 4/3/2012** WATER LEVEL **5.78 m 06/14/2012**
DATUM **Geodetic (NAD-27)**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | SAMPLE TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 10 | | Compact to very dense, brown, silty SAND (SM); trace gravel, cobbles and boulders: TILL | | | | | |
| 11.3 | | | BS | 11 | 100% | - | |
| 12.2 | 590.51 | Very dense, grey, silty SAND (SM); trace gravel and cobbles: TILL | | | | | |
| 15.2 | | | SS | 12 | 380 | 93 | S |
| 18.1 | | | BS | 13 | 100% | - | |
| 19.1 | | | BS | 14 | 100% | - | |
| 20 | | | | | | | |

UNDRAINED SHEAR STRENGTH - kPa
WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. **ROB-11-07**
PAGE **3** of **7**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854802.17 m** E **631655.16 m**
DATES (mm-dd-yy): BORING **3/27/2012 to 4/3/2012** WATER LEVEL **5.78 m 06/14/2012**

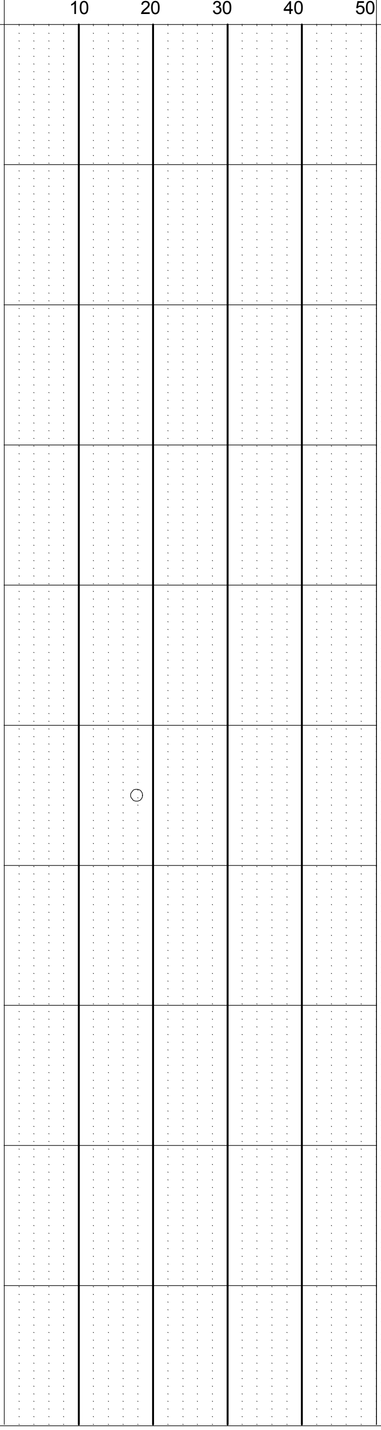
| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | |
| 20 | | Very dense, grey, silty SAND (SM); trace gravel and cobbles: TILL | | | | | | | |
| 21 | | | | | BS | 15 | 100% | - | |
| 22.4 | | | | | BS | 16 | 100% | - | |
| 25.5 | | | | | BS | 17 | 100% | - | |
| 27 | 575.57 | | | | BS | 18 | 100% | - | |
| 27.1 | | Very dense, brown, silty SAND (SM); trace gravel and cobbles: TILL | | | | | | | |
| 28.5 | | | | | BS | 19 | 100% | - | |
| 30 | | | | | | | | | |

UNDRAINED SHEAR STRENGTH - kPa
10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

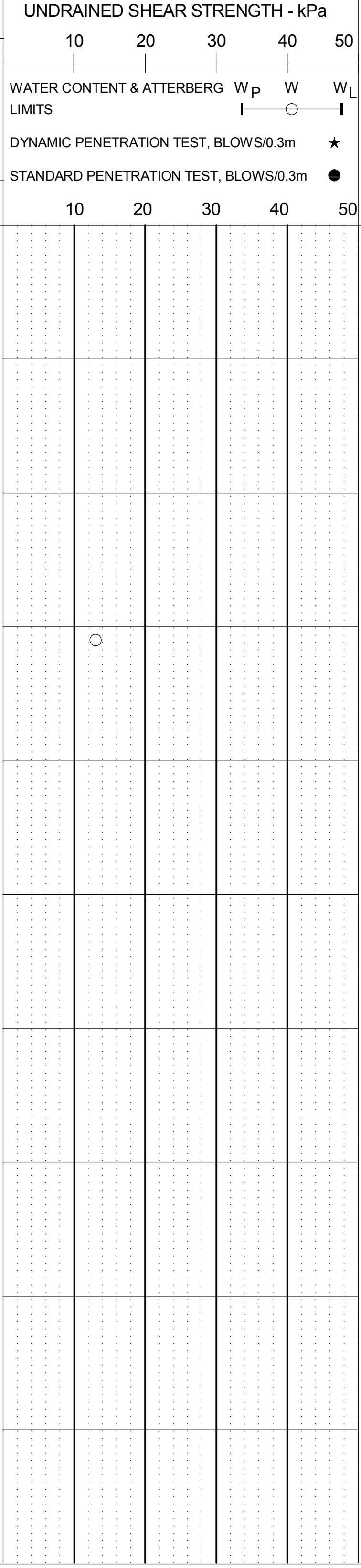
BOREHOLE No. **ROB-11-07**
PAGE 4 of 7
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

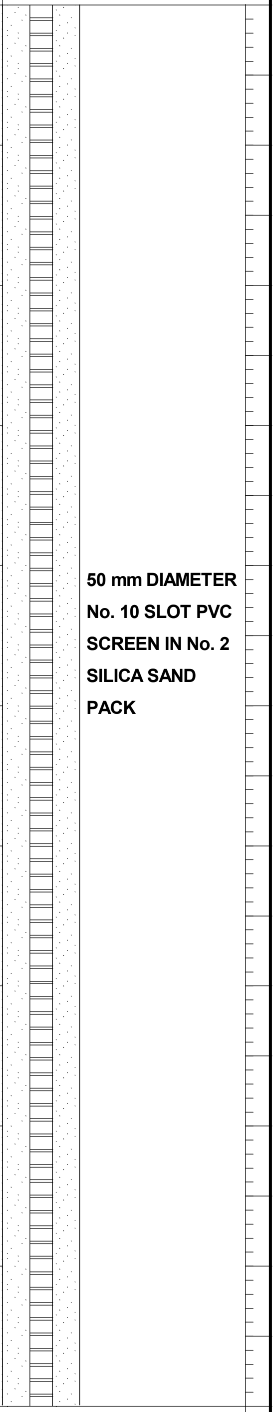
CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854802.17 m** E **631655.16 m**
DATES (mm-dd-yy): BORING **3/27/2012 to 4/3/2012** WATER LEVEL **5.78 m 06/14/2012**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 30 | | Very dense, brown, silty SAND (SM); trace gravel and cobbles: TILL |
| 31.85 | 570.85 | Very dense, grey, silty SAND (SM); trace gravel and cobbles: TILL |
| 37.90 | 564.90 | Very dense, brown, silty SAND (SM); trace gravel and cobbles: TILL |

| DEPTH (m) | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|
| 30 | BS | 20 | 100% | - | |
| 33 | BS | 21 | 100% | - | |
| 36 | BS | 22 | 100% | - | |
| 39 | BS | 23 | 100% | - | |





△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

Stantec

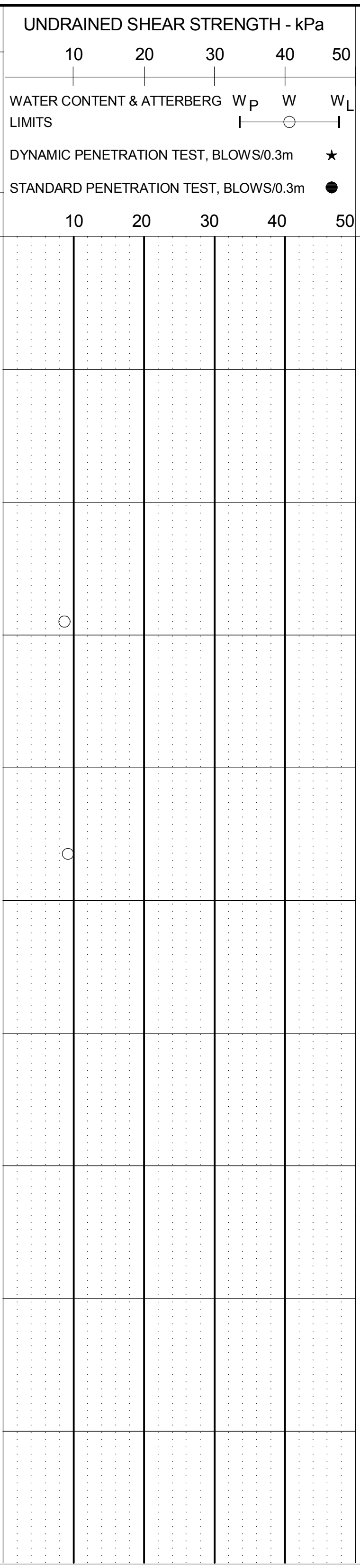
# BOREHOLE RECORD

BOREHOLE No. ROB-11-07
PAGE 5 of 7
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project - Pit Slope Design
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5854802.17 m
E 631655.16 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 3/27/2012 to 4/3/2012
WATER LEVEL 5.78 m 06/14/2012
DATUM Geodetic (NAD-27)

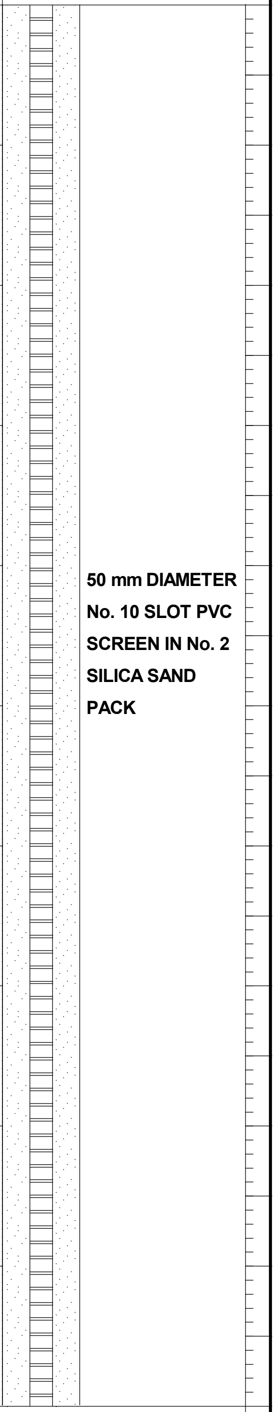
Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 40 | | Very dense, brown, silty SAND (SM); trace gravel and cobbles: TILL |
| 43.3 | 559.42 | Very dense, grey, silty SAND (SM); trace gravel, cobbles and boulders: TILL |

| SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| BS | 24 | 100% | - | |
| BS | 25 | 100% | - | S |
| BS | 26 | 100% | - | S |
| ~~SS~~ | ~~27~~ | ~~0~~ | ~~50/0~~ | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

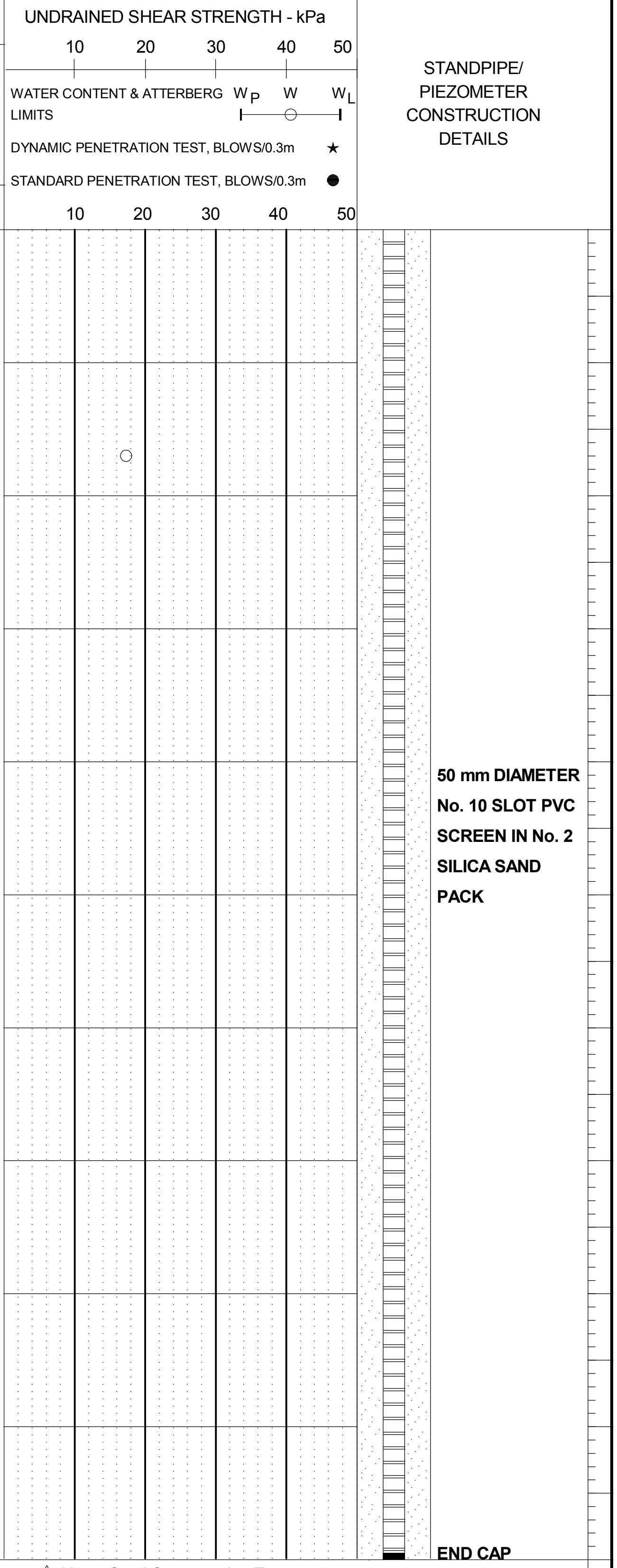
**Stantec**

# BOREHOLE RECORD

BOREHOLE No. **ROB-11-07**
PAGE **6** of **7**
CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854802.17 m** E **631655.16 m**
DATES (mm-dd-yy): BORING **3/27/2012 to 4/3/2012** WATER LEVEL **5.78 m 06/14/2012**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 50 | | Very dense, grey, silty SAND (SM); trace gravel, cobbles and boulders: TILL | | | | | |
| 51.8 | | | BS | 28 | 100% | - | |
| 52.4 | 550.27 | Very severely fractured to severely fractured, extremely weak, dark grey, muscovite biotite schist (Menihek Formation): BEDROCK<br>Note: Bedrock is so weak some of it is getting washed out with the drilling water. | | | | | |
| 54 | | | SS | 29 | 125 | 50/125 | |
| 55.5 | | | NQ | 30 | 26% | 9% | |
| 57.7 | | | NQ | 31 | 87% | 48% | |
| 59.3 | | | NQ | 32 | 52% | 0% | |
| 60 | | | | | | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

**Stantec**

BOREHOLE No. **ROB-11-07**
PAGE **7** of **7**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854802.17 m** E **631655.16 m**
DATES (mm-dd-yy): BORING **3/27/2012 to 4/3/2012** WATER LEVEL **5.78 m 06/14/2012**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES: TYPE | SAMPLES: NUMBER | SAMPLES: RECOVERY(mm) OR TCR % | SAMPLES: N-VALUE OR RQD % | SAMPLES: OTHER TESTS | UNDRAINED SHEAR STRENGTH - kPa (10 20 30 40 50)<br>WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$<br>DYNAMIC PENETRATION TEST, BLOWS/0.3m ★<br>STANDARD PENETRATION TEST, BLOWS/0.3m ●<br>(10 20 30 40 50) | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | | | |
| 60 | 542.65 | End of Borehole | | | | | | | | | |
| 61 | | | | | | | | | | | |
| 62 | | | | | | | | | | | |
| 63 | | | | | | | | | | | |
| 64 | | | | | | | | | | | |
| 65 | | | | | | | | | | | |
| 66 | | | | | | | | | | | |
| 67 | | | | | | | | | | | |
| 68 | | | | | | | | | | | |
| 69 | | | | | | | | | | | |
| 70 | | | | | | | | | | | |

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

**Stantec**

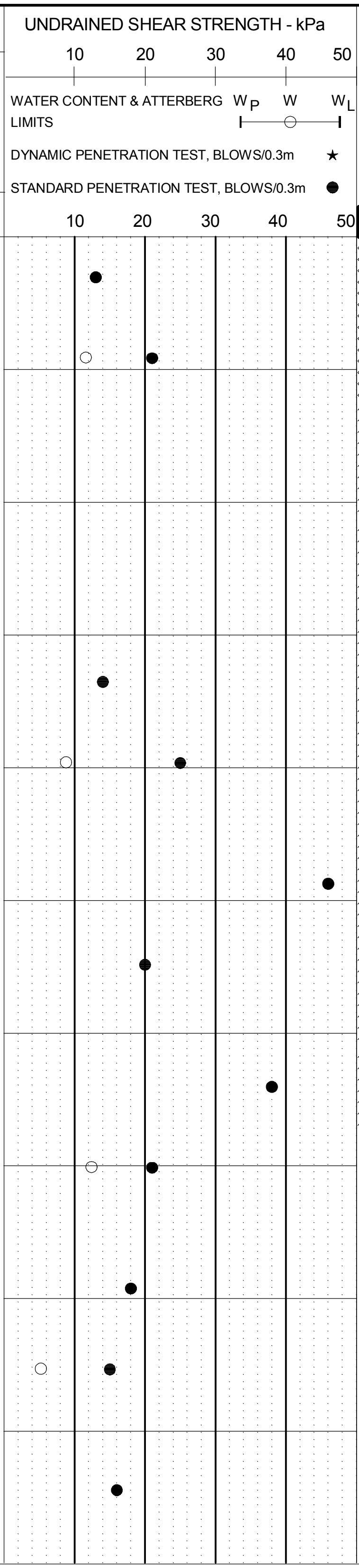
# BOREHOLE RECORD

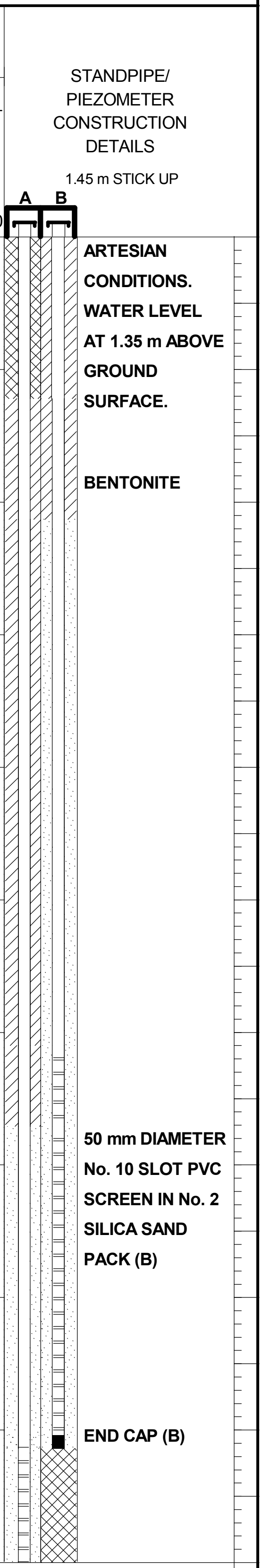
BOREHOLE No. **ROB-11-08**
PAGE **1** of **4**
CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL**
N **5854786.46 m** E **631956.37 m**
SIZE **HW/HQ**
DATES (mm-dd-yy): BORING **10/26/2011 to 10/28/2011**
WATER LEVEL **N/A**
DATUM **Geodetic (NAD-27)**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 579.20 | |
| | 578.90 | Cobbles and boulders pile at surface with peat and topsoil veneer |
| | | Compact to dense, grey to brown, silty SAND (SM); trace to locally some gravel: TILL<br>-frequent cobbles and boulders to 1.5m depth; occasional cobbles below 1.5m depth |
| | 569.45 | Compact to very dense, brown to |
| 10 | | |

SAMPLES

| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 560 | 13 | |
| SS | 2 | 405 | 21 | S |
| SS | 3 | 355 | 14 | |
| SS | 4 | 380 | 25 | S |
| SS | 5 | 280 | 46 | |
| SS | 6 | 230 | 20 | |
| SS | 7 | 50 | 38 | |
| SS | 8 | 535 | 21 | S |
| SS | 9 | 255 | 18 | S H |
| SS | 10 | 355 | 15 | S |
| SS | 11 | 280 | 16 | |





**ARTESIAN CONDITIONS. WATER LEVEL AT 1.35 m ABOVE GROUND SURFACE.**

**BENTONITE**

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B)**

**END CAP (B)**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

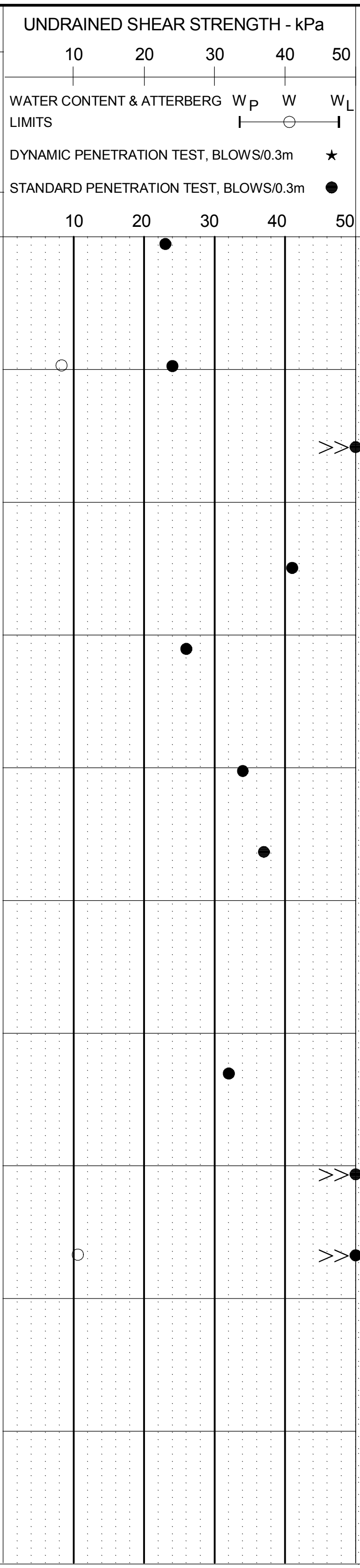
# BOREHOLE RECORD

BOREHOLE No. **ROB-11-08**
PAGE **2** of **4**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL**
N **5854786.46 m** E **631956.37 m**
DATES (mm-dd-yy): BORING **10/26/2011 to 10/28/2011**
WATER LEVEL **N/A**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 10 | | grey, silty SAND with gravel (SM); trace cobbles: TILL | SS | 12 | 280 | 23 | |
| 11 | | | SS | 13 | 355 | 24 | S |
| | | | SS | 14 | 305 | 51 | |
| 12 | | | SS | 15 | 255 | 41 | |
| 13 | | | SS | 16 | 280 | 26 | |
| 14 | | | SS | 17 | 125 | 34 | |
| | | | SS | 18 | 255 | 37 | |
| 15 | | | | | | | |
| 16 | | | SS | 19 | 280 | 32 | |
| 17 | | | SS | 20 | 75 | 62 | |
| | | | SS | 21 | 330 | 54 | S |
| 18 | 560.66 | | SS | 22 | 255 | 98/300 | |
| 19 | | Very dense, dark grey, silty SAND with gravel (SM) to silty clayey SAND (SC-SM); occasional cobbles: TILL | BS | 23 | - | - | |
| 20 | | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (A)**

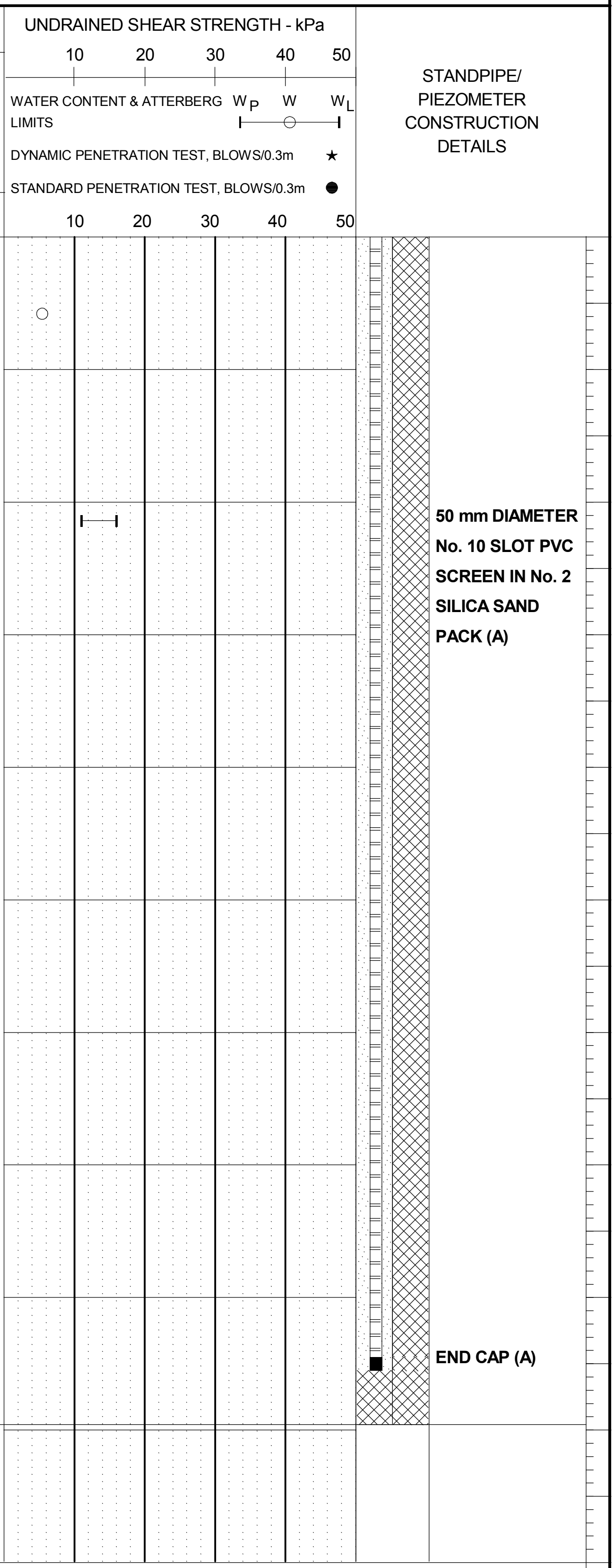
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

**Stantec**

BOREHOLE No. **ROB-11-08**
PAGE **3** of **4**
CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL**
N **5854786.46 m** E **631956.37 m**
SIZE **HW/HQ**
DATES (mm-dd-yy): BORING **10/26/2011 to 10/28/2011**
WATER LEVEL **N/A**
DATUM **Geodetic (NAD-27)**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | |
| 20 | | Very dense, dark grey, silty SAND with gravel (SM) to silty clayey SAND (SC-SM); occasional cobbles: TILL | | | BS | 24 | 92% | - | S |
| | | | | | SS | 25 | 75 | 50/75 | |
| 22 | | | | | BS | 26 | - | - | S H |
| | 556.34 | | | | | | | | |
| 23 | | Very severely fractured to moderately jointed, medium strong to occasionally weak, grey, banded, Quartzite, Wishart Formation: BEDROCK | | | HQ | 27 | 30% | 0% | |
| 24 | | | | | SS | 28 | 0 | 50/0 | |
| 25 | | | | | HQ | 29 | 60% | 0% | |
| 26 | | | | | HQ | 30 | 100% | 35% | |
| 28 | | | | | HQ | 31 | 100% | 81% | |
| 29 | 550.24 | End of Borehole<br>- Artesian conditions encountered during drilling at approximately | | | | | | | |
| 30 | | | | | | | | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. **ROB-11-08**
PAGE **4** of **4**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854786.46 m** E **631956.37 m**
DATES (mm-dd-yy): BORING **10/26/2011 to 10/28/2011** WATER LEVEL **N/A**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES | | | | | UNDRAINED SHEAR STRENGTH - kPa<br>10 20 30 40 50<br>WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$<br>DYNAMIC PENETRATION TEST, BLOWS/0.3m ★<br>STANDARD PENETRATION TEST, BLOWS/0.3m ●<br>10 20 30 40 50 | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | | |
| 30 | | 17.7m to 19.9m depth and 22.9m to 29.0m depth.<br>- Artesian water condition flowing above ground surface. | | | | | | | | | |
| 31 | | | | | | | | | | | |
| 32 | | | | | | | | | | | |
| 33 | | | | | | | | | | | |
| 34 | | | | | | | | | | | |
| 35 | | | | | | | | | | | |
| 36 | | | | | | | | | | | |
| 37 | | | | | | | | | | | |
| 38 | | | | | | | | | | | |
| 39 | | | | | | | | | | | |
| 40 | | | | | | | | | | | |

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

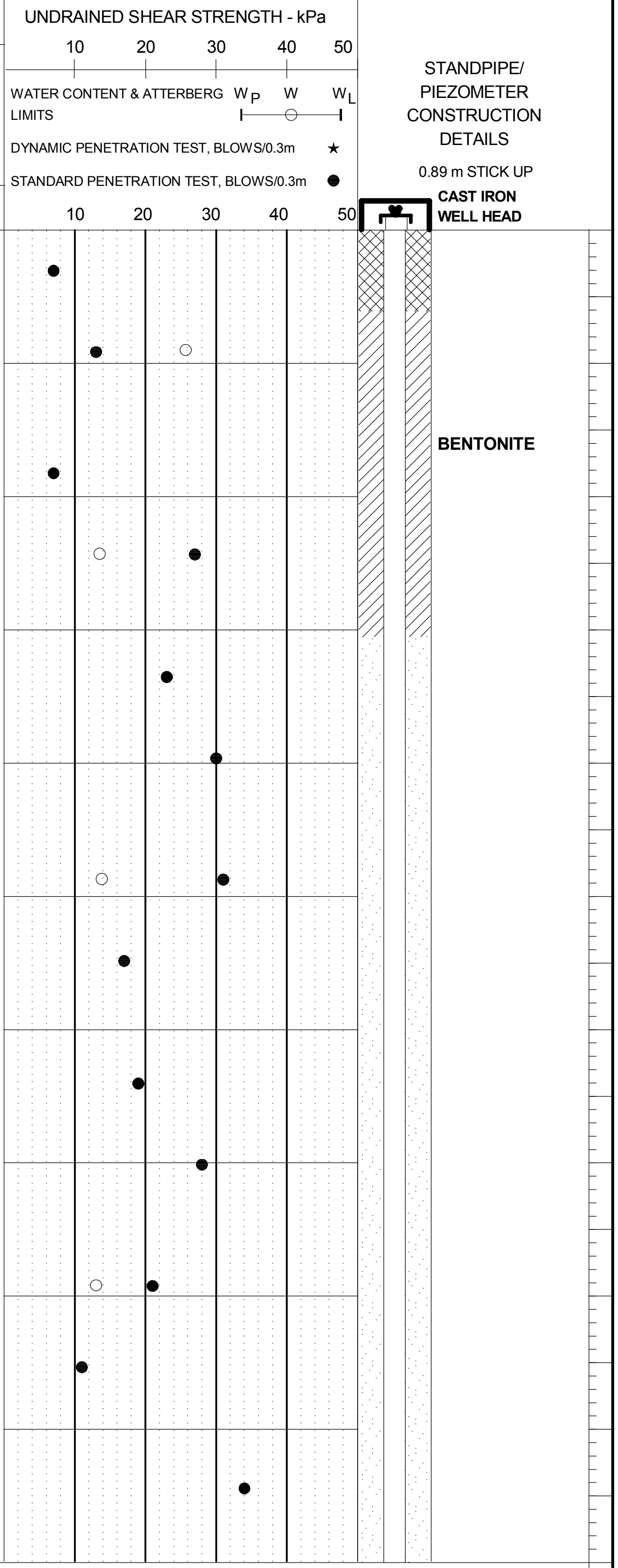
# BOREHOLE RECORD

BOREHOLE No. **ROB-11-09**
PAGE **1** of **4**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854655.61 m** E **632217.11 m**
DATES (mm-dd-yy): BORING **11/2/2011 to 11/5/2011** WATER LEVEL **-0.9 m 11/3/2011**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 589.70 | |
| | 589.55 | PEAT |
| | | Loose to compact, brown, SILT (ML); trace sand: TILL |
| | 588.18 | Loose to compact, brown, silty SAND (SM); trace gravel to poorly graded SAND with gravel (SP); occasional cobbles: TILL |
| | 580.10 | Compact to dense, grey, silty SAND with gravel (SM); trace cobbles and |

| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 560 | 7 | |
| SS | 2 | 355 | 13 | S |
| SS | 3 | 205 | 7 | S H |
| SS | 4 | 455 | 27 | S |
| SS | 5 | 255 | 23 | |
| SS | 6 | 405 | 30 | |
| SS | 7 | 305 | 31 | S |
| SS | 8 | 405 | 17 | |
| SS | 9 | 330 | 19 | |
| SS | 10 | 480 | 28 | |
| SS | 11 | 455 | 21 | S |
| SS | 12 | 455 | 11 | |
| SS | 13 | 510 | 34 | |



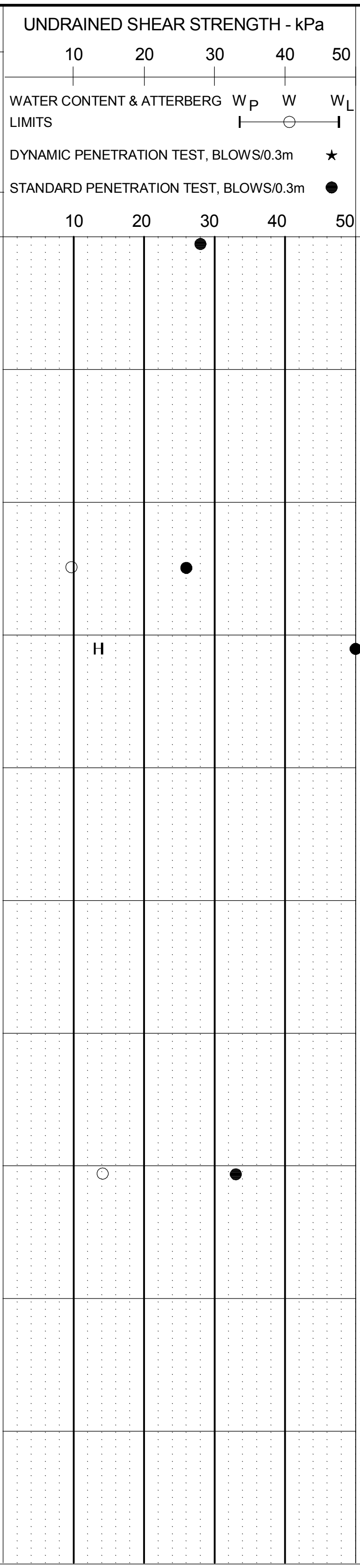
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

Stantec

BOREHOLE No. **ROB-11-09**
PAGE **2** of **4**
CLIENT **Alderon Iron Ore Corp.**
PROJECT No. **121614000-305**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
METHOD **Wash/Dia**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854655.61 m** E **632217.11 m**
SIZE **HW/HQ**
DATES (mm-dd-yy): BORING **11/2/2011 to 11/5/2011**
WATER LEVEL **-0.9 m 11/3/2011**
DATUM **Geodetic (NAD-27)**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | SAMPLES NUMBER | SAMPLES RECOVERY(mm) OR TCR % | SAMPLES N-VALUE OR RQD % | SAMPLES OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | |
| 10 | | boulders: TILL | | | SS | 14 | 230 | 28 | |
| | | | | | SS | 15 | 0 | 50/0 | |
| 12 | | | | | SS | 16 | 355 | 26 | S |
| 13 | | | | | SS | 17 | 355 | 50 | S H |
| 16 | 573.55 | Dense to very dense, brown, silty SAND with gravel (SM); trace cobbles: TILL | | | | | | | |
| 17 | | | | | SS | 18 | 610 | 33 | S |
| 18 | | | | | SS | 19 | 230 | 128/530 | |
| 20 | | | | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

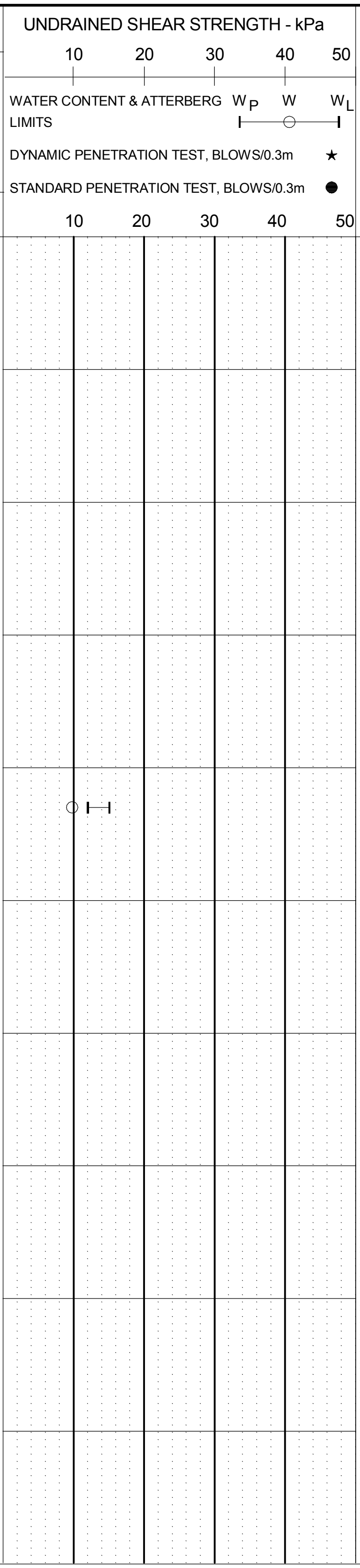
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-09
PAGE 3 of 4
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5854655.61 m E 632217.11 m
DATES (mm-dd-yy): BORING 11/2/2011 to 11/5/2011 WATER LEVEL -0.9 m 11/3/2011
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION<br>Continued from Previous Page | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|
| 20 | | Dense to very dense, brown, silty SAND with gravel (SM); trace cobbles: TILL | SS | 20 | 150 | 112/300 | | |
| 21 | | | SS | 21 | 305 | 113/380 | | |
| 22 | 567.14 | Very dense, grey silty SAND with gravel (SM); trace cobbles and boulders: TILL | | | | | | |
| 24 | | | BS | 22 | 150 | - | S H | |
| 25 | | | BS | 23 | 150 | - | | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| 26 | 563.79 | Fractured, extremely weak, orange brown, Ms-Sch (Muscivite Schist), Menihek Formation: BEDROCK | HQ | 24 | 100% | 67% | | |
| 28 | | | HQ | 25 | 100% | 50% | | |
| 29 | | | HQ | 26 | 83% | 72% | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-09
PAGE 4 of 4
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5854655.61 m E 632217.11 m
DATES (mm-dd-yy): BORING 11/2/2011 to 11/5/2011 WATER LEVEL -0.9 m 11/3/2011
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES |  |  |  |  | OTHER TESTS | UNDRAINED SHEAR STRENGTH - kPa (10 20 30 40 50)<br>WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$<br>DYNAMIC PENETRATION TEST, BLOWS/0.3m ★<br>STANDARD PENETRATION TEST, BLOWS/0.3m ●<br>10 20 30 40 50 | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % |  |  |  |  |
|  |  | Continued from Previous Page |  |  |  |  |  |  |  |  |  |  |
| 30 | 559.22 | Fractured, extremely weak, orange brown, Ms-Sch (Muscivite Schist), Menihek Formation: BEDROCK |  |  |  |  |  |  |  |  |  | END CAP |
|  |  | End of Borehole |  |  |  |  |  |  |  |  |  |  |
| 31 |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 |  |  |  |  |  |  |  |  |  |  |  |  |
| 33 |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 |  |  |  |  |  |  |  |  |  |  |  |  |
| 35 |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 |  |  |  |  |  |  |  |  |  |  |  |  |
| 37 |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 |  |  |  |  |  |  |  |  |  |  |  |  |
| 39 |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 |  |  |  |  |  |  |  |  |  |  |  |  |

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

**Stantec**

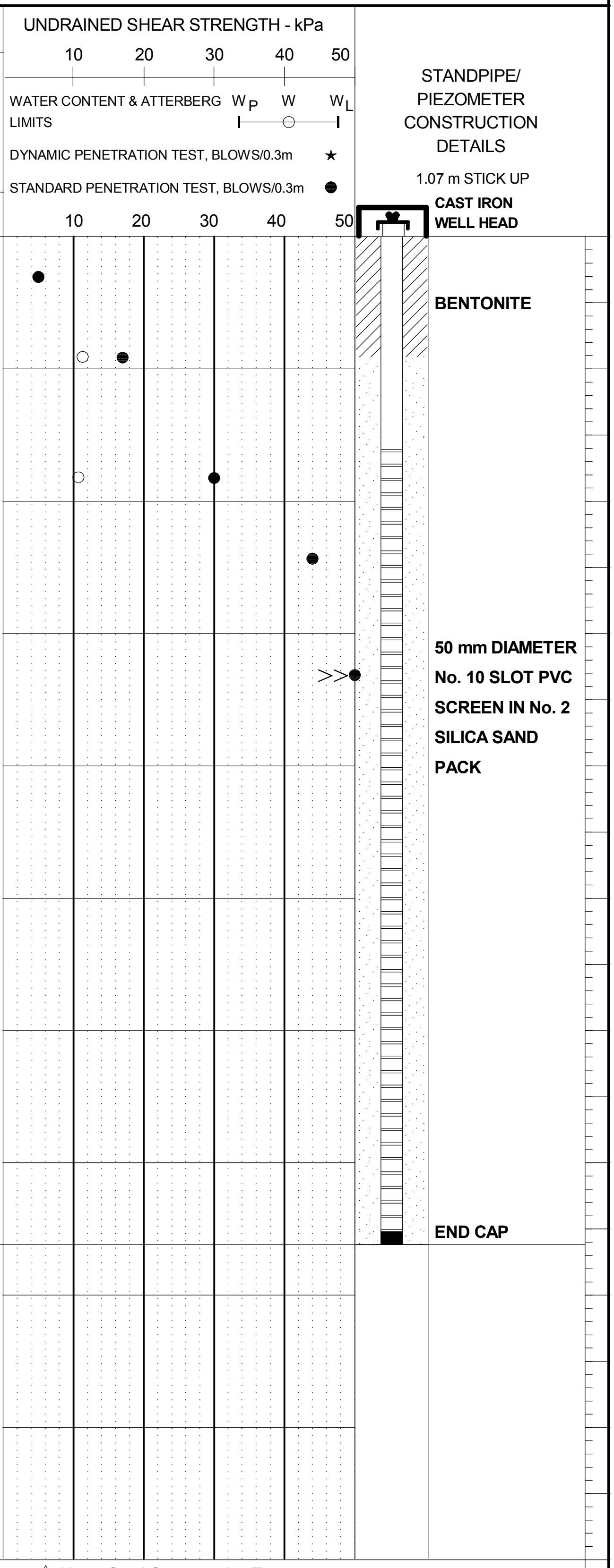
# BOREHOLE RECORD

BOREHOLE No. **ROB-11-10**
PAGE **1** of **1**
CLIENT **Alderon Iron Ore Corp.**
PROJECT No. **121614000-305**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
METHOD **Wash/Dia**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5854663 m** E **632645 m**
SIZE **HW/HQ**
DATES (mm-dd-yy): BORING **10/17/2011 to 10/18/2011**
WATER LEVEL **6.45 m 03/01/2012**
DATUM **Geodetic (NAD-27)**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 615.60 | |
| | 615.52 | PEAT |
| | 615.45 | TOPSOIL |
| | | Loose to very dense, light brown, silty SAND (SM) to sandy SILT (ML); trace gravel: TILL |
| | 612.02 | Intact, strong, grey, thickly banded, magnetite quartzite iron formation (Sokoman Formation, IF-MAIN): BEDROCK |
| | 607.98 | End of Borehole |

SAMPLES

| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 280 | 5 | |
| SS | 2 | 430 | 17 | S |
| SS | 3 | 430 | 30 | S |
| SS | 4 | 355 | 44 | S H |
| SS | 5 | 355 | 55 | |
| HQ | 6 | 100% | 92% | |
| HQ | 7 | 100% | 100% | |
| HQ | 8 | 100% | 100% | |



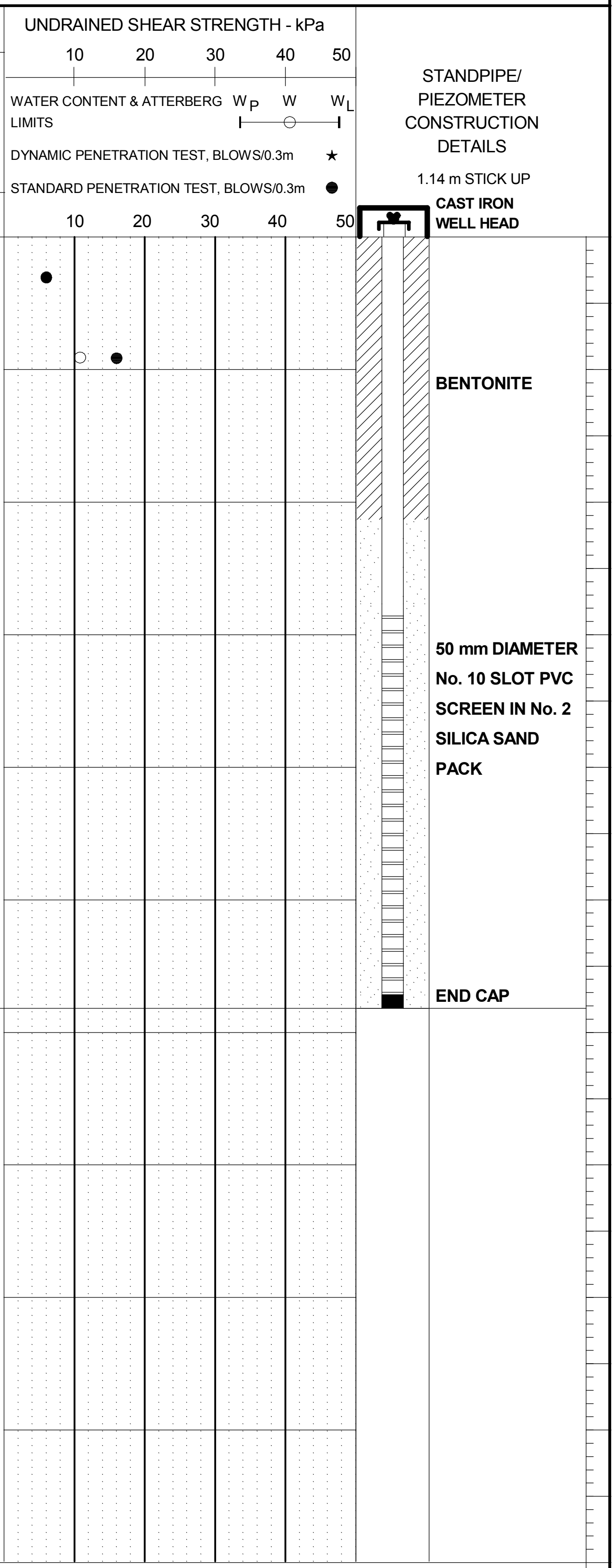
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

Stantec

# BOREHOLE RECORD

BOREHOLE No. ROB-11-11
PAGE 1 of 1
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5854786 m E 632918 m
DATES (mm-dd-yy): BORING 10/19/2011
WATER LEVEL 3.39 m 03/01/2012
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
|  | 616.70 |  |  |  |  |  |  |  |  |
| 0 | 616.55 | TOPSOIL |  |  |  |  |  |  |  |
|  |  | Loose to compact, brown, silty SAND (SM); trace gravel: TILL |  |  | SS | 1 | 455 | 6 |  |
| 1 |  |  |  |  | SS | 2 | 430 | 16 | S |
|  | 614.95 |  |  |  | SS | 3 | 100 | 60/230 |  |
| 2 |  | Intact, strong, grey, wavy banded, quartz carbonate iron formation (Sokoman Formation, IF-carbonate): BEDROCK |  |  | HQ | 4 | 100% | 100% |  |
| 3 |  |  |  | ▼ |  |  |  |  |  |
| 4 |  |  |  |  | HQ | 5 | 100% | 100% |  |
| 5 |  |  |  |  | HQ | 6 | 100% | 100% |  |
|  | 610.88 |  |  |  |  |  |  |  |  |
| 6 |  | End of Borehole |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |  |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

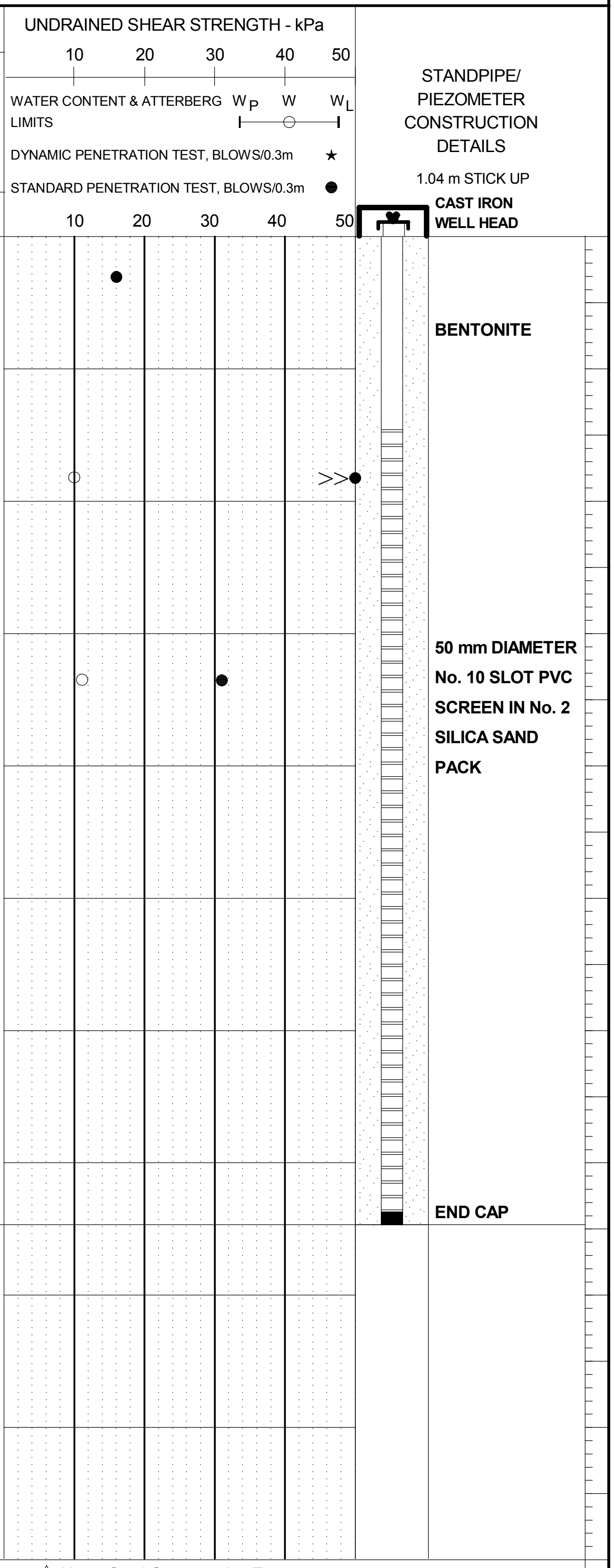
# BOREHOLE RECORD

BOREHOLE No. ROB-11-12
PAGE 1 of 1
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5854952.57 m E 633242.08 m
DATES (mm-dd-yy): BORING 10/20/2011 to 10/21/2011
WATER LEVEL 3.25 m 04/01/2012
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

| ELEVATION (m) | DESCRIPTION |
|---|---|
| 629.60 | |
| 629.45 | PEAT |
| 625.66 | Compact to very dense, brown, silty SAND with gravel (SM); trace cobbles and boulders: TILL |
| 623.77 | Intact, strong, grey, magnetite quartzite iron formation (Sokoman Formation, IF-main): BEDROCK |
| 622.13 | Intact, strong, grey, quartz silicate iron formation (Sokoman Formation, IF-silicate): BEDROCK |
| | End of Borehole |

WATER LEVEL: ▼ 3.25 m

| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 330 | 16 | |
| SS | 2 | 230 | 95/300 | |
| SS | 3 | 305 | 73 | S |
| SS | 4 | 380 | 31 | S |
| SS | 5 | 100 | 80/180 | |
| HQ | 6 | 100% | 100% | |
| HQ | 7 | 100% | 100% | |
| HQ | 8 | 100% | 100% | |
| HQ | 9 | 100% | 95% | |



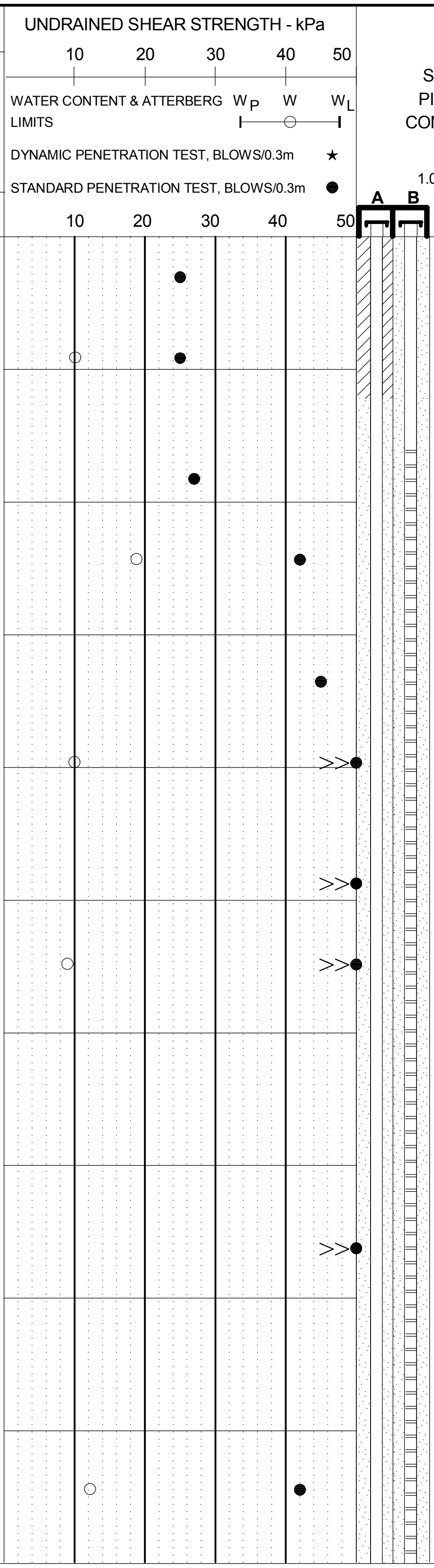
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

**Stantec**

BOREHOLE No. ROB-11-13
PAGE 1 of 2
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855229.49 m
E 633783.66 m
METHOD Wash/Dia
SIZE HW/HQ
DATES (mm-dd-yy): BORING 3/18/2012
WATER LEVEL 6.15 m 04/01/2012
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | WATER LEVEL | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|
| 0 | 633.20 | | | | | | | |
| | 633.10 | ROOTMAT/TOPSOIL | | | | | | |
| | | Compact, light brown to grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL | | SS | 1 | 560 | 25 | |
| 1 | | | | SS | 2 | 255 | 25 | |
| 2 | | | | SS | 3 | 150 | 27 | |
| | 630.76 | Dense to very dense, grey to light brown, silty SAND to silty SAND with gravel (SM); occasional cobbles and boulders: TILL | | SS | 4 | 305 | 42 | |
| 3 | | | | SS | 5 | 305 | 45 | |
| 4 | | | | SS | 6 | 255 | 55 | |
| 5 | | | | SS | 7 | 305 | 60 | |
| | | | | SS | 8 | 305 | 62 | S |
| 6 | | | ▼ | SS | 9 | 150 | 126/380 | |
| 7 | | | | SS | 10 | 0 | 81 | |
| 8 | | | | | | | | |
| 9 | 624.06 | Dense, light brown, silty SAND with gravel (SM); occasional cobbles and boulders: TILL | | SS | 11 | 255 | 42 | |
| 10 | | | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

1.02 m STICK UP

**BENTONITE (A)**

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK (B)**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

# BOREHOLE RECORD

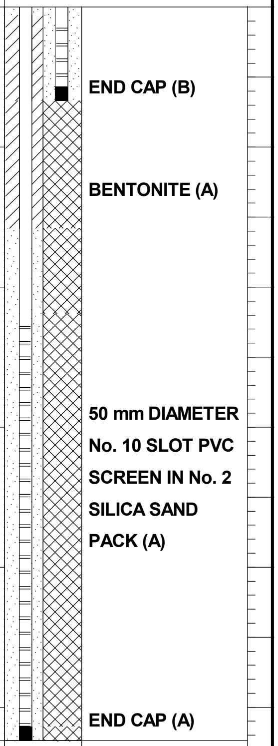
**Stantec**

BOREHOLE No. ROB-11-13
PAGE 2 of 2
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855229.49 m E 633783.66 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 3/18/2012
WATER LEVEL 6.15 m 04/01/2012
DATUM Geodetic (NAD-27)

UNDRAINED SHEAR STRENGTH - kPa: 10 20 30 40 50
WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●
10 20 30 40 50

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | SAMPLES NUMBER | SAMPLES RECOVERY(mm) OR TCR % | SAMPLES N-VALUE OR RQD % | SAMPLES OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | |
| 10 | 621.92 | Dense, light brown, silty SAND with gravel (SM); occasional cobbles and boulders: TILL | | | SS | 12 | 75 | 50/75 | |
| 11 | | Moderately jointed to intact, medium strong, dark grey, muscovite biotite schist (Menihek Formation): BEDROCK | | | HQ | 13 | 100% | 88% | |
| 12 | | | | | HQ | 14 | 94% | 88% | |
| 13 | | | | | HQ | 15 | 92% | 92% | |
| 14 | 617.96 | | | | HQ | 16 | 100% | 100% | |
| 15 | | End of Borehole | | | | | | | |
| 16 | | | | | | | | | |
| 17 | | | | | | | | | |
| 18 | | | | | | | | | |
| 19 | | | | | | | | | |
| 20 | | | | | | | | | |

STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



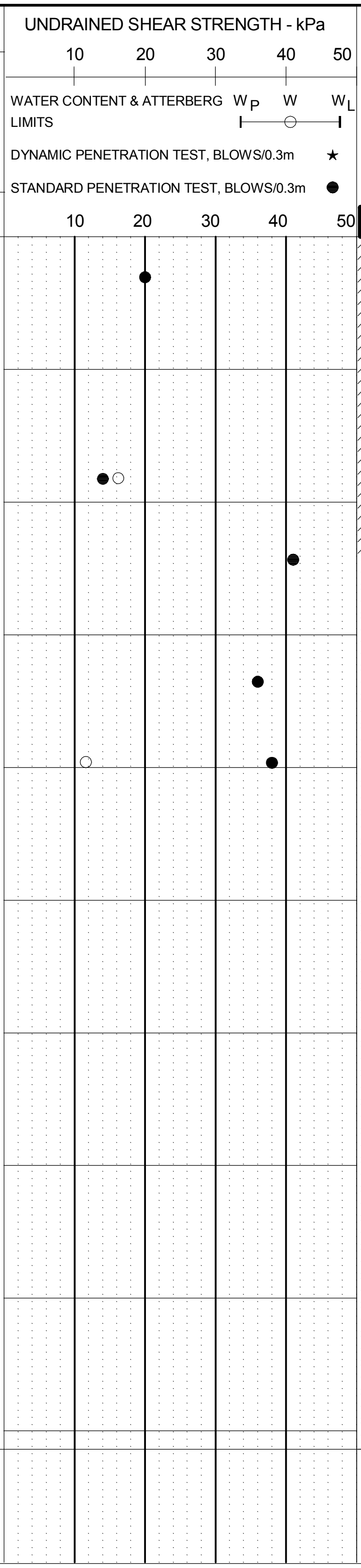
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

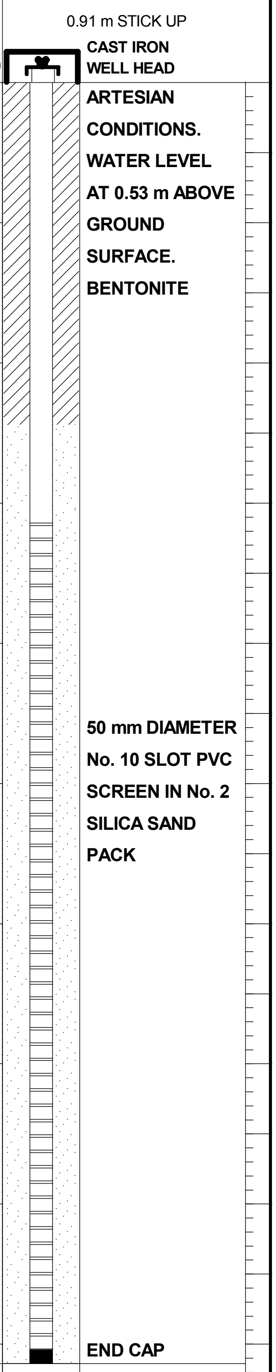
**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-14
PAGE 1 of 1
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855758.73 m E 633875.62 m
METHOD Wash/Dia
SIZE HW/HQ
DATES (mm-dd-yy): BORING 3/25/2012
WATER LEVEL -0.53 m 06/14/12
DATUM Geodetic (NAD-27)

| ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|
| 605.80 | | | | | | |
| 605.75 | ROOTMAT/TOPSOIL | | | | | |
| | Compact, dark brown, silty SAND with gravel (SM); occasional cobbles, occasional rootlets | SS | 1 | 255 | 20 | |
| 604.43 | Comapct to dense, grey to brown, silty SAND (SM); trace gravel, occasional cobbles and boulders: TILL | SS | 2 | 100 | 14 | |
| | | SS | 3 | 255 | 41 | |
| | | SS | 4 | 205 | 36 | |
| | | SS | 5 | 355 | 38 | S |
| | | SS | 6 | 150 | 92/250 | |
| 600.98 | Moderately jointed to intact, medium strong, dark grey, muscovite biotite schist (Menihek Formation), occasional quartz and pyrite, occasional sand seams: BEDROCK | HQ | 7 | 100% | 96% | |
| | | HQ | 8 | 93% | 80% | |
| | | HQ | 9 | 100% | 100% | |
| 596.66 | End of Borehole<br>- Artesian water condition flowing at approx. 0.53m above ground surface. | | | | | |





△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

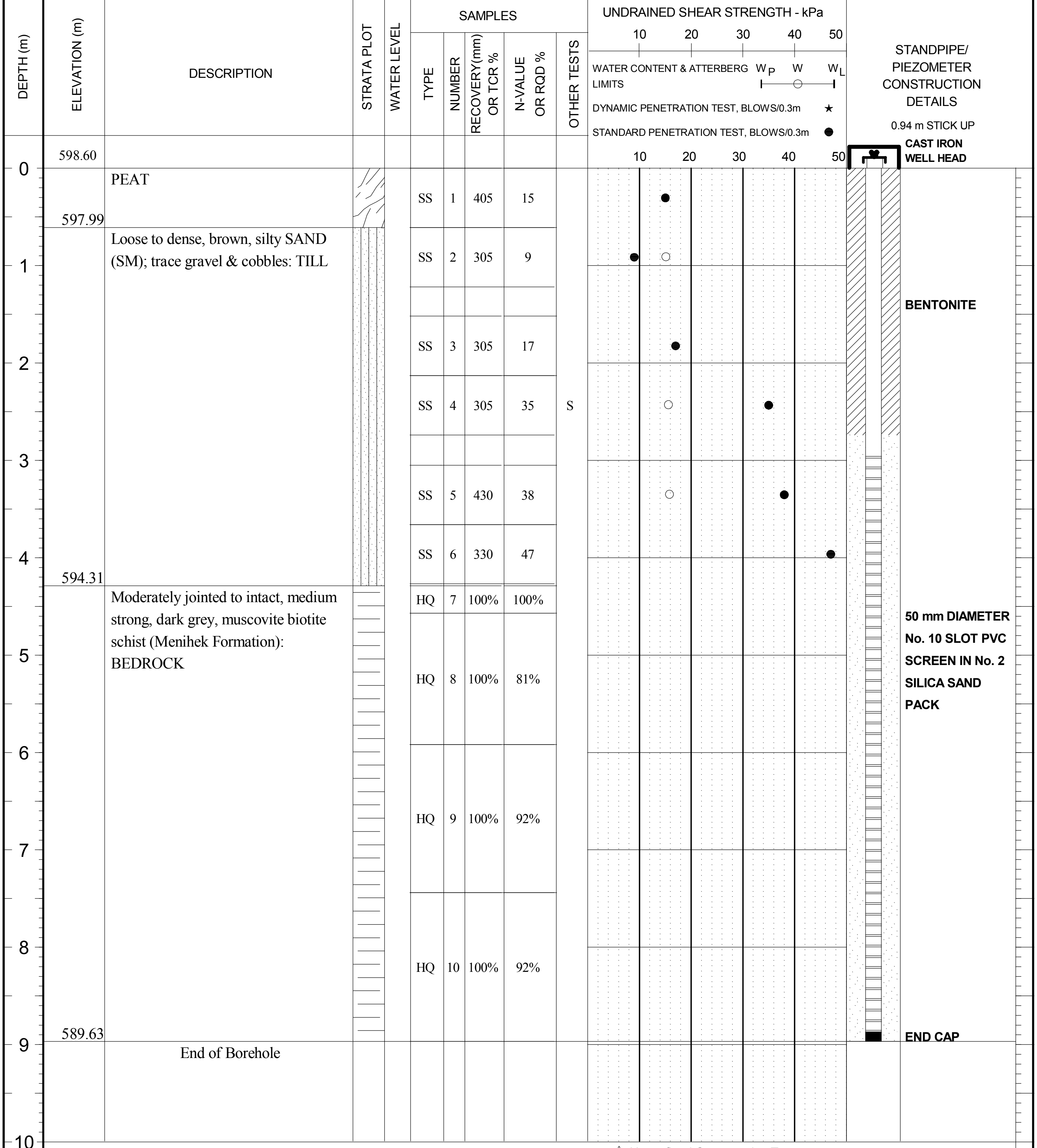
**Stantec**

# BOREHOLE RECORD

BOREHOLE No. **ROB-11-15**
PAGE **1** of **1**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5856144.49 m** E **633477.5 m**
DATES (mm-dd-yy): BORING **4/8/2012** WATER LEVEL **N/A**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 598.60 | | | | | | | | |
| | | PEAT | | | SS | 1 | 405 | 15 | |
| | 597.99 | Loose to dense, brown, silty SAND (SM); trace gravel & cobbles: TILL | | | SS | 2 | 305 | 9 | |
| | | | | | SS | 3 | 305 | 17 | |
| | | | | | SS | 4 | 305 | 35 | S |
| | | | | | SS | 5 | 430 | 38 | |
| | | | | | SS | 6 | 330 | 47 | |
| | 594.31 | Moderately jointed to intact, medium strong, dark grey, muscovite biotite schist (Menihek Formation): BEDROCK | | | HQ | 7 | 100% | 100% | |
| | | | | | HQ | 8 | 100% | 81% | |
| | | | | | HQ | 9 | 100% | 92% | |
| | | | | | HQ | 10 | 100% | 92% | |
| 9 | 589.63 | End of Borehole | | | | | | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

STANTEC GEOTECH BOREHOLE/MONITOR WELL 8/30/12 2:42:43 PM

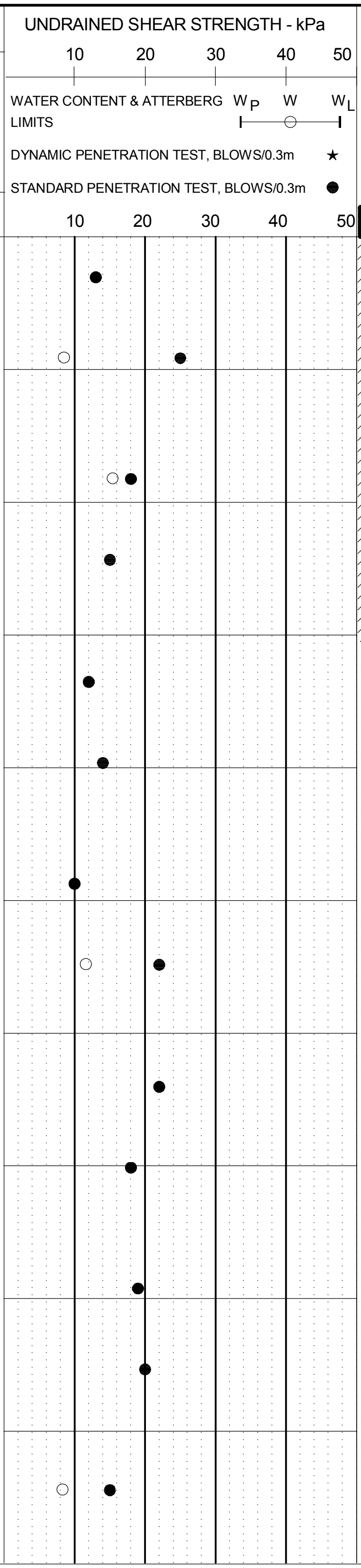
# BOREHOLE RECORD

Stantec

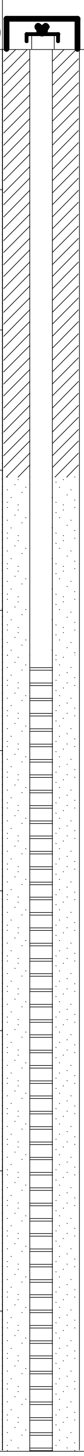
BOREHOLE No. ROB-11-16
PAGE 1 of 2
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5856085.38 m E 633197.23 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 10/24/2011 to 10/25/2011
WATER LEVEL -55 m 11/3/2011
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 0 | 570.50 | | | | | | |
| | 570.35 | PEAT | | | | | |
| | 570.20 | TOPSOIL | SS | 1 | 335 | 13 | |
| | | Compact, grey, silty SAND with gravel (SM) to silty SAND (SM); trave gravel: TILL | SS | 2 | 280 | 25 | S H |
| | | | SS | 3 | 175 | 18 | S |
| | | | SS | 4 | 175 | 15 | |
| | | | SS | 5 | 175 | 12 | |
| | | | SS | 6 | 150 | 14 | |
| | | | SS | 7 | 175 | 10 | |
| | | | SS | 8 | 330 | 22 | S |
| | | | SS | 9 | 100 | 22 | |
| | | | SS | 10 | 355 | 18 | |
| | | | SS | 11 | 205 | 19 | |
| | | | SS | 12 | 175 | 20 | |
| | | | SS | 13 | 205 | 15 | S |
| 10 | | | | | | | |

UNDRAINED SHEAR STRENGTH - kPa



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

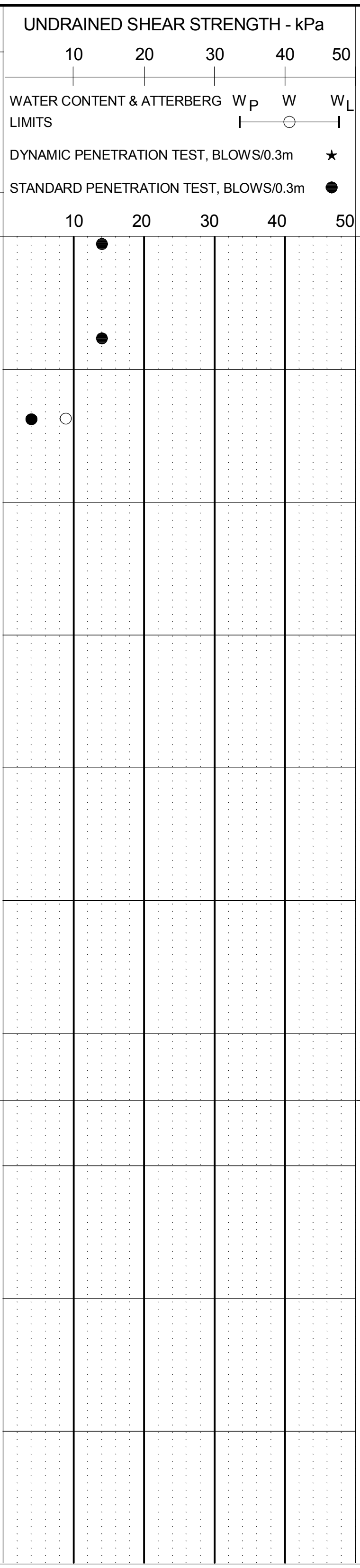
**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-16
PAGE 2 of 2
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5856085.38 m E 633197.23 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 10/24/2011 to 10/25/2011
WATER LEVEL -55 m 11/3/2011
DATUM Geodetic (NAD-27)

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|
| 10 | | Compact, grey, silty SAND with gravel (SM) to silty SAND (SM); trave gravel: TILL | SS | 14 | 230 | 14 | S H | |
| | | | SS | 15 | 150 | 14 | | |
| 11 | | -locally loose from 11.1m to 11.7m depth | SS | 16 | 610 | 4 | S | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| 12 | 558.28 | | SS | 17 | 230 | 90/230 | | |
| | | Fractured to intact, medium strong to strong, black, banded, biotite muscovite quartz schist, graphitic muscovite quartz schist, and hornblende biotite garnet gneiss (Menihek Formation): BEDROCK | HQ | 18 | 100% | 98% | | |
| 14 | | | HQ | 19 | 98% | 50% | | |
| 15 | | | HQ | 20 | 100% | 100% | | |
| 16 | 553.99 | | | | | | | END CAP |
| | | End of Borehole | | | | | | |
| 17 | | - Artesian water condition flowing at approx. 0.55m above ground surface. | | | | | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

**Stantec**

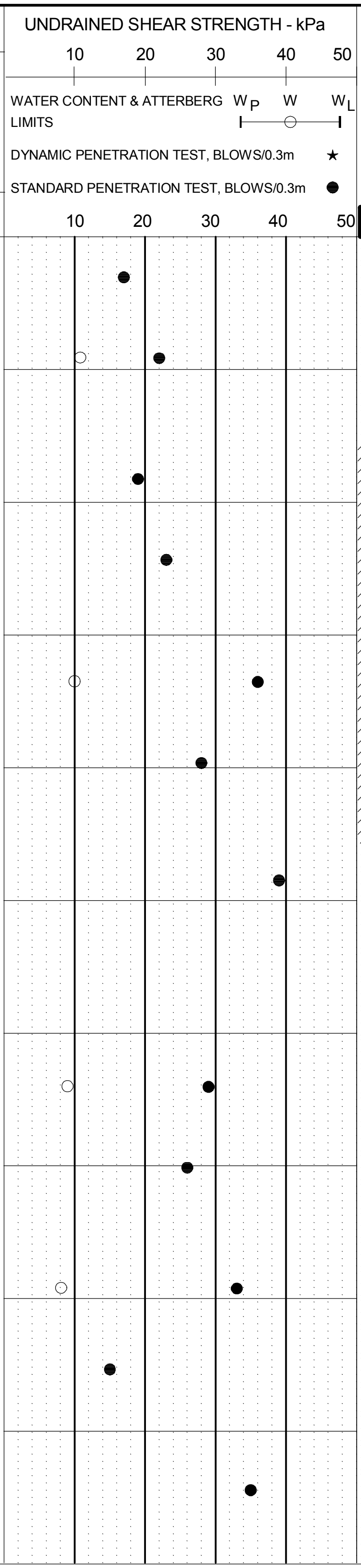
# BOREHOLE RECORD

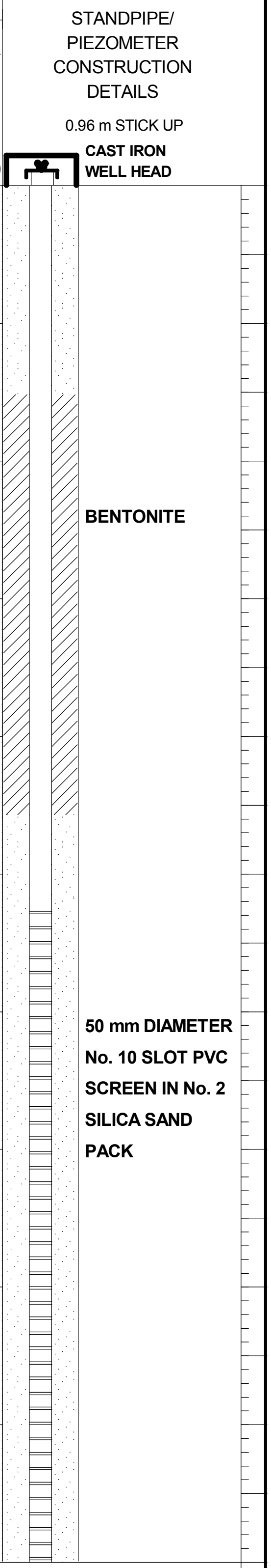
BOREHOLE No. ROB-11-17
PAGE 1 of 5
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project - Pit Slope Design
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855599.02 m E 632769.44 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 10/10/2011 to 10/13/2011
WATER LEVEL 1.41 m 03/01/2012
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 581.60 | |
| | 581.45 | TOPSOIL |
| | | Compact to dense, brown, silty SAND with gravel (SM); trace cobbles and boulders: TILL |
| | 574.13 | Compact to dense, grey, silty SAND with gravel (SM) to silty SAND (SM); trace gravel, cobbles and boulders: TILL |
| 10 | | |

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

| SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 380 | 17 | |
| SS | 2 | 205 | 22 | S |
| SS | 3 | 205 | 19 | |
| SS | 4 | 50 | 23 | |
| SS | 5 | 205 | 36 | S |
| SS | 6 | 175 | 28 | |
| SS | 7 | 355 | 39 | |
| SS | 8 | 380 | 29 | S |
| SS | 9 | 230 | 26 | |
| SS | 10 | 355 | 33 | S |
| SS | 11 | 280 | 15 | S H |
| SS | 12 | 305 | 35 | |





△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

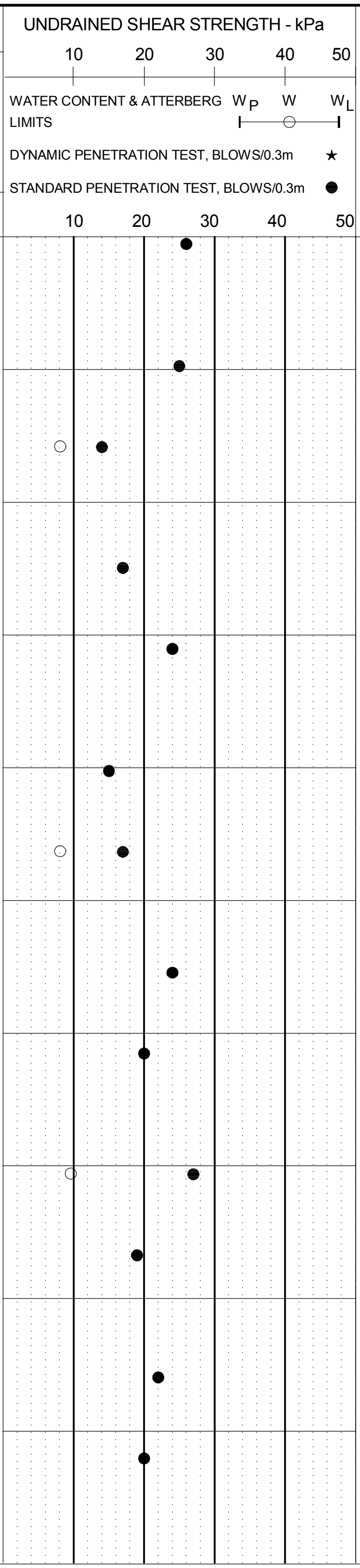
BOREHOLE No. ROB-11-17
PAGE 2 of 5
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
PROJECT No. 121614000-305
METHOD Wash/Dia
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855599.02 m
E 632769.44 m
SIZE HW/HQ
DATES (mm-dd-yy): BORING 10/10/2011 to 10/13/2011
WATER LEVEL 1.41 m 03/01/2012
DATUM Geodetic (NAD-27)

DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL

Continued from Previous Page

Depth 10 to 20 m: Compact to dense, grey, silty SAND with gravel (SM) to silty SAND (SM); trace gravel, cobbles and boulders: TILL

| SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 13 | 355 | 26 | |
| SS | 14 | 280 | 25 | |
| SS | 15 | 355 | 14 | S |
| SS | 16 | 330 | 17 | |
| SS | 17 | 480 | 24 | |
| SS | 18 | 50 | 15 | |
| SS | 19 | 380 | 17 | S |
| SS | 20 | 280 | 24 | |
| SS | 21 | 330 | 20 | |
| SS | 22 | 355 | 27 | S |
| SS | 23 | 230 | 19 | |
| SS | 24 | 280 | 22 | |
| SS | 25 | 405 | 20 | S H |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

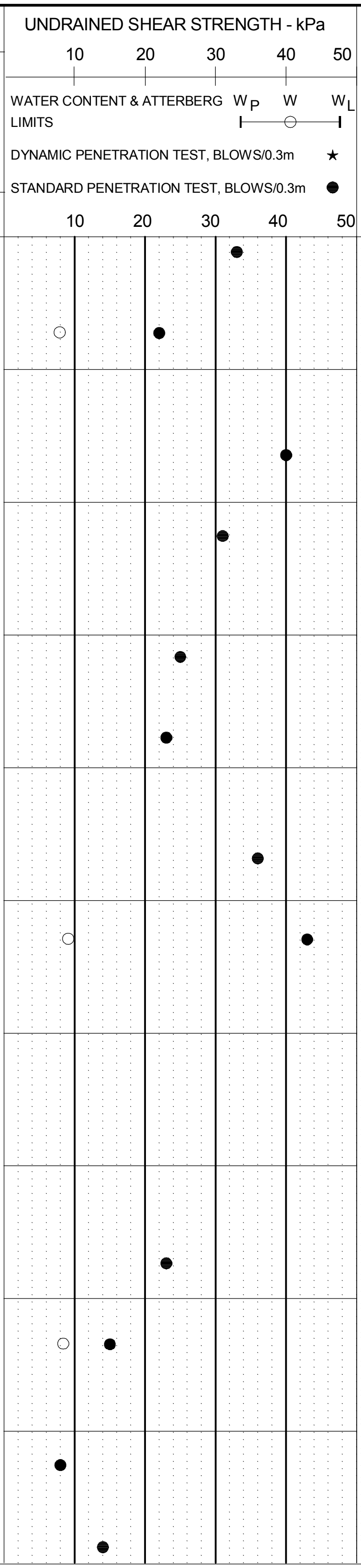
# BOREHOLE RECORD

**Stantec**

BOREHOLE No. ROB-11-17
PAGE 3 of 5
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855599.02 m E 632769.44 m
DATES (mm-dd-yy): BORING 10/10/2011 to 10/13/2011 WATER LEVEL 1.41 m 03/01/2012

| DEPTH (m) | ELEVATION (m) | DESCRIPTION<br>Continued from Previous Page | SAMPLES TYPE | SAMPLES NUMBER | SAMPLES RECOVERY(mm) OR TCR % | SAMPLES N-VALUE OR RQD % | SAMPLES OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|
| 20 | | Compact to dense, grey, silty SAND with gravel (SM) to silty SAND (SM); trace gravel, cobbles and boulders: TILL | SS | 26 | 175 | 33 | | |
| | | | SS | 27 | 380 | 22 | S | |
| | | | SS | 28 | 175 | 40 | | |
| | | | SS | 29 | 280 | 31 | | |
| | | | SS | 30 | 355 | 25 | | |
| | | | SS | 31 | 330 | 23 | | |
| | | | SS | 32 | 150 | 36 | | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| | | | SS | 33 | 480 | 43 | S | |
| 26 | | | SS | 34 | 0 | 73/230 | | |
| | | | SS | 35 | 150 | 23 | | |
| | | | SS | 36 | 510 | 15 | S | |
| 29 | | -locally loose from 29.0m to 29.6m depth | SS | 37 | 175 | 8 | | |
| | | | SS | 38 | 330 | 14 | | |
| 30 | | | | | | | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

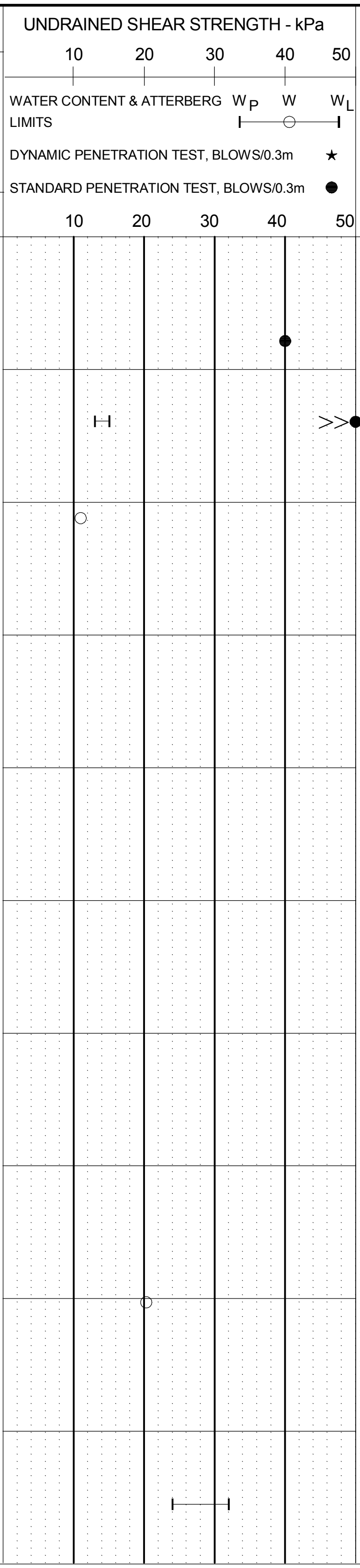
**Stantec**

# BOREHOLE RECORD

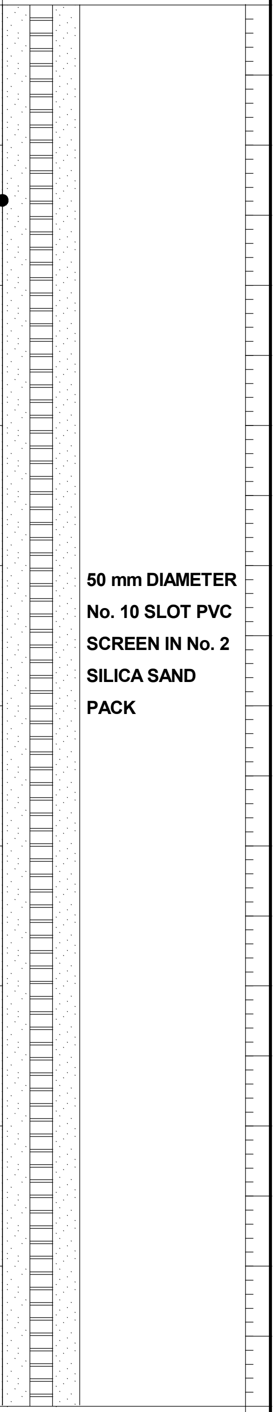
BOREHOLE No. ROB-11-17
PAGE 4 of 5
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855599.02 m E 632769.44 m
DATES (mm-dd-yy): BORING 10/10/2011 to 10/13/2011 WATER LEVEL 1.41 m 03/01/2012

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 30 | | Continued from Previous Page<br>Compact to dense, grey, silty SAND with gravel (SM) to silty SAND (SM); trace gravel, cobbles and boulders: TILL | | | | | |
| | | | SS | 39 | 480 | 40 | |
| 31 | | | SS | 40 | 480 | 52 | S H |
| 32 | 549.35 | | SS | 41 | 255 | 94/250 | S |
| | | Very dense, grey, SILT with sand (ML); trace gravel to gravelly SILT (ML); trace sand, cobbles and boulders throughout: TILL | | | | | |
| 33 | | | BS | 42 | 0% | - | |
| 34 | | | BS | 43 | 100% | - | |
| 35 | | | | | | | |
| 36 | | | ~~SS~~ | ~~44~~ | ~~0~~ | ~~50/50~~ | |
| 37 | | | | | | | |
| 38 | | | BS | 45 | 100% | - | S |
| 39 | | | BS | 46 | 100% | - | S H |
| 40 | | | | | | | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

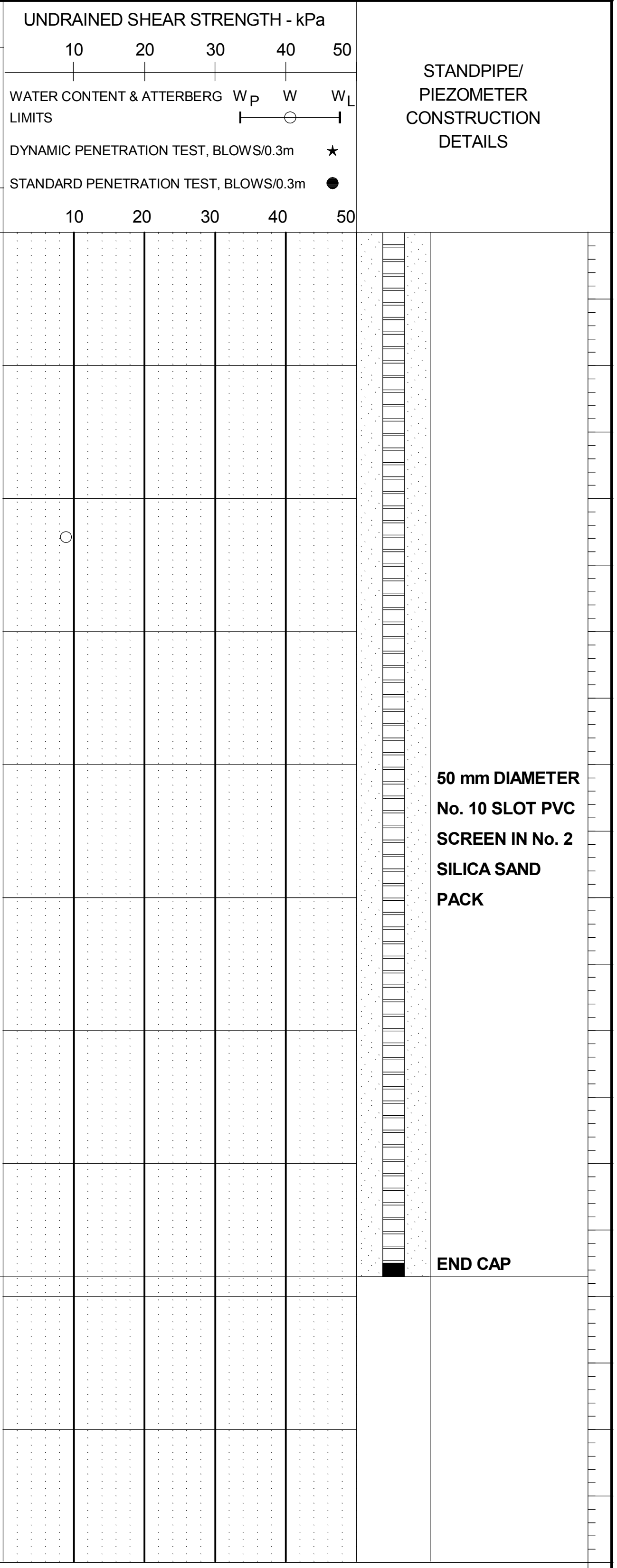
**Stantec**

BOREHOLE No. **ROB-11-17**
PAGE **5** of **5**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5855599.02 m** E **632769.44 m**
DATES (mm-dd-yy): BORING **10/10/2011 to 10/13/2011** WATER LEVEL **1.41 m 03/01/2012**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 40 | | Very dense, grey, SILT with sand (ML); trace gravel to gravelly SILT (ML); trace sand, cobbles and boulders throughout: TILL | | | | | |
| | 541.06 | Very dense, dark grey, silty SAND (SM); trace gravel, cobbles and boulders: TILL | | | | | |
| 41 | | | SS | 47 | 175 | 90/180 | |
| 42 | | | BS | 48 | 100% | - | S |
| 43 | 538.32 | Intact, strong, dark grey, foliated, biotite muscovite quartz schist (Menihek Formation): BEDROCK | | | | | |
| 44 | | | NQ | 49 | 100% | 100% | |
| 46 | | | NQ | 50 | 100% | 100% | |
| 47 | 533.75 | End of Borehole | | | | | |



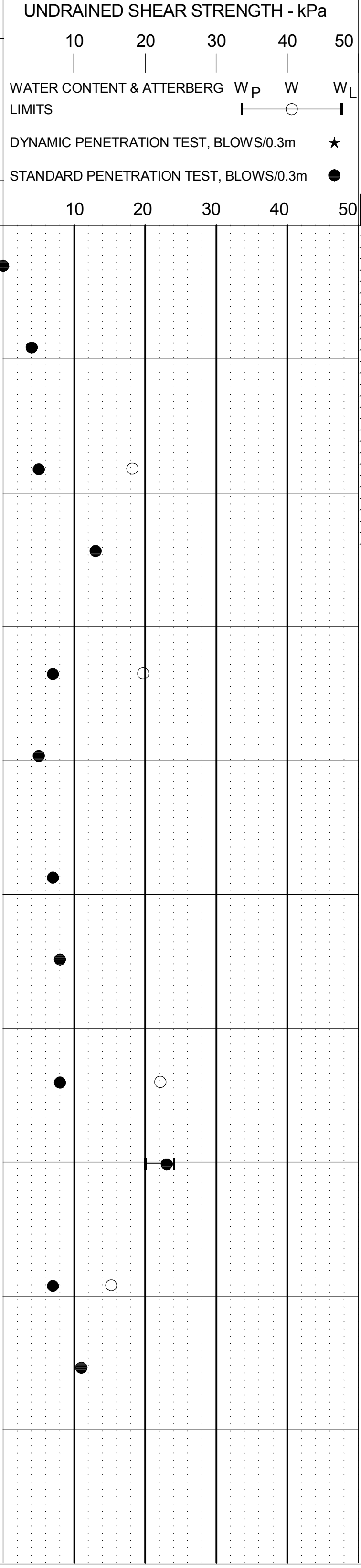
△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# BOREHOLE RECORD

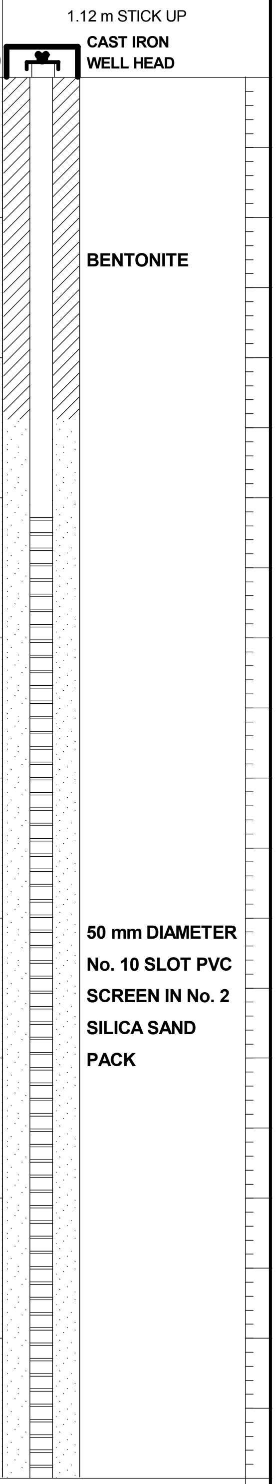
BOREHOLE No. ROB-11-18
PAGE 1 of 4
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855676.4 m E 632186.75 m
DATES (mm-dd-yy): BORING 10/14/2011 to 10/16/2011 WATER LEVEL 0 m 11/3/2011

| ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|
| 574.30 | PEAT | SS | 1 | 0 | 0 | |
| | | SS | 2 | 125 | 4 | |
| 572.62 | Loose to compact, grey, silty SAND (SM): TILL | SS | 3 | 380 | 5 | S |
| | | SS | 4 | 380 | 13 | S H |
| 571.25 | Firm to very stiff, grey, sandy SILT (ML) to SILT (ML); trace sand: TILL | SS | 5 | 480 | 7 | S |
| | | SS | 6 | 355 | 5 | S H |
| | | SS | 7 | 405 | 7 | |
| | | SS | 8 | 430 | 8 | |
| | | SS | 9 | 535 | 8 | S |
| | -locally clayey below 6.7m depth | SS | 10 | 355 | 23 | S H |
| 566.68 | Loose to very dense, grey, silty SAND with gravel (SM); occasional cobbles: TILL | SS | 11 | 355 | 7 | S |
| | - Grain size and relative density increase with depth. | SS | 12 | 280 | 11 | S H |
| | | SS | 13 | 75 | 70/230 | |



STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-18
PAGE 2 of 4
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855676.4 m E 632186.75 m
DATES (mm-dd-yy): BORING 10/14/2011 to 10/16/2011 WATER LEVEL 0 m 11/3/2011

DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES | UNDRAINED SHEAR STRENGTH - kPa | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS

Continued from Previous Page

Depth 10 – 20 m:

Loose to very dense, grey, silty SAND with gravel (SM); occasional cobbles: TILL

- Grain size and relative density increase with depth.

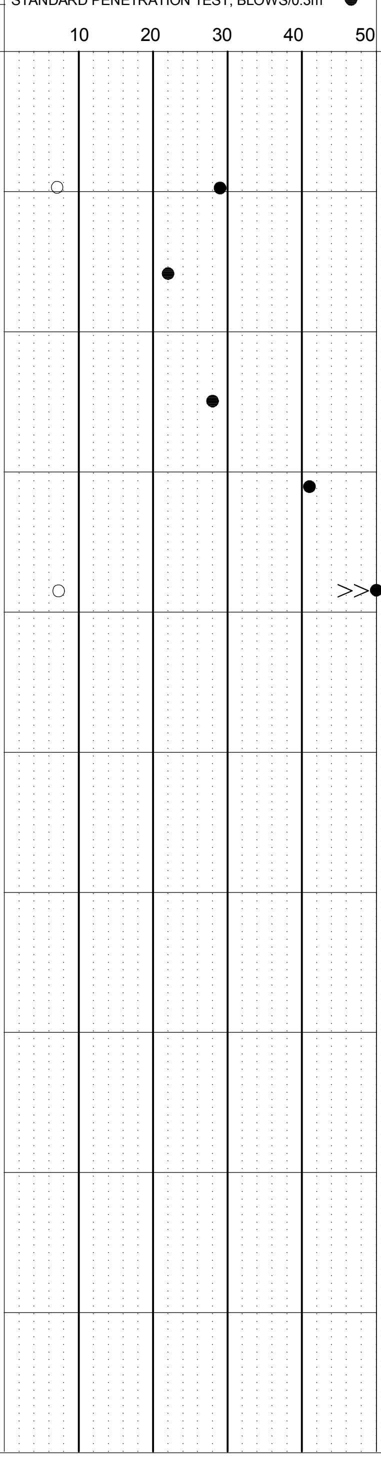
| TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 14 | 455 | 29 | S |
| SS | 15 | 280 | 22 | |
| SS | 16 | 380 | 28 | |
| SS | 17 | 455 | 41 | |
| SS | 18 | 480 | 85 | S |
| SS | 19 | 0 | 50/0 | |
| SS | 20 | 100 | 50/100 | |
| BS | 21 | 100% | - | |
| BS | 22 | 100% | - | |

UNDRAINED SHEAR STRENGTH - kPa: 10 20 30 40 50

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●



**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

**Stantec**

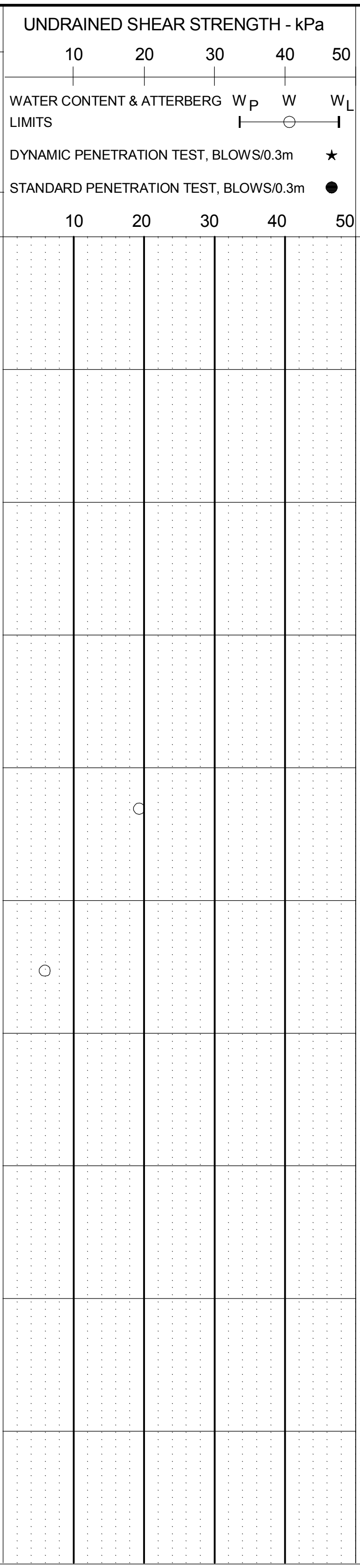
# BOREHOLE RECORD

BOREHOLE No. ROB-11-18
PAGE 3 of 4
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855676.4 m E 632186.75 m
DATES (mm-dd-yy): BORING 10/14/2011 to 10/16/2011 WATER LEVEL 0 m 11/3/2011

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|
| 20 | | Loose to very dense, grey, silty SAND with gravel (SM); occasional cobbles: TILL<br>- Grain size and relative density increase with depth. | | | | | | |
| 21 | | | SS | 23 | 75 | 50/75 | | |
| 22 | | | BS | 24 | 100% | - | | |
| 24 | | | BS | 25 | 100% | - | S | **50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK** |
| 25 | | | BS | 26 | 100% | - | S | |
| 26 | 547.78 | Very severely fractured, medium strong, brown, extremely weathered, Sokoman Formation - HIF (Hematite Iron Formation): BEDROCK | | | | | | |
| 27 | | | HQ | 27 | 100% | 25% | | |
| 28 | | | HQ | 28 | 55% | 0% | | |
| 29 | | | HQ | 29 | 72% | 22% | | |
| 30 | | | | | | | | |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-18
PAGE 4 of 4

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855676.4 m E 632186.75 m
DATES (mm-dd-yy): BORING 10/14/2011 to 10/16/2011 WATER LEVEL 0 m 11/3/2011

PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES: TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS | UNDRAINED SHEAR STRENGTH - kPa 10 20 30 40 50 | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | Continued from Previous Page |  |  |  |  |  |  |  |  |  |
| 30 | 543.82 | Very severely fractured, medium strong, brown, extremely weathered, Sokoman Formation - HIF (Hematite Iron Formation): BEDROCK |  |  |  |  |  |  |  |  | END CAP |
| 31 |  | End of Borehole |  |  |  |  |  |  |  |  |  |
| 32 |  |  |  |  |  |  |  |  |  |  |  |
| 33 |  |  |  |  |  |  |  |  |  |  |  |
| 34 |  |  |  |  |  |  |  |  |  |  |  |
| 35 |  |  |  |  |  |  |  |  |  |  |  |
| 36 |  |  |  |  |  |  |  |  |  |  |  |
| 37 |  |  |  |  |  |  |  |  |  |  |  |
| 38 |  |  |  |  |  |  |  |  |  |  |  |
| 39 |  |  |  |  |  |  |  |  |  |  |  |
| 40 |  |  |  |  |  |  |  |  |  |  |  |

WATER CONTENT & ATTERBERG LIMITS $W_P$ W $W_L$
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●
10 20 30 40 50

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

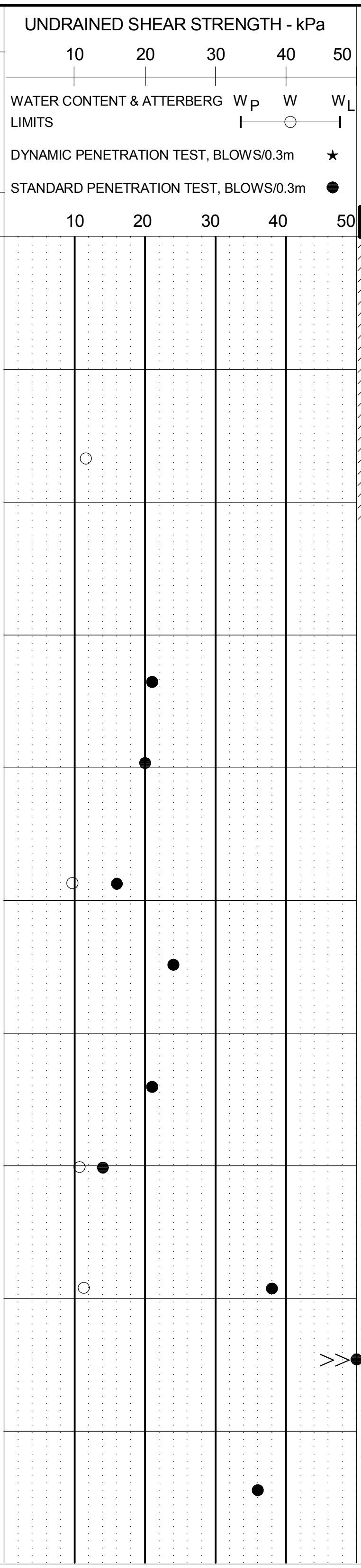
# BOREHOLE RECORD

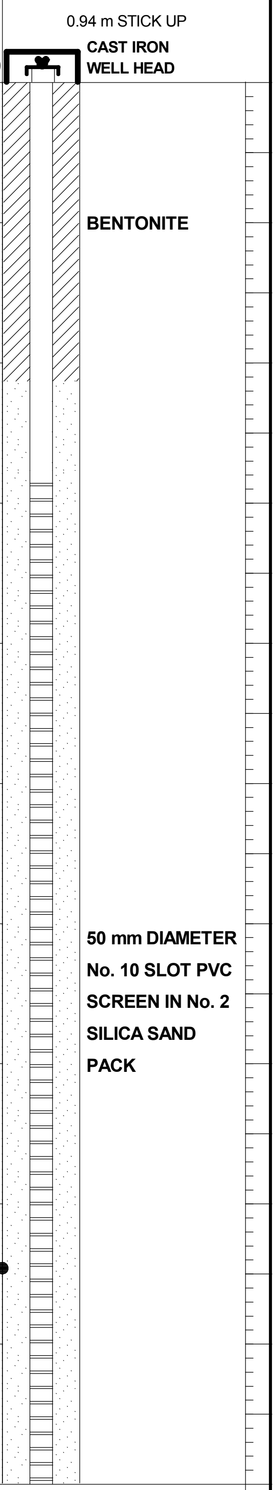
Stantec

BOREHOLE No. ROB-11-19
PAGE 1 of 2
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL N 5855373 m E 632349 m
DATES (mm-dd-yy): BORING 4/9/2012 WATER LEVEL N/A

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 0 | 574.40 | | | | | | |
| | 574.10 | PEAT | SS | 1 | 175 | 55/300 | |
| | | Compact to very dense, grey, silty SAND (SM); trace gravel & cobbles: TILL | | | | | |
| 1 | | | | | | | |
| | | | SS | 2 | 305 | 132/300 | |
| 2 | | | | | | | |
| 3 | | | SS | 3 | 50 | 21 | |
| 4 | | | SS | 4 | 230 | 20 | |
| 5 | | | SS | 5 | 380 | 16 | |
| | | | SS | 6 | 255 | 24 | |
| 6 | | | SS | 7 | 125 | 21 | |
| 7 | | | SS | 8 | 330 | 14 | |
| 8 | | | SS | 9 | 610 | 38 | S H |
| | | | SS | 10 | 175 | 78 | |
| 9 | 565.10 | | | | | | |
| | | Very severely fractured to fractured, weak, dark green silicate iron formation (Sokoman Formation): | SS | 11 | 455 | 36 | |
| 10 | | | | | | | |





△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

# BOREHOLE RECORD

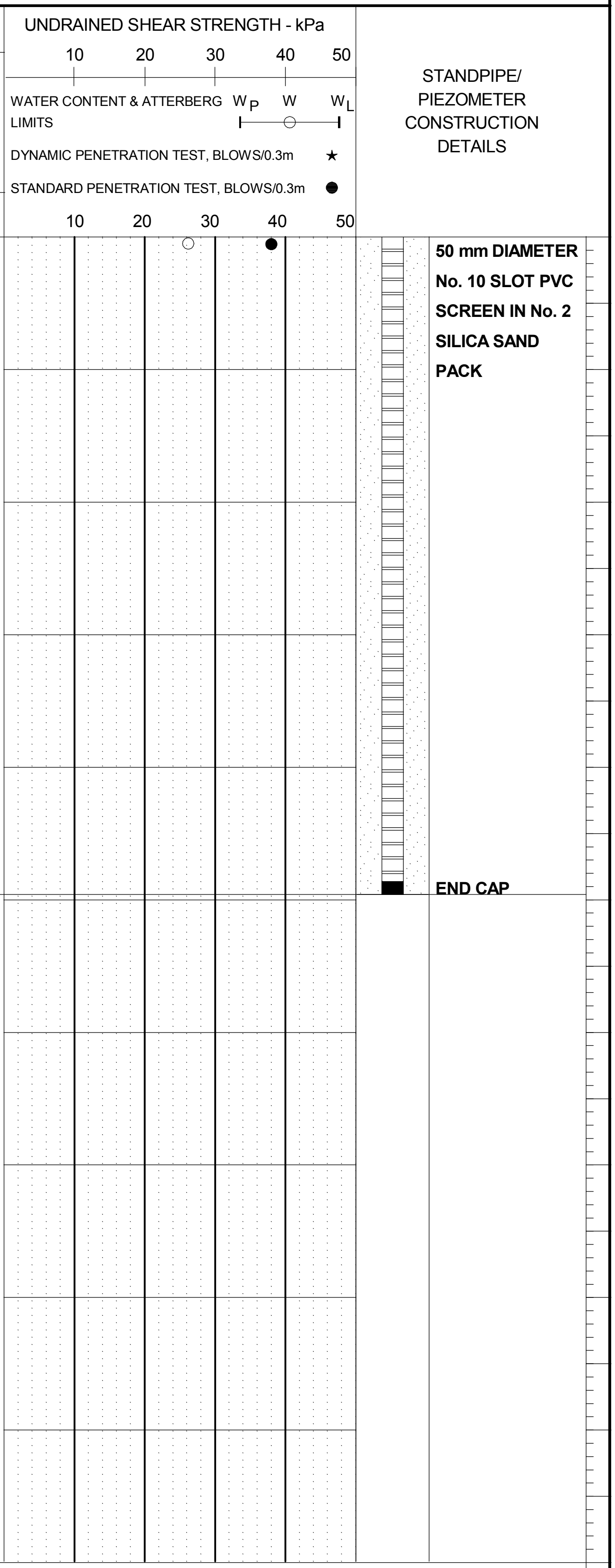
**Stantec**

BOREHOLE No. **ROB-11-19**
PAGE **2** of **2**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL**
N **5855373 m** E **632349 m**
DATES (mm-dd-yy): BORING **4/9/2012**
WATER LEVEL **N/A**

Continued from Previous Page

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % |
|---|---|---|---|---|---|---|
| 10 | | BEDROCK | SS | 12 | 205 | 38 |
| | | | HQ | 13 | 100% | 27% |
| | 562.80 | Very severely fractured to fractured, weak, dark green to grey, magnetite-silicate iron formation (Sokoman Formation): BEDROCK | HQ | 14 | 95% | 18% |
| | 560.70 | Very severely fractured to fractured, weak, dark grey, muscovite biotite schist (Menihek Formation): BEDROCK | HQ | 15 | 100% | 55% |
| 15 | 559.44 | End of Borehole | | | | |



**50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK**

**END CAP**

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◩ Torvane

**Stantec**

# BOREHOLE RECORD

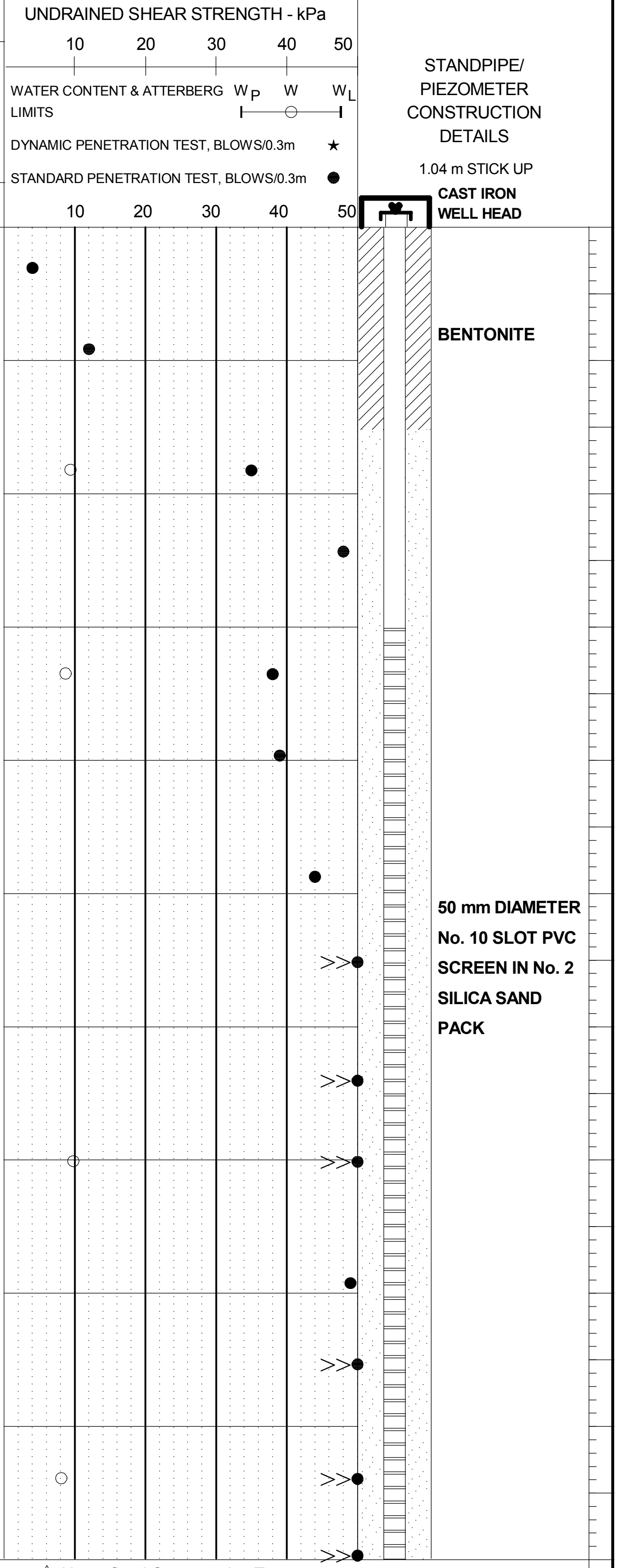
BOREHOLE No. **ROB-11-20**
PAGE **1** of **2**
PROJECT No. **121614000-305**
METHOD **Wash/Dia**
SIZE **HW/HQ**
DATUM **Geodetic (NAD-27)**

CLIENT **Alderon Iron Ore Corp.**
PROJECT **Kami Iron Ore Project - Pit Slope Design**
LOCATION **Kami Iron Ore Mine Site, Labrador West, NL** N **5855298 m** E **633251 m**
DATES (mm-dd-yy): BORING **10/23/2011** WATER LEVEL **5.68 m 03/01/2012**

| DEPTH (m) | ELEVATION (m) | DESCRIPTION |
|---|---|---|
| 0 | 624.90 | |
| | 624.75 | PEAT |
| | 624.29 | TOPSOIL |
| | | Compact to very dense, light brown, silty SAND (SM); trace to some gravel; trace cobbles and boulders: TILL |
| | | From 6.1 m to 10.2 m: Becomes darker brown in colour. Grain size and relative density increase. |

WATER LEVEL: ▼ 5.68 m

| SAMPLES TYPE | NUMBER | RECOVERY(mm) OR TCR % | N-VALUE OR RQD % | OTHER TESTS |
|---|---|---|---|---|
| SS | 1 | 560 | 4 | |
| SS | 2 | 510 | 12 | |
| SS | 3 | 455 | 35 | S |
| SS | 4 | 430 | 48 | S H |
| SS | 5 | 405 | 38 | S |
| SS | 6 | 480 | 39 | |
| SS | 7 | 455 | 44 | |
| SS | 8 | 535 | 97 | |
| SS | 9 | 230 | 52 | |
| SS | 10 | 330 | 64 | S |
| SS | 11 | 480 | 49 | S H |
| SS | 12 | 430 | 64 | |
| SS | 13 | 305 | 56 | S |



△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

**Stantec**

# BOREHOLE RECORD

BOREHOLE No. ROB-11-20
PAGE 2 of 2
PROJECT No. 121614000-305
METHOD Wash/Dia
SIZE HW/HQ
DATUM Geodetic (NAD-27)

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project - Pit Slope Design
LOCATION Kami Iron Ore Mine Site, Labrador West, NL
N 5855298 m E 633251 m
DATES (mm-dd-yy): BORING 10/23/2011
WATER LEVEL 5.68 m 03/01/2012

UNDRAINED SHEAR STRENGTH - kPa
10 20 30 40 50
WATER CONTENT & ATTERBERG LIMITS W<sub>P</sub> W W<sub>L</sub>
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●
10 20 30 40 50

| DEPTH (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | SAMPLES TYPE | SAMPLES NUMBER | SAMPLES RECOVERY(mm) OR TCR % | SAMPLES N-VALUE OR RQD % | OTHER TESTS | STANDPIPE/ PIEZOMETER CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Continued from Previous Page | | | | | | | | |
| 10 | 614.66 | | | | SS | 14 | 610 | 81 | | 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK |
| | | Fractured to intact, strong to very strong, dark grey, banded, hornblende biotite garnet gneiss (Menihek Formation): BEDROCK | | | HQ | 15 | 92% | 92% | | |
| 11 | | | | | HQ | 16 | 100% | 77% | | |
| 12 | | | | | HQ | 17 | 100% | 90% | | |
| 13 | | | | | | | | | | |
| 14 | | | | | HQ | 18 | 100% | 65% | | |
| 15 | 609.79 | | | | | | | | | END CAP |
| | | End of Borehole | | | | | | | | |
| 16 | | | | | | | | | | |
| 17 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | | | | | | | | | | |

△ Unconfined Compression Test
☐ Field Vane Test ■ (Remolded)
◇ Fall Cone Test ◆ (Remolded)
▽ Hand Penetrometer Test ◪ Torvane

# Appendix D. Fault Analysis

The following boreholes were analyzed (based on televiewers surveys and core photos) for major fracture zones or faults:

- K-10-55
- K-10-61
- K-11-115
- K-11-161
- K-11-163
- K-11-165
- K-12-176A
- K-12-177
- K-12-179
- K-12-184
- K-12-200

| Borehole | Type | Depth Top (m) | Depth Center (m) | Depth Bottom (m) | Dip (°) | Dip Direction (°) | Apparent aperture / thickness (mm) | Code 1 | Code 2 | Code 3 | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K-10-55 | ATV | 234.55 | 238.96 | 243.37 | 84 | 335 | 8820 | HFZ | | | Highly fractured zone with closed, partially open, open and multiple discontinued joints. |
| K-10-55 | ATV | 41.15 | 43.375 | 45.60 | 26 | 286 | 4450 | HFZ | | | Highly fractured zone with closed, partially open, open and discontinued joints. 2 main joint orientations. |
| K-10-55 | ATV | 76.96 | 79.185 | 81.41 | 67 | 143 | 4450 | OJC | | | Concentration of open joints |
| K-10-55 | ATV | 178.40 | 180.2 | 182.00 | 80 | 013 | 3600 | MFZ | | | Moderately fractured zone with closed and partially open joints mostly |
| K-10-55 | ATV | 173.20 | 174.49 | 175.78 | 77 | 133 | 2580 | MFZ | | | Moderately fractured zone with closed and partially open joints mostly |
| K-10-55 | ATV | 250.09 | 250.775 | 251.46 | 87 | 146 | 1370 | OJC | | | Concentration of open joints |
| K-10-55 | ATV | 163.40 | 164.03 | 164.66 | 86 | 359 | 1260 | HFZ | | | Highly fractured zone with closed, partially open and discontinued joints. |
| K-10-61 | ATV | 74.40 | 78.9 | 83.40 | 65 | 145 | 9000 | HFZ | | | Highly fractured zone with closed, partially open, open joints mainly. |
| K-10-61 | ATV | 66.20 | 68.8 | 71.40 | 85 | 014 | 5200 | HFZ | PF | PG | Highly fractured zone with closed, partially open, open and discontinued joints. 2 main orientations. |
| K-10-61 | ATV | 86.40 | 88.6 | 90.80 | 84 | 155 | 4400 | HFZ | PF | PG | Highly fractured zone with closed, partially open, open joints mainly. |
| K-10-61 | ATV | 60.37 | 62.45 | 64.53 | 80 | 180 | 4160 | HFZ | PF | PG | Highly fractured zone with closed, partially open, open and discontinued joints. |
| K-10-61 | ATV | 109.72 | 110.43 | 111.14 | 82 | 128 | 1420 | HFZ | PG | | Highly fractured zone with multiple open joints and a few closed joints. |
| K-10-61 | ATV | 125.29 | 125.71 | 126.13 | 72 | 151 | 840 | HFZ | | | Highly fractured zone with closed, partially open and discontinued joints. |
| K-11-115 | Core | 105.70 | 114.20 | 122.70 | | | 17000.0 | HFZ | PF | WR | Split core. Highly fractured zone, broken core. Locally very weathered. |
| K-11-115 | Core | 127.60 | 132.15 | 136.70 | | | 9100.0 | HFZ | PF | WR | Split core. Highly fractured zone, broken core. Locally very weathered. |
| K-11-115 | Core | 144.00 | 159.30 | 174.60 | | | 30600.0 | HFZ | PF | WR | Split core. Highly fractured zone, broken core. Mostly very weathered. |
| K-11-115 | Core | 272.00 | 277.00 | 282.00 | | | 10000.0 | HFZ | | | Split core in 4. Very uncertain, but appears to be fractured rock, weathered, but does not appear like a fault necessarily. |
| K-11-115 | Core | 395.80 | 406.40 | 417.00 | | | 21200.0 | HFZ | PF | WR | Split core. Highly fractured zone, broken core. Mostly very weathered. |
| K-11-131 | OTV | 349.50 | 352.10 | 354.70 | 65 | 290 | 5200.0 | FZ | | | Fractured zone with mainly closed to slightly open features. Random orientation mainly. |
| K-11-131 | OTV | 52.93 | 53.65 | 54.37 | 67 | 321 | 727.4 | OJC | VO | | Open joint concentration |
| K-11-131 | OTV | 418.66 | 418.78 | 418.89 | 70 | 313 | 230.0 | HFZ | PG | | Highly fractured zone. Likely crushed rock. |
| K-11-131 | OTV | 128.95 | 129.16 | 129.36 | 75 | 127 | 155.8 | HFZ | PG | | Highly fractured zone. Likely crushed rock. |

| Borehole | Type | Depth Top (m) | Depth Center (m) | Depth Bottom (m) | Dip (°) | Dip Direction (°) | Apparent aperture / thickness (mm) | Code 1 | Code 2 | Code 3 | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K-11-131 | OTV | 371.88 | 371.97 | 372.06 | 78 | 287 | 95.1 | HFZ | PG |  | Highly fractured zone. Likely crushed rock. |
| K-11-131 | OTV | 55.75 | 58.28 | 60.80 | 40 | 275 | 34.0 | HFZ | WR | VO | Highly fractured rock zone with multiple open, partially open and closed joints. Weathered rock. |
| K-11-161 | OTV/core | 159.50 | 161.25 | 163.00 |  |  | 3500.0 | FZ |  |  | NO ACCESS TO WELLCAD LICENSE |
| K-11-161 | OTV/core | 446.00 | 454.00 | 462.00 |  |  | 16000.0 | HFZ | PF | WR | NO ACCESS TO WELLCAD LICENSE |
| K-11-163 | Core | 211.80 | 215.15 | 218.50 |  |  | 6700.0 | HFZ |  |  |  |
| K-11-163 | Core | 222.80 | 229.90 | 237.00 |  |  | 14200.0 | HFZ | PF | WR | Split core. Highly fractured zone. Slightly to very weathered. Mostly broken core and partly soil. |
| K-11-163 | Core | 272.50 | 280.50 | 288.50 |  |  | 16000.0 | HFZ | PF | WR | Highly fractured zone. Slightly to very weathered. Mostly broken core and partly soil. |
| K-11-165 | OTV | 184.84 | 187.78 | 190.71 | 79 | 132 | 5870.0 | HFZ | PF | PG | Highly fractured zone with many partially open, open and discontinued joints. Probable gouge, fault and crushed rock. One main orientation. |
| K-11-165 | OTV | 385.67 | 386.51 | 387.35 | 86 | 213 | 1680.0 | HFZ | PF | PG | Highly fractured zone. Seems to be a major open joint but difficult to describe because of a blurry image. Orientation likely innacurate. |
| K-11-165 | OTV | 269.18 | 270.01 | 270.84 | 84 | 118 | 1660.0 | HFZ |  |  | Highly fractured zone with closed, partially open, open and discontinued joints. Including major open joints. |
| K-11-165 | OTV | 257.56 | 258.16 | 258.75 | 72 | 125 | 1190.0 | OJC |  |  | Open joint concentration |
| K-11-165 | OTV | 266.64 | 267.22 | 267.80 | 69 | 148 | 1160.0 | HFZ |  |  | Highly fractured zone including two major open joints of 254 and 433 mm. |
| K-11-165 | OTV | 235.74 | 236.31 | 236.88 | 79 | 141 | 1140.0 | OJC |  |  | Open joint concentration |
| K-11-165 | OTV | 137.06 | 137.55 | 138.03 | 50 | 158 | 970.0 | OJC | VO |  | Open joint concentration |
| K-11-165 | OTV | 227.08 | 227.53 | 227.98 | 80 | 150 | 900.0 | OJC |  |  | Open joint concentration |
| K-11-165 | OTV | 349.95 | 350.36 | 350.76 | 71 | 197 | 810.0 | FZ |  |  | Moderately fractured zone with closed, partially open, open and discontinued joints. |
| K-11-165 | OTV | 379.54 | 379.89 | 380.24 | 67 | 221 | 700.0 | OJC |  |  | Open joint concentration |
| K-11-165 | OTV | 339.90 | 340.12 | 340.33 | 70 | 200 | 430.0 | OJC |  |  | Open joint concentration |
| K-11-165 | OTV | 384.88 | 385.12 | 385.35 | 69 | 131 | 262.7 | MOJ |  |  | Major open joint. |
| K-11-165 | OTV | 167.13 | 167.27 | 167.40 | 68 | 112 | 152.6 | MOJ | PG |  | Major open joint. Possible gouge and crushed rock. |
| K-12-176A | ATV | 282.26 | 304.94 | 327.61 | 81 | 128 | 45350.0 | HFZ | PF |  | Highly fractured zone with multiple open and slightly open joints. One major joint orientation. |
| K-12-176A | ATV | 181.19 | 188.23 | 195.27 | 80 | 152 | 14080.0 | HFZ | PF | PG | Highly fractured zone with partially open and open joints. Possible gouge filling. Likely weathered and crushed rock. |
| K-12-176A | ATV | 471.43 | 478.16 | 484.88 | 65 | 145 | 13450.0 | HFZ | PF |  | Highly fractured zone with multiple open and slightly open joints. One main joint orientation. |

| Borehole | Type | Depth Top (m) | Depth Center (m) | Depth Bottom (m) | Dip (°) | Dip Direction (°) | Apparent aperture / thickness (mm) | Code 1 | Code 2 | Code 3 | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K-12-176A | ATV | 356.79 | 363.11 | 369.43 | 82 | 130 | 12640.0 | HFZ | PF |  | Highly fractured zone with multiple open and slightly open joints. One major joint orientation with a particular zone of varying joint orientations. |
| K-12-176A | ATV | 244.92 | 250.34 | 255.76 | 78 | 160 | 10840.0 | HFZ |  |  | Highly fractured zone with multiple open and slightly open joints. One major joint orientation. |
| K-12-176A | ATV | 371.68 | 375.77 | 379.86 | 66 | 136 | 8180.0 | HFZ |  |  | Highly fractured zone with multiple open and slightly open joints. |
| K-12-176A | ATV | 486.18 | 489.23 | 492.27 | 71 | 148 | 6090.0 | HFZ | PF |  | Highly fractured zone with multiple open and slightly open joints. One main joint orientation. |
| K-12-176A | ATV | 422.26 | 423.88 | 425.50 | 69 | 228 | 3240.0 | HFZ |  |  | Moderately to highly fractured zone with multiple open and partially open joints and a few closed joints. One main joint orientation. |
| K-12-176A | ATV | 433.93 | 435.34 | 436.74 | 83 | 312 | 2810.0 | HFZ | PF | PG | Highly fractured zone with multiple open and slightly open joints. One main joint orientation. |
| K-12-176A | ATV | 401.09 | 402.30 | 403.50 | 82 | 219 | 2410.0 | HFZ |  |  | Moderately to highly fractured zone with multiple open and partially open joints and a few closed joints. Two main joint orientations including southern dipping joints. |
| K-12-176A | ATV | 172.35 | 173.35 | 174.35 | 74 | 148 | 2000.0 | HFZ | PF | PG | Highly fractured zone with partially open and open joints. Possible gouge filling. |
| K-12-176A | ATV | 51.47 | 52.31 | 53.14 | 70 | 164 | 1670.0 | HFZ |  |  | Highly fractured zone with multiple open and partially open joints. |
| K-12-176A | ATV | 336.91 | 337.72 | 338.52 | 73 | 138 | 1610.0 | HFZ |  |  | Highly fractured zone with multiple open and slightly open joints. One major joint orientation. |
| K-12-176A | ATV | 128.85 | 129.62 | 130.38 | 64 | 088 | 1530.0 | HFZ |  |  | Highly fractured zone with mainly closed joints, and some partially open and open joints. |
| K-12-176A | ATV | 136.85 | 137.56 | 138.26 | 75 | 130 | 1410.0 | HFZ | PF | PG | Highly fractured zone with partially open and open joints. Possible gouge filling. |
| K-12-176A | ATV | 196.00 | 196.50 | 197.00 | 79 | 134 | 1000.0 | HFZ |  |  | Highly to moderately fractured zone with closed, partially open, open and discontinued joints. |
| K-12-176A | ATV | 205.17 | 205.56 | 205.94 | 74 | 137 | 770.0 | HFZ | PF |  | Highly fractured zone with multiple open joints and partially open and closed joints. |
| K-12-176A | ATV | 48.38 | 48.71 | 49.04 | 80 | 130 | 660.0 | OJC |  |  | Concentration of open joints |
| K-12-176A | ATV | 179.20 | 179.37 | 179.53 | 80 | 180 | 330.0 | HFZ | PF | PG | Highly fractured zone with partially open and open joints. Possible gouge filling. |
| K-12-177 | Core | 146.50 | 166.00 | 185.50 |  |  | 39000.0 | HFZ | PF | WR | Split core. Highly fractured zone. Mostly very weathered. Fractured a lot along foliation. |
| K-12-177 | Core | 236.50 | 251.50 | 266.50 |  |  | 30000.0 | HFZ | PF | WR | Split core. Highly fractured zone. Slightly weathered. Partly broken core and partly soil. |

| Borehole | Type | Depth Top (m) | Depth Center (m) | Depth Bottom (m) | Dip (°) | Dip Direction (°) | Apparent aperture / thickness (mm) | Code 1 | Code 2 | Code 3 | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K-12-177 | Core | 270.00 | 276.85 | 283.70 | | | 13700.0 | HFZ | PF | WR | Split core. Highly fractured zone. Slightly weathered. Partly broken core and partly soil. |
| K-12-177 | Core | 286.00 | 290.00 | 294.00 | | | 8000.0 | HFZ | | | |
| K-12-179 | OTV | 176.20 | 187.10 | 198.00 | 65 | 135 | 21800.0 | HFZ | PF | PG | Very highly fractured zone with multiple open joints. Likely fault, crushed rock and gouge. Weathered looking rock. One main orientation. |
| K-12-179 | OTV | 203.90 | 208.47 | 213.03 | 70 | 130 | 9130.0 | HFZ | PF | PG | Highly fractured zone with multiple open joints but zones more concentrated in closed and slightly open features. Weathered looking rock. One main orientation. |
| K-12-179 | OTV | 238.80 | 242.80 | 246.80 | 80 | 130 | 8000.0 | HFZ | PF | PG | Highly fractured zone with multiple open joints. Likely fault, crushed rock and gouge. Weathered looking rock. One main orientation. |
| K-12-179 | OTV | 160.33 | 162.29 | 164.25 | 74 | 151 | 3920.0 | HFZ | PF | PG | Highly fractured zone with closed, partially open, open and discontinued joints. Many major open features and likely crushed rock zones. Varying orientations. |
| K-12-179 | OTV | 154.40 | 155.60 | 156.80 | 62 | 138 | 2400.0 | HFZ | PF | | Highly fractured zone with partially open, open and discontinued joints. |
| K-12-179 | OTV | 172.55 | 173.63 | 174.70 | 65 | 140 | 2150.0 | FZ | | | Fractured zone with mainly closed and slightly open joints. |
| K-12-179 | OTV | 166.60 | 167.50 | 168.40 | 75 | 154 | 1800.0 | HFZ | | | Highly fractured zone with closed, partially open, open and discontinued joints. |
| K-12-179 | OTV | 252.25 | 253.04 | 253.82 | 79 | 134 | 1570.0 | HFZ | PG | | Highly fractured zone with multiple open and partially open joints. Including major open joints of 205 mm and more than 395 mm. Possible gouge and crushed rock. |
| K-12-179 | OTV | 247.70 | 248.48 | 249.25 | 72 | 140 | 1550.0 | FZ | | | Fractured zone with mainly closed and slightly open joints. |
| K-12-179 | OTV | 68.95 | 69.71 | 70.47 | 24 | 156 | 1520.0 | HFZ | PG | VO | Highly fractured zone with closed, partially open, open and discontinued joints. Including a major open joint (90 mm). |
| K-12-179 | OTV | 71.78 | 72.33 | 72.88 | 33 | 135 | 1100.0 | FZ | | | Slightly to moderately fractured zone with closed, partially open, open and discontinued joints. |
| K-12-179 | OTV | 170.89 | 171.18 | 171.47 | 70 | 145 | 580.0 | HFZ | PG | | Highly fractured zone with many open joints. Likely crushed rock and gouge. |
| K-12-179 | OTV | 143.98 | 144.19 | 144.40 | 66 | 146 | 420.0 | FZ | | | Possible fractured zone with one open joint and several closed joints. |
| K-12-179 | OTV | 169.58 | 169.71 | 169.84 | 79 | 138 | 260.0 | HFZ | PG | | Highly fractured zone with wide aperture. Likely crushed rock and gouge. |
| K-12-179 | OTV | 172.00 | 172.09 | 172.17 | 70 | 129 | 170.0 | HFZ | PG | | Highly fractured zone with wide aperture. Likely crushed rock and gouge. |

| Borehole | Type | Depth Top (m) | Depth Center (m) | Depth Bottom (m) | Dip (°) | Dip Direction (°) | Apparent aperture / thickness (mm) | Code 1 | Code 2 | Code 3 | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K-12-179 | OTV | 74.51 | 74.57 | 74.63 | 41 | 114 | 120.0 | MOJ | PG |  | Major open joint. Possible gouge and crushed rock. |
| K-12-179 | OTV | 21.44 | 21.49 | 21.54 | 61 | 137 | 100.0 | MOJ |  |  | Major open joint. |
| K-12-179 | OTV | 220.56 | 220.61 | 220.66 | 74 | 138 | 100.0 | MOJ | PG |  | Major open joint. Possible gouge and crushed rock. |
| K-12-179 | OTV | 140.88 | 140.95 | 141.01 | 62 | 121 | 84.0 | HFZ |  |  | Highly fractured zone. Likely crushed rock. |
| K-12-179 | OTV | 219.78 | 219.82 | 219.85 | 77 | 137 | 70.0 | MOJ | PG |  | Major open joint. Possible gouge and crushed rock. |
| K-12-179 | OTV | 119.01 | 119.06 | 119.10 | 60 | 162 | 52.7 | HFZ |  |  | Highly fractured zone. Likely crushed rock. |
| K-12-179 | OTV | 25.39 | 25.40 | 25.41 | 43 | 269 | 20.0 | MOJ |  |  | Major open joint. |
| K-12-184 | OTV/core | 143.00 | 151.75 | 160.50 |  |  | 17500.0 | HFZ | PF | WR | NO ACCESS TO WELLCAD LICENSE |
| K-12-184 | OTV/core | 181.50 | 182.75 | 184.00 |  |  | 2500.0 | HFZ | PF | WR | NO ACCESS TO WELLCAD LICENSE |
| K-12-200 | ATV | 20.99 | 23.36 | 25.73 | 77 | 126 | 4740.0 | HFZ | PG | VO | Highly fractured zone with multiple open, partially open and discontinued joints and a few closed joints. Multiple joint orientations. |
| K-12-200 | ATV | 28.40 | 28.61 | 28.82 | 45 | 280 | 420.0 | HFZ | PG |  | Highly fractured zone. One orientation. Possible crushed rock and gouge. |
| K-12-200 | ATV | 31.80 | 32.05 | 32.30 | 59 | 090 | 500.0 | HFZ |  |  | Highly fractured zone with several slightly open joints. One main joint orientation. |
| K-12-200 | ATV | 49.70 | 50.49 | 51.28 | 57 | 116 | 1580.0 | HFZ |  |  | Highly fractured zone with multiple open joints, partially open and discontinued joints. One main joint orientation with random joints. |
| K-12-200 | ATV | 88.02 | 88.14 | 88.26 | 56 | 140 | 240.0 | HFZ | PG |  | Highly fractured zone. One orientation. Possible crushed rock and gouge. |
| K-12-200 | ATV | 170.44 | 170.51 | 170.57 | 56 | 118 | 130.0 | HFZ | PG |  | Highly fractured zone. One orientation. Possible crushed rock and gouge. |
| K-12-200 | ATV | 179.06 | 179.13 | 179.20 | 62 | 124 | 140.0 | HFZ | PG |  | Highly fractured zone. One orientation. Possible crushed rock and gouge. |
| K-12-212 | OTV | 193.50 | 202.10 | 210.70 | 45 | 020 | 17200.0 | FZ | VO | WR | Fractured zone with mainly closed and slightly open joints. Slightly weathered looking aspect. Randomly oriented joints mainly. |
| K-12-212 | OTV | 57.51 | 59.18 | 60.84 | 53 | 000 | 3330.0 | HFZ |  |  | Highly fractured zone with many partially open and open joints. One main joint orientation but others too. |
| K-12-212 | OTV | 69.63 | 71.26 | 72.88 | 49 | 357 | 3250.0 | HFZ |  |  | Highly fractured zone with many partially open and open joints. One main joint orientation but others too. |
| K-12-212 | OTV | 189.35 | 190.94 | 192.52 | 38 | 136 | 3170.0 | FZ | VO | WR | Fractured zone with mainly closed and slightly open joints. Slightly weathered looking aspect. Randomly oriented joints mainly. |

| Borehole | Type | Depth Top (m) | Depth Center (m) | Depth Bottom (m) | Dip (°) | Dip Direction (°) | Apparent aperture / thickness (mm) | Code 1 | Code 2 | Code 3 | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K-12-212 | OTV | 213.77 | 215.29 | 216.80 | 80 | 320 | 3030.0 | HFZ | WR |  | Highly fractured zone with multiple closed and partially open joints and a few open joints. |
| K-12-212 | OTV | 18.83 | 19.77 | 20.70 | 40 | 317 | 1870.0 | OJC |  |  | Open joint concentration |
| K-12-212 | OTV | 49.14 | 49.59 | 50.04 | 64 | 344 | 904.0 | HFZ | PF | PG | Highly fractured zone with closed, partially open and open joints. Weathered appearance. Possible crushed rock and gouge. |
| K-12-212 | OTV | 46.97 | 47.31 | 47.64 | 30 | 350 | 670.0 | OJC | PG | WR | Open joint concentration. Weathered appearance. Possible gouge. |
| K-12-212 | OTV | 37.25 | 37.44 | 37.63 | 23 | 031 | 380.0 | OJC |  |  | Open joint concentration |
| K-12-212 | OTV | 51.60 | 51.74 | 51.88 | 47 | 335 | 280.0 | HFZ | PG | WR | Highly fractured zone partially open and open joints. Weathered appearance. Possible crushed rock and gouge. |
| K-12-212 | OTV | 159.80 | 159.90 | 160.00 | 48 | 148 | 200.0 | MOJ |  |  | Major open joint. |
| RBR-12-02 | ATV | 222.80 | 248.07 | 273.33 | 78 | 148 | 50530.0 | HFZ | PF |  | Highly fractured zone with multiple open and partially open joints. Likely crushed and weathered rock. One main orientation. |
| RBR-12-02 | ATV | 181.54 | 191.81 | 202.07 | 75 | 157 | 20530.0 | HFZ | PF |  | Highly fractured zone with multiple open and partially open joints. Likely crushed and weathered rock. One main orientation. |
| RBR-12-02 | ATV | 281.83 | 288.71 | 295.59 | 79 | 139 | 13760.0 | HFZ | PF |  | Highly fractured zone with multiple open and partially open joints. Likely crushed and weathered rock. One main orientation. |
| RBR-12-02 | ATV | 212.78 | 216.88 | 220.98 | 72 | 147 | 8200.0 | HFZ | PF |  | Highly fractured zone with multiple open and partially open joints. Likely crushed and weathered rock. One main orientation. |
| RBR-12-02 | ATV | 101.22 | 103.77 | 106.31 | 70 | 152 | 5090.0 | HFZ | PF |  | Highly fractured zone with multiple open and partially open joints. Likely crushed and weathered rock. One main orientation, but other orientations too. |
| RBR-12-02 | ATV | 49.71 | 51.28 | 52.85 | 80 | 132 | 3140.0 | HFZ |  |  | Moderately to highly fractured zone with closed, partially open, open and discontinued joints. |
| RBR-12-02 | ATV | 40.81 | 42.34 | 43.87 | 71 | 131 | 3060.0 | HFZ |  |  | Moderately to highly fractured zone with closed, partially open, open and discontinued joints. |
| RBR-12-02 | ATV | 22.10 | 23.23 | 24.36 | 60 | 140 | 2260.0 | HFZ | PG | VO | Highly to very highly fractured zone. Probable weathered and crushed rock. |
| RBR-12-02 | ATV | 45.01 | 45.60 | 46.19 | 72 | 111 | 1180.0 | OJC |  |  | Open joint concentration |
| RBR-12-02 | ATV | 19.86 | 20.31 | 20.76 | 65 | 133 | 900.0 | HFZ | PG |  | Highly to very highly fractured zone. Probable weathered and crushed rock. |
| RBR-12-02 | ATV | 97.00 | 97.14 | 97.27 | 53 | 160 | 270.0 | OJC |  |  | Open joint concentration |

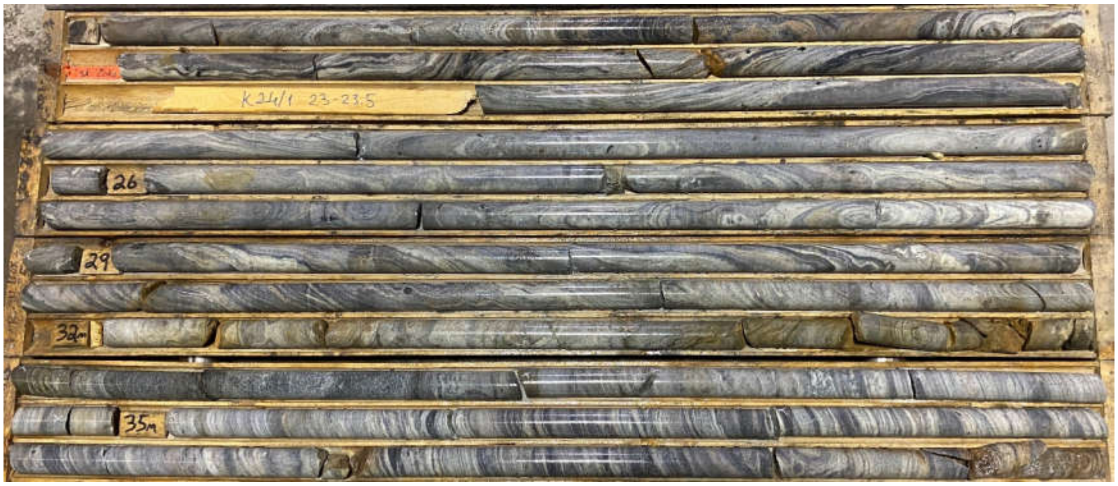
**Table D1 - Fault analysis**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**

| | |
|---|---|
| FZ | Fractured zone |
| HFZ | Highly fractured zone |
| OJC | Open joint concentration |
| MOJ | Major open joint |
| PG | Possible gouge |
| PF | Possible fault |
| VO | Varying orientations (global orientation +/- accurate) |
| WR | Weathered rock |

# Appendix E. Core Photos

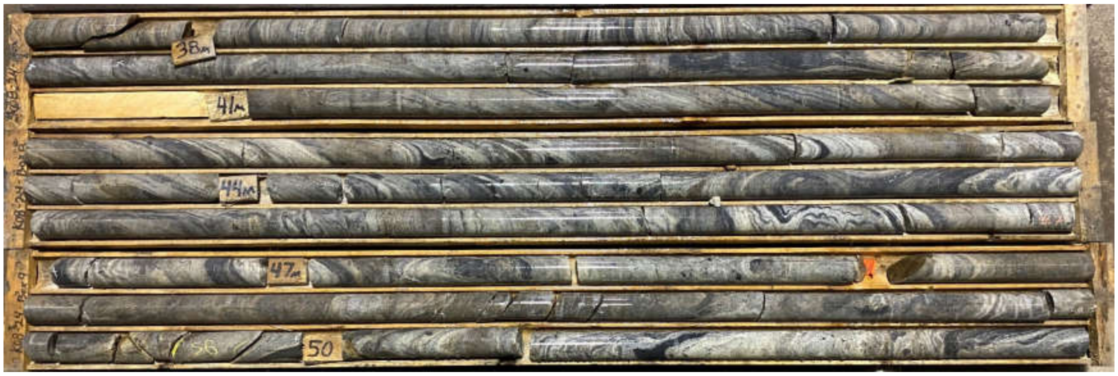
- K-08-24
- K-10-30
- K-11-115
- K-11-133
- K-11-137
- K-11-151
- K-11-161
- K-11-163
- K-12-175
- K-12-176A
- K-12-177
- K-12-179
- K-12-182
- K-12-184
- K-12-186
- K-12-200
- RBR-12-01
- RBR-12-02

20.0 m



37.8 m

37.8 m



51.0 m

**K-08-24 - Core Logs**

**Total core length : 305 m**

9.5 m

13.9 m

**K-10-30 - Core Logs**

**Core length : 191 m**

99.8 m

111.3 m

111.3 m

122.7 m

122.7 m

132.7 m

K-11-115_CF - Core Logs

Total core length : 417 m

132.7 m

144.1 m

144.1 m

159.3 m

159.3 m

169.2 m

**K-11-115_CF - Core Logs**

**Total core length : 417 m**

169.2 m

180.9 m

263.0 m

274.3 m

274.3 m

284.3 m

**K-11-115_CF - Core Logs**

**Total core length : 417 m**

**284.3 m**

**292.7 m**

**384.4 m**

**395.8 m**

**395.8 m**

**405.0 m**

**K-11-115_CF - Core Logs**

**Total core length : 417 m**

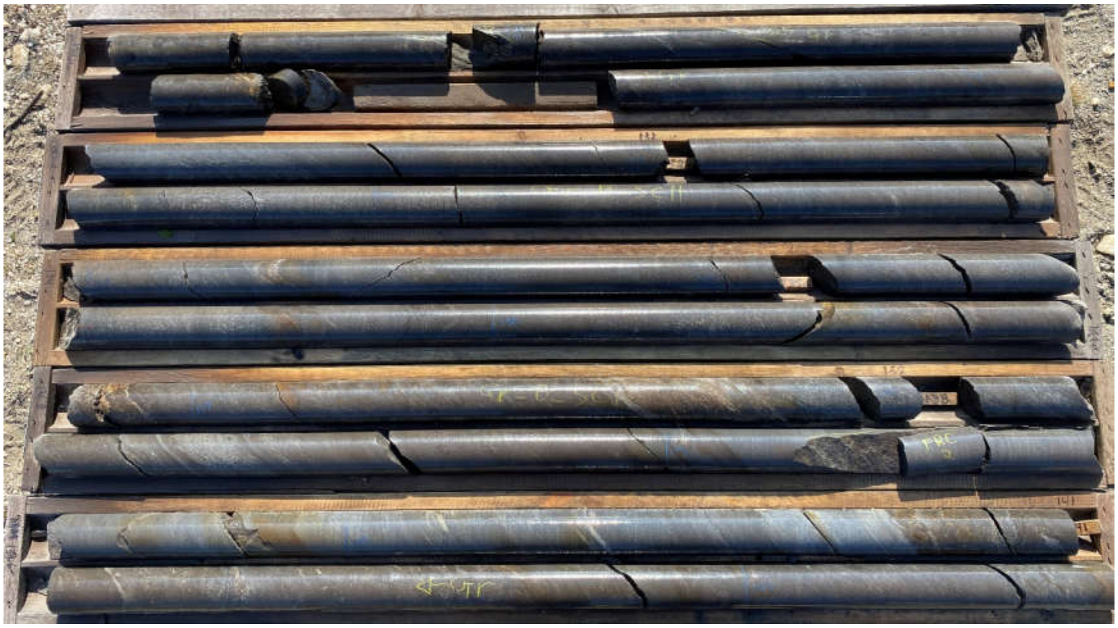
405.0 m

417.0 m

**K-11-115_CF - Core Logs**

**Total core length : 417 m**

128.4 m



142.5 m

142.5 m

156.7 m

**K-11-133 - Core Logs**

**Total core length : 421.5 m**

345.2 m

350.7 m

357.7 m

358.8 m

**K-11-137 - Core Logs**

**Total core length : 539 m**

71.4 m

81.1 m

**K-11-151 - Core Logs**

**Total core length : 299 m**

147.1 m

158.3 m

158.3 m

169.6 m

169.6 m

177.9 m

**K-11-161 - Core Logs**

**Total core length : 671 m**

578.4 m

589.7 m

609.2 m

617.0 m

## K-11-161 - Core Logs

Total core length : 671 m

652.1 m

663.7 m

**K-11-161 - Core Logs**

**Total core length : 671 m**

160.7 m

163.6 m

166.4 m

171.9 m

171.9 m

184.0 m

210.4 m

225.0 m

## K-11-163 - Core Logs

**Toal core length : 585 m**

225.0 m

237.4 m

271.8 m

283.7 m

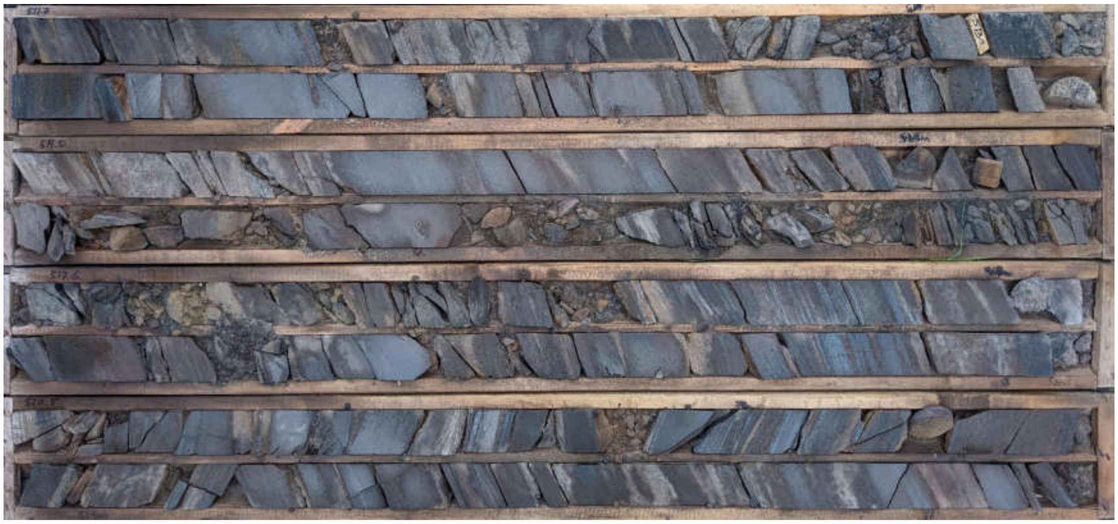
283.7 m

295.6 m

**K-11-163 - Core Logs**

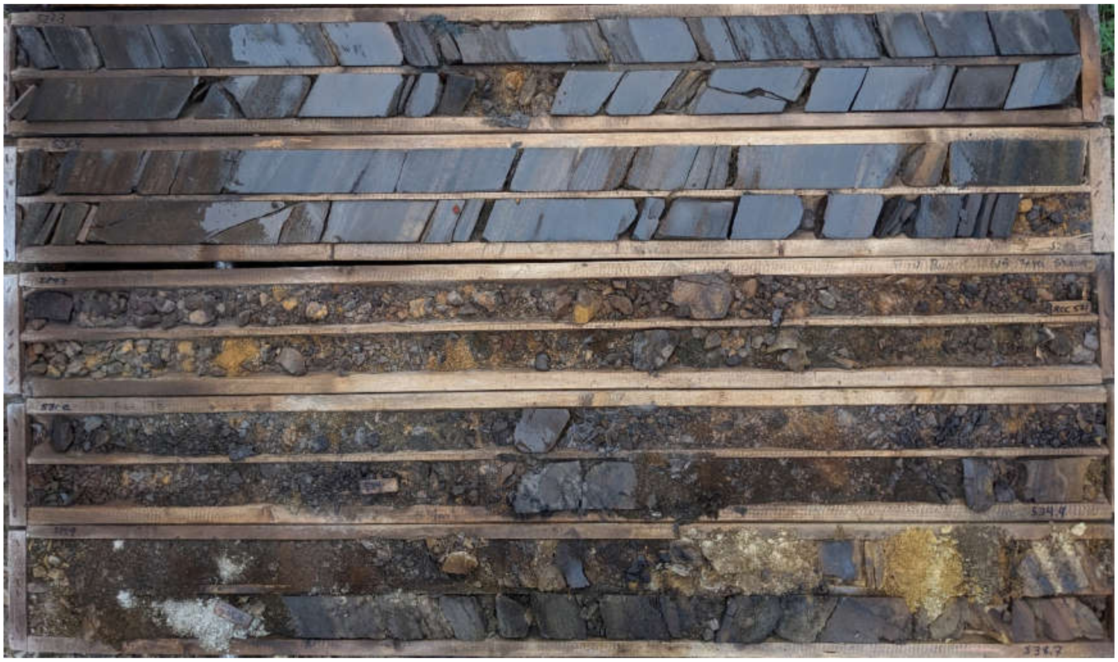
**Toal core length : 585 m**

511.7 m



523.3 m

523.3 m



538.7 m

**K-11-163 - Core Logs**

**Toal core length : 585 m**

559.2 m

569.7 m

**K-11-163 - Core Logs**

**Toal core length : 585 m**

50.0 m

55.5 m

**K-12-175 - Core Logs**

**Total core length : 323 m**

585.0 m

596.5 m

136.9 m

151.4 m

151.4 m

162.2 m

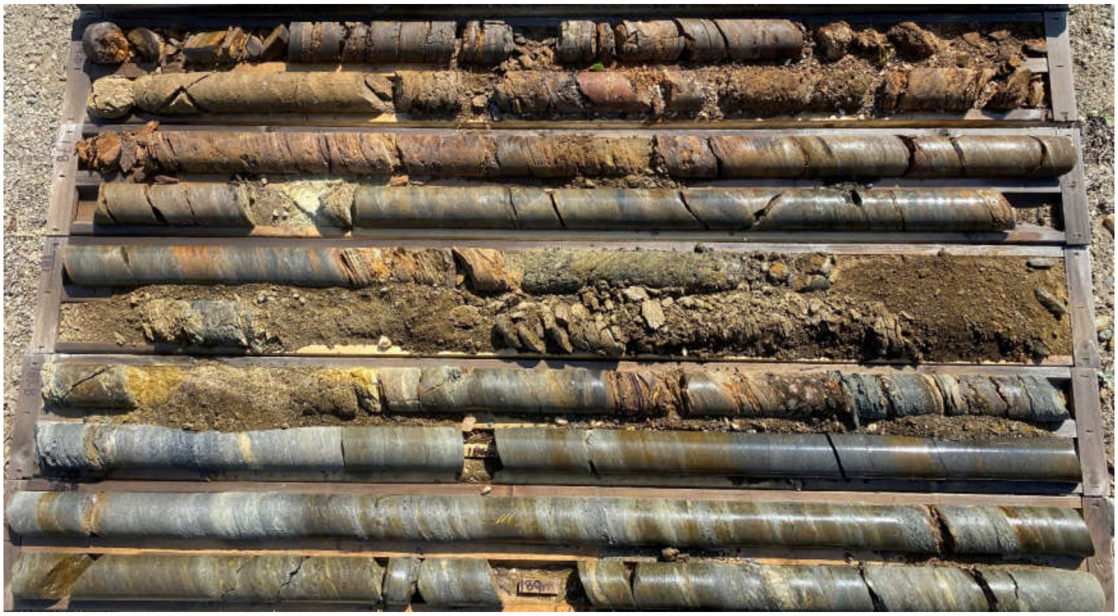
**K-12-177 - Core Logs**

**Total core length : 561 m**

162.2 m

174.6 m

174.6 m



189.7 m

## K-12-177 - Core Logs

Total core length : 561 m

228.6 m

240.2 m

240.2 m

252.0 m

252.0 m

264.1 m

264.1 m

272.5 m

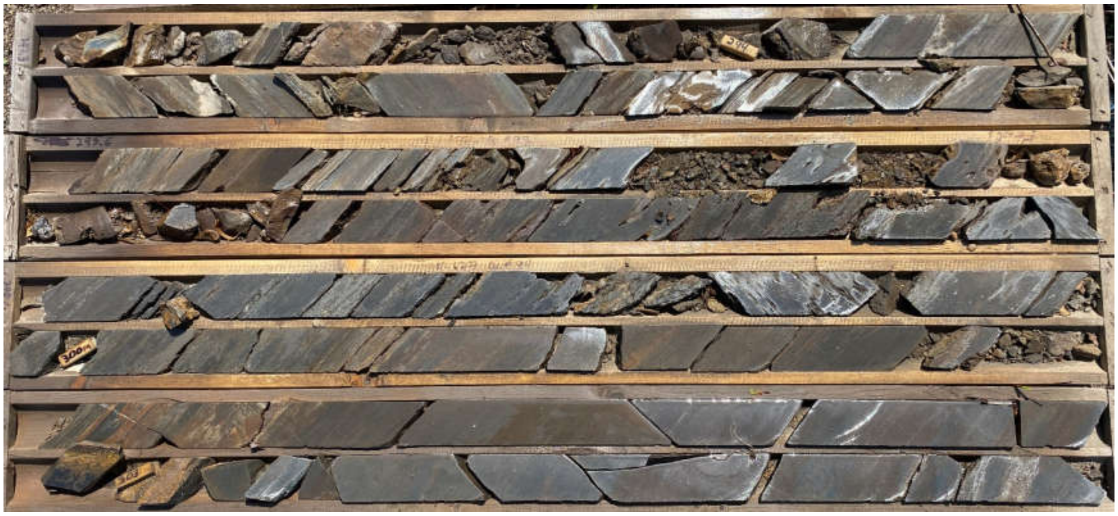
280.9 m

293.3 m

**K-12-177 - Core Logs**

**Total core length : 561 m**

293.3 m



304.0 m

545.2 m

556.5 m

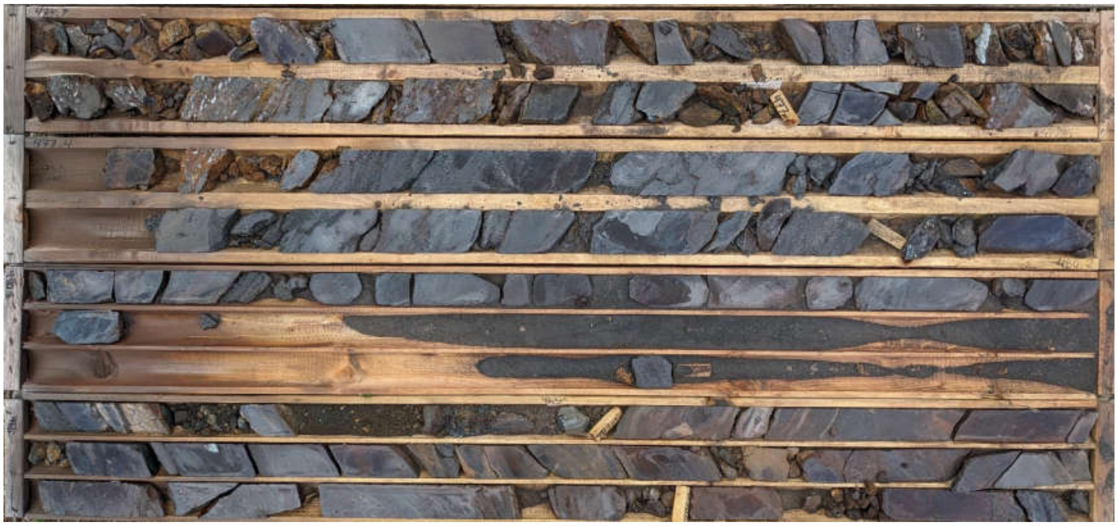
556.5 m

561.0 m

**K-12-177 - Core Logs**

**Total core length : 561 m**

474.9 m



486.5 m

486.5 m

504.0 m

540.4 m

543.0 m

**K-12-179 - Core Logs**

**Toal core length : 546 m**

415.4 m

430.2 m

430.2 m

456.0 m

**K-12-182 - Core Logs**

**Toal core length : 456 m**

129.2 m

140.0 m

140.0 m

149.3 m

149.3 m

159.9 m

**K-12-184 - Core Logs**

**Total core length : 479 m**

159.9 m

168.0 m

**K-12-184 - Core Logs**

**Total core length : 479 m**

217.3 m

231.1 m

231.1 m

239.5 m

390.0 m

407.1 m

**K-12-186 - Core Logs**

**Toal core length : 423 m**

407.1 m

423.0 m

## K-12-186 - Core Logs

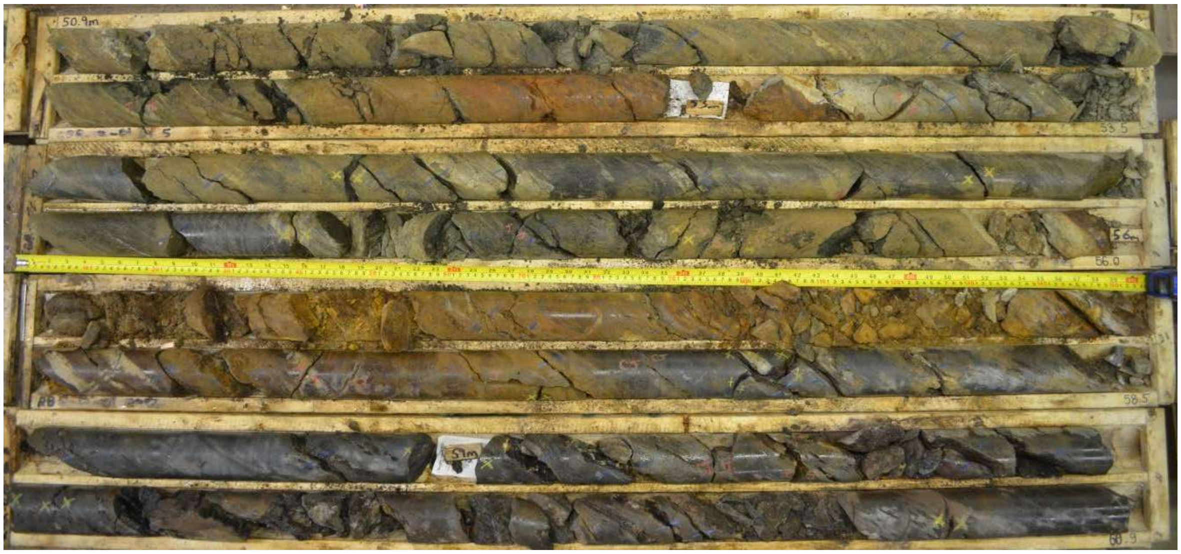
**Toal core length : 423 m**

181.5 m

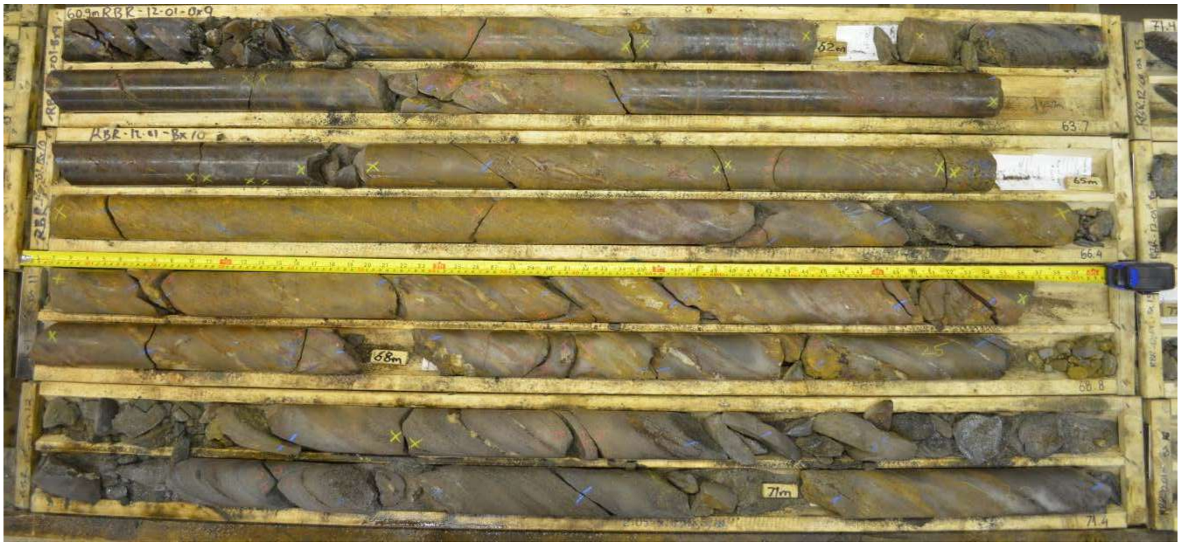
188.6 m

36.2 m

50.9 m



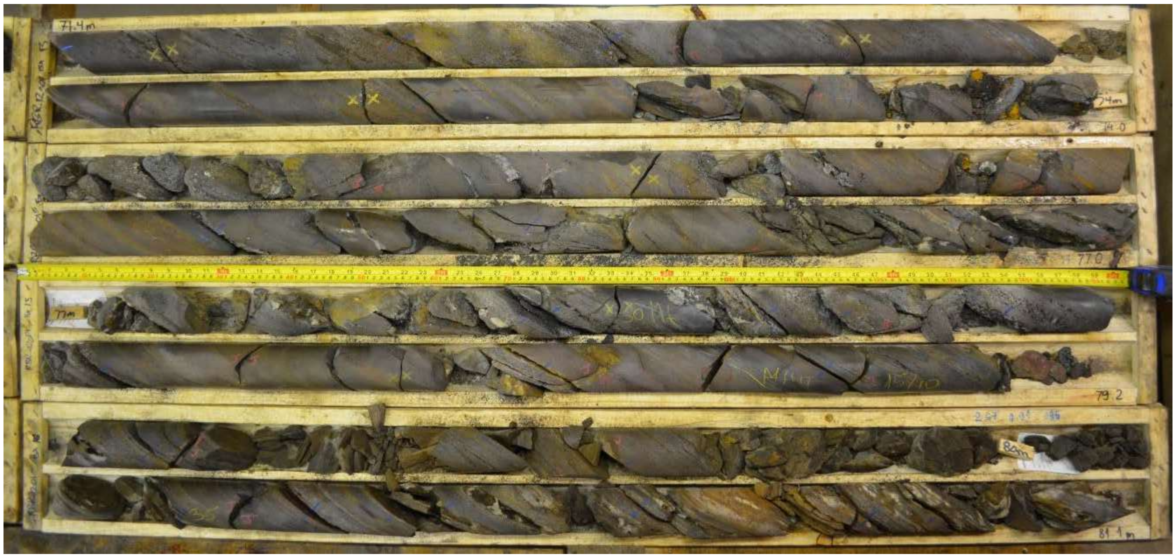
60.9 m



71.4 m

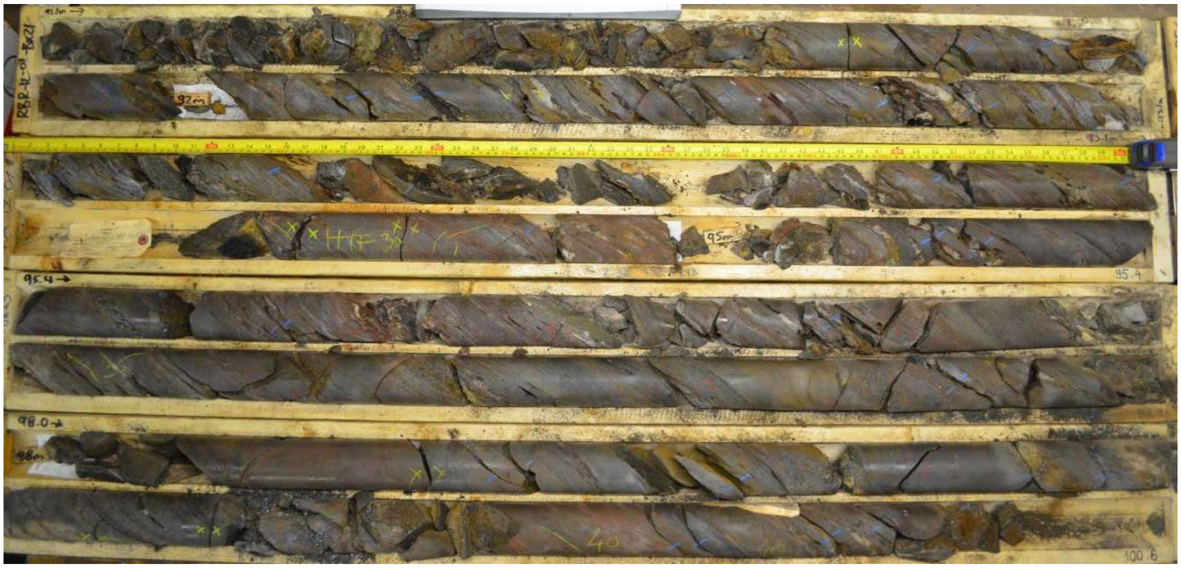
RBR-12-01 – Core Logs

71.4 m



81.1 m

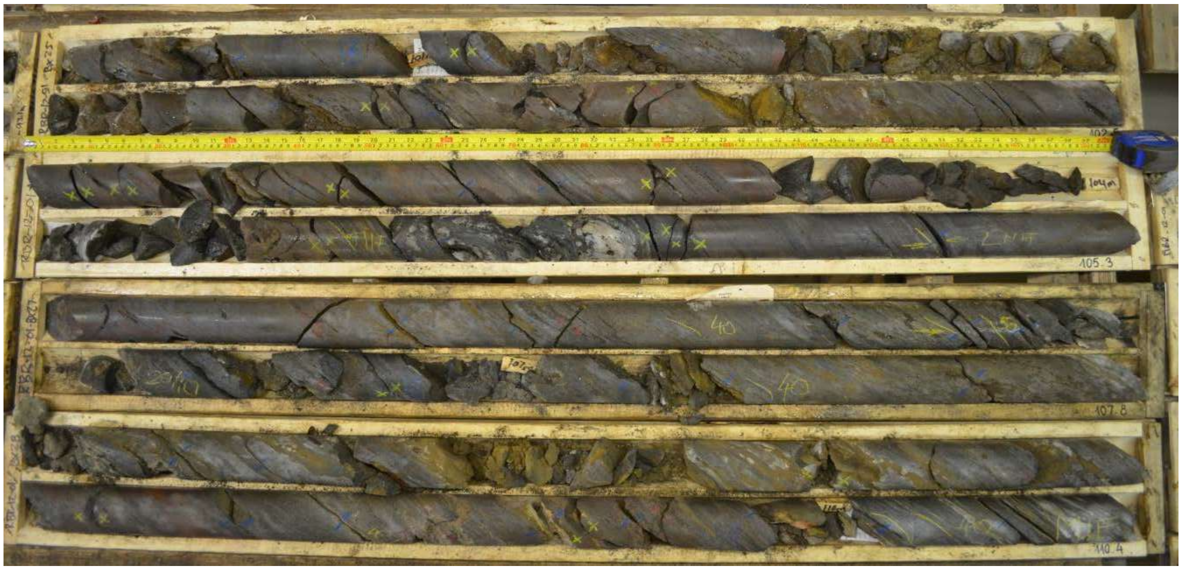
91.1 m



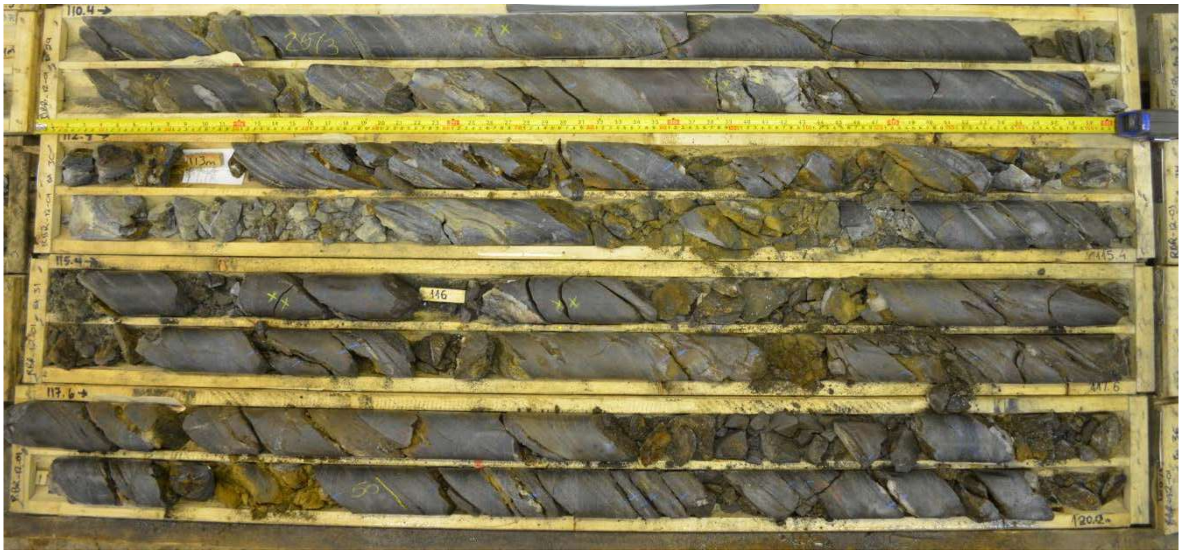
100.6 m

RBR-12-01 – Core Logs

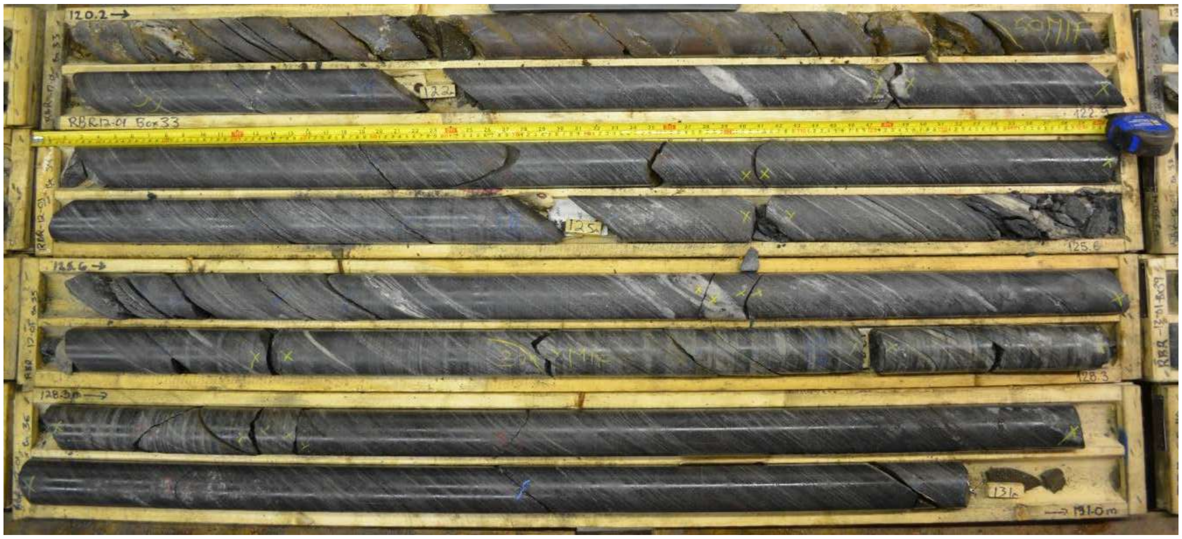
100.6 m



110.4 m

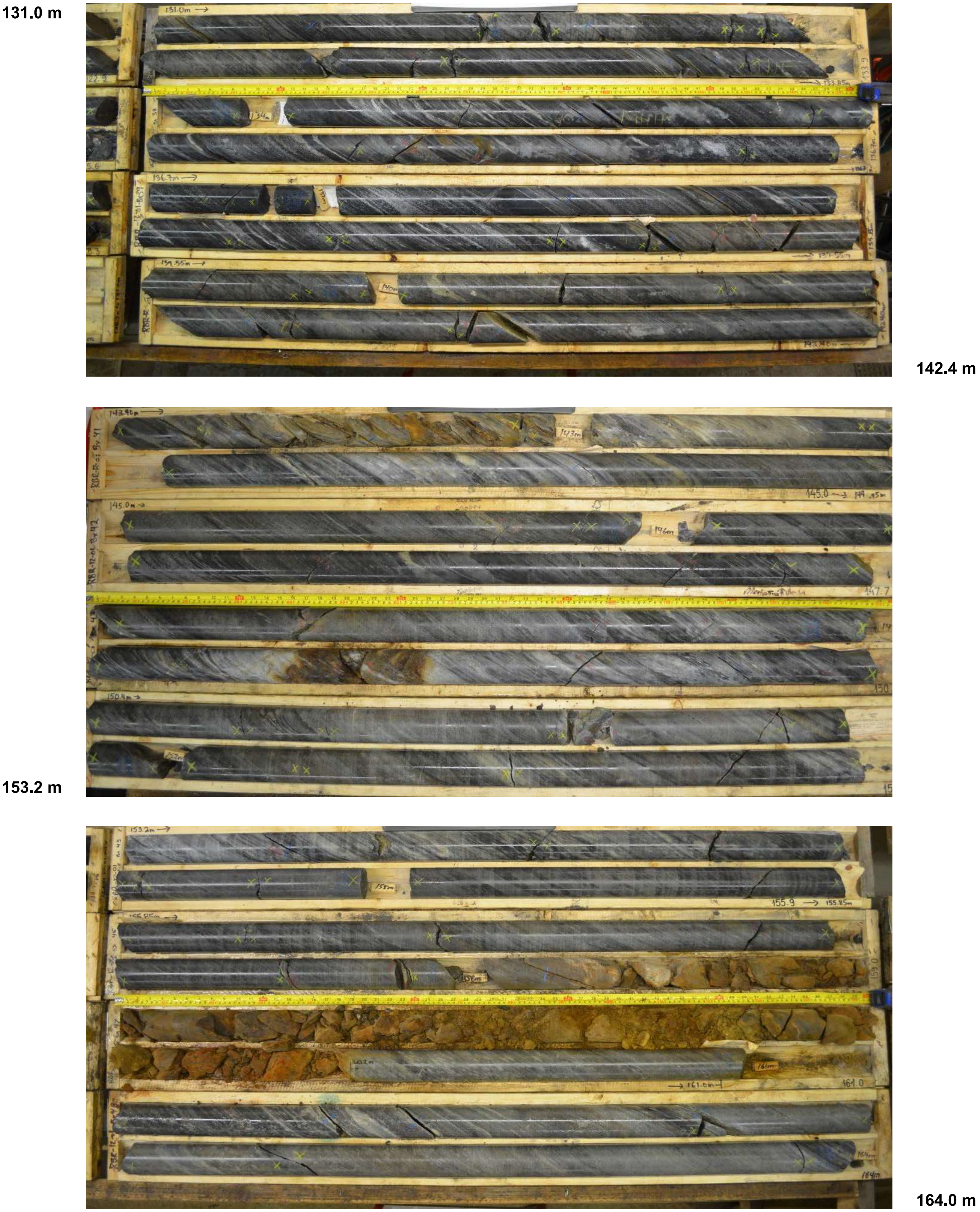


120.2 m



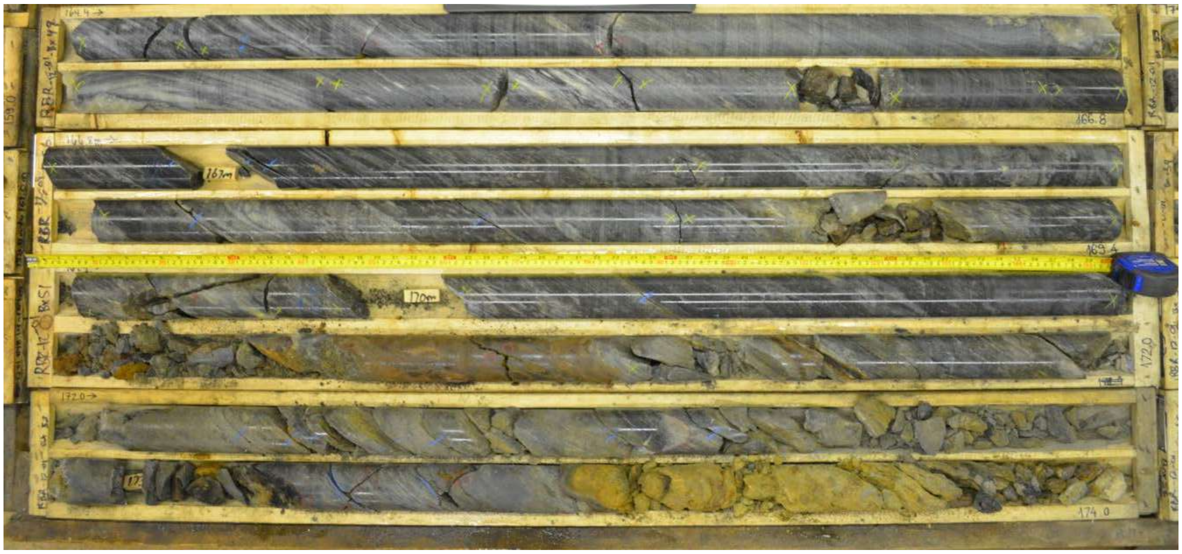
131.0 m

RBR-12-01 – Core Logs

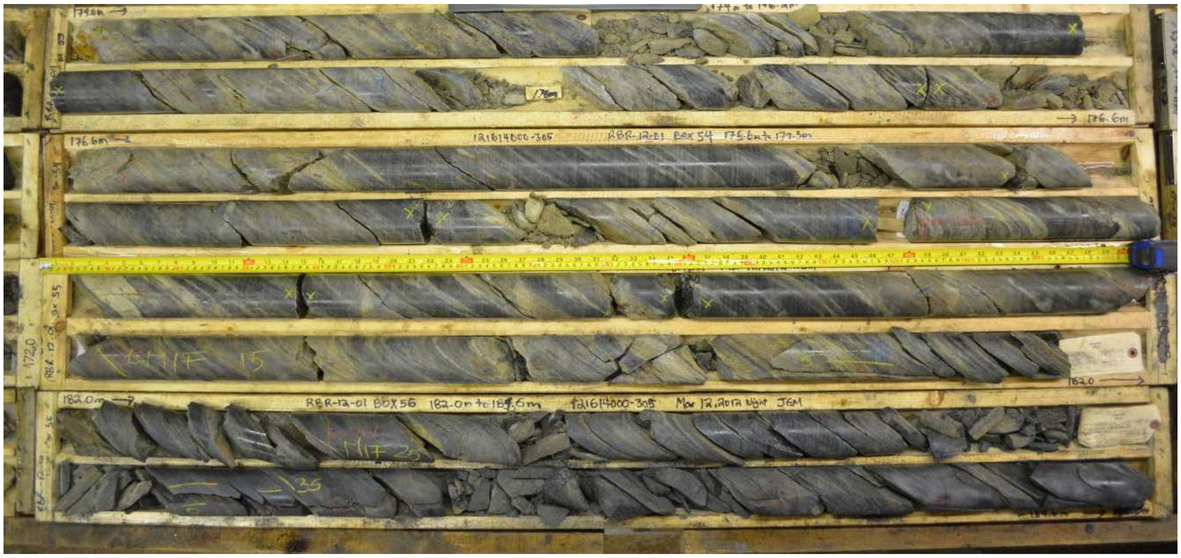


**RBR-12-01 – Core Logs**

164.0 m



174.0 m



184.6. m

194.75 m

RBR-12-01 – Core Logs

194.75 m

206.0 m

217.5 m

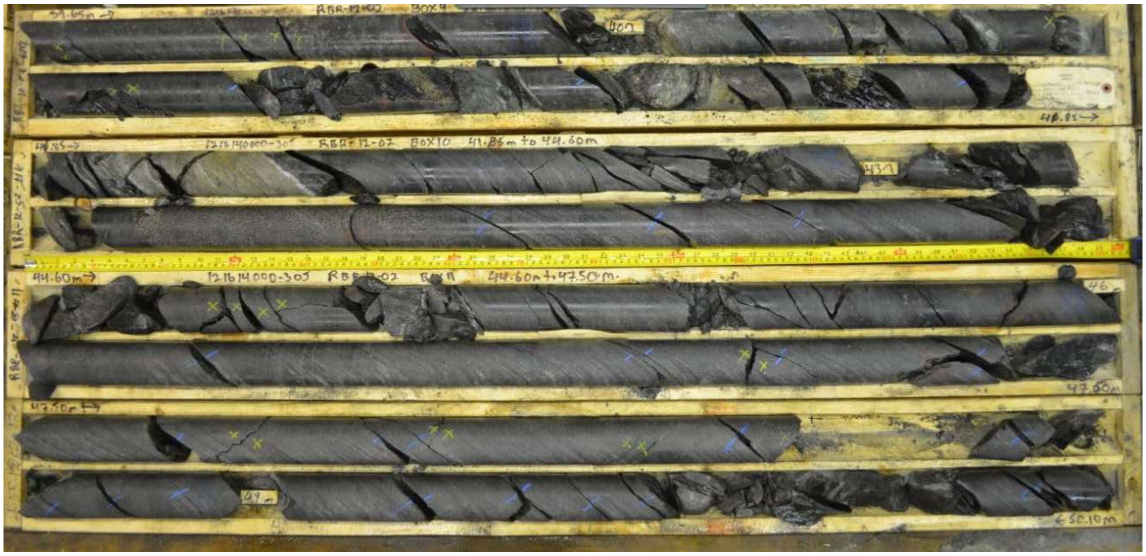
224.0 m

**RBR-12-01 – Core Logs**

**16 m**

**29.5 m**

**39.6 m**



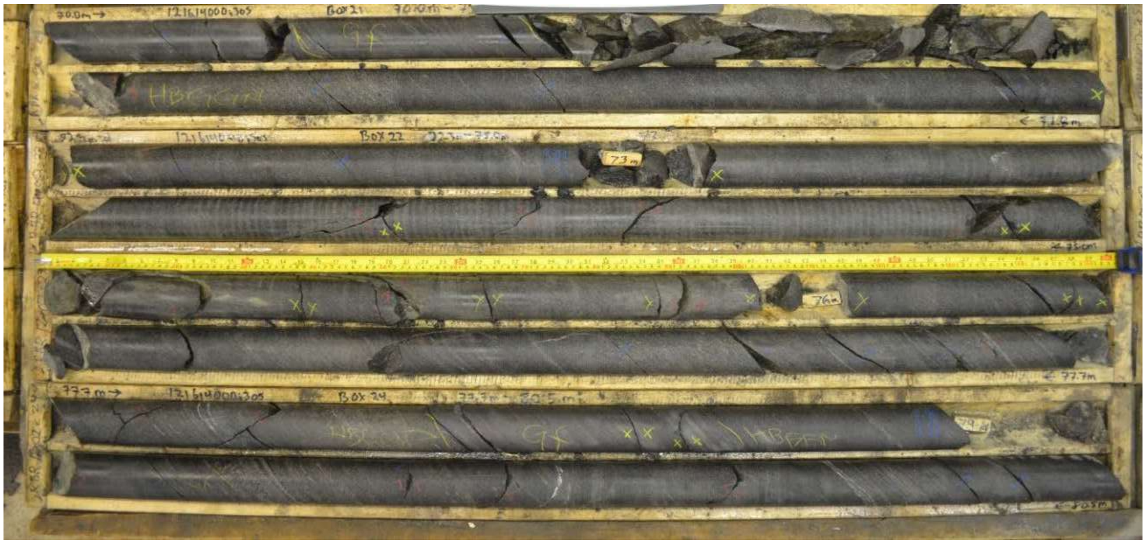
**50.1 m**

**RB-12-02 – Core Logs**

**50.1 m**

**59.3 m**

**70.0 m**



**80.5 m**

**RB-12-02 – Core Logs**

80.5 m

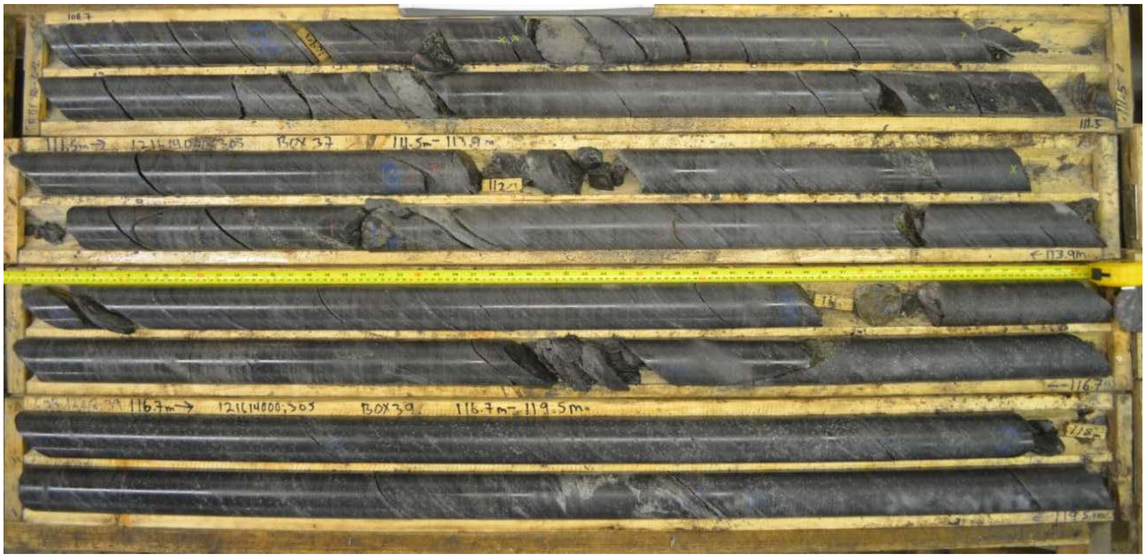
91.5 m

101.9 m

108.7 m

**RB-12-02 – Core Logs**

**108.7 m**



**119.5 m**

**131.4 m**

**142.1 m**

**RB-12-02 – Core Logs**

142.1 m

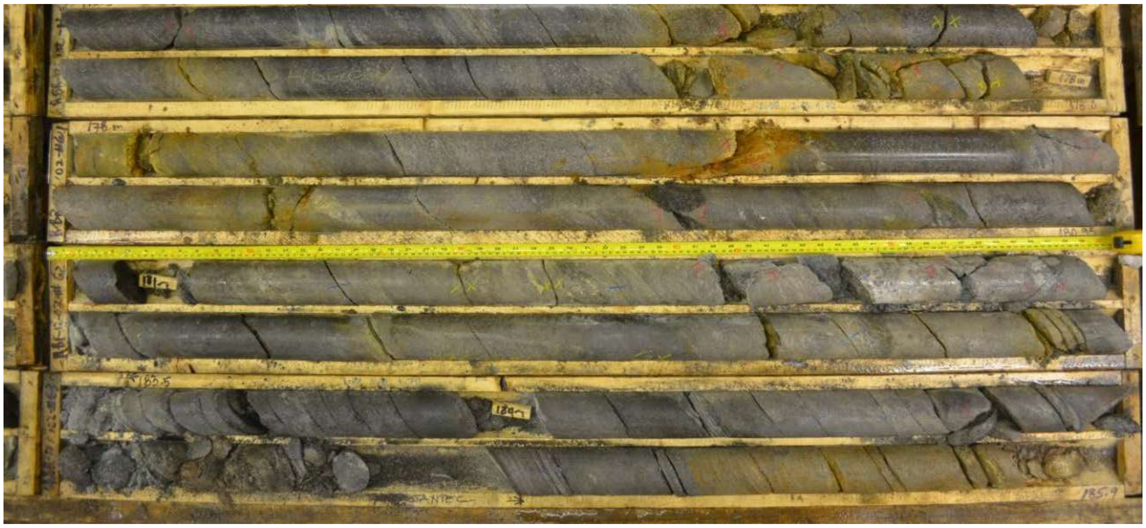
153.5 m

164.5 m

175.5 m

RB-12-02 – Core Logs

175.5 m



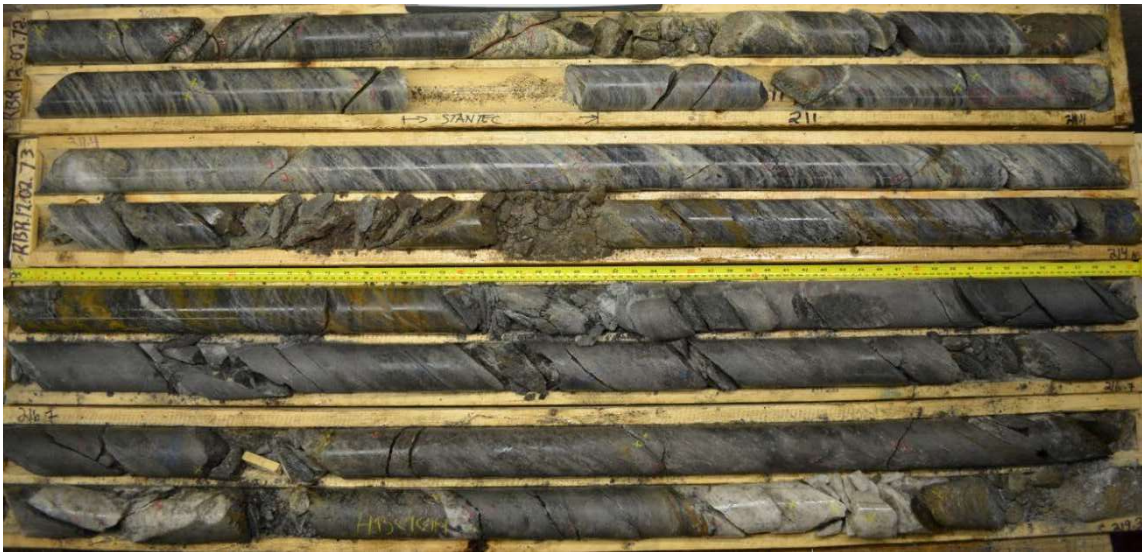
185.9 m

197.6 m

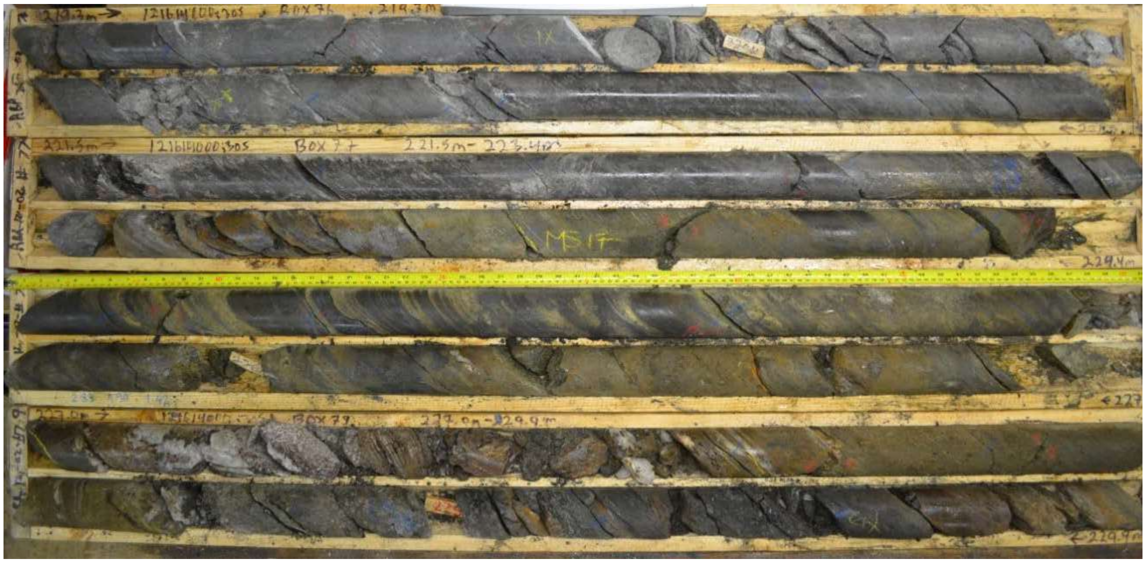
208.6 m

RB-12-02 – Core Logs

208.6 m



219.3 m



229.9 m

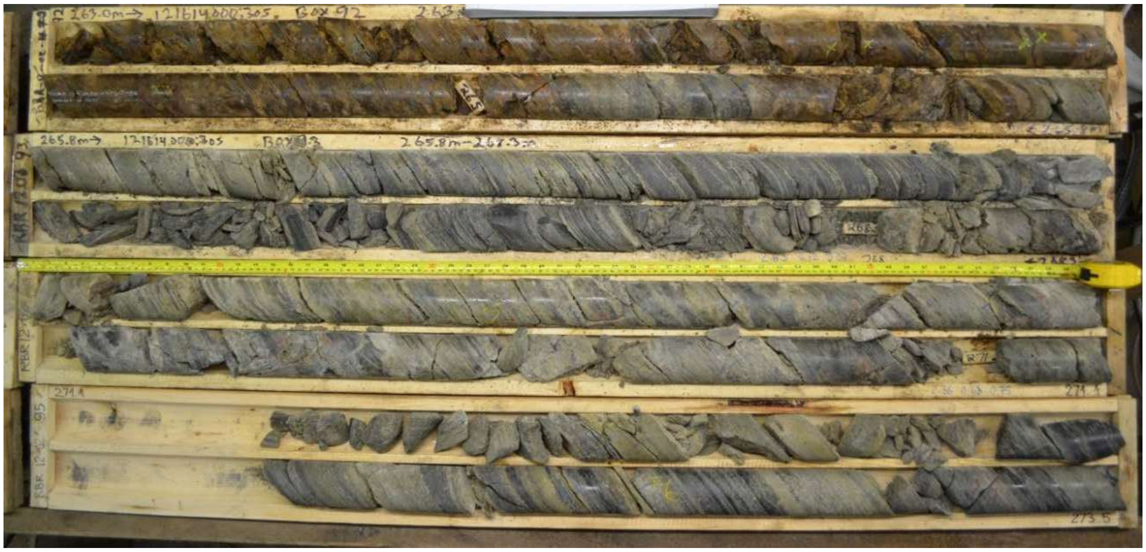
240.4 m

RB-12-02 – Core Logs

240.4 m

251.5 m

263.0 m



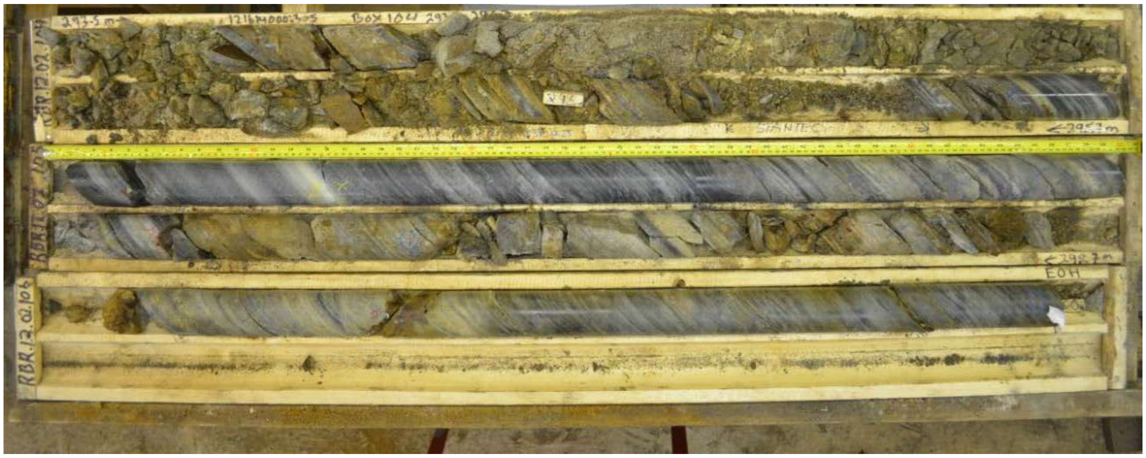
273.5 m

RB-12-02 – Core Logs

273.5 m

283.5 m

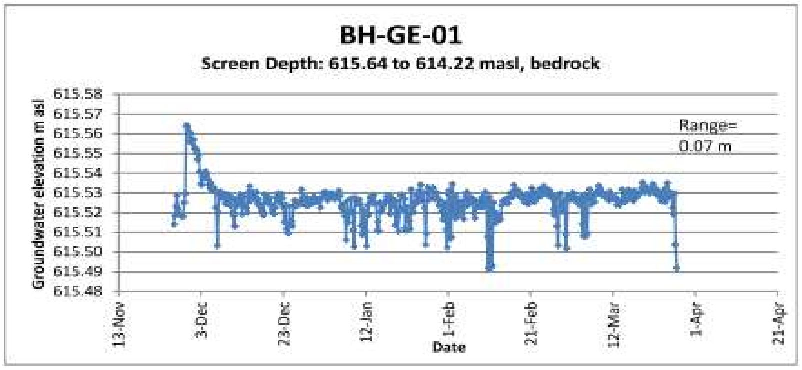
293.5 m



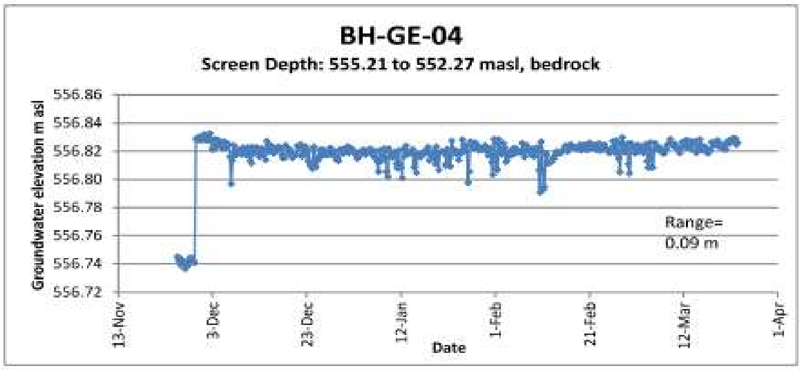
300.0 m

RB-12-02 – Core Logs

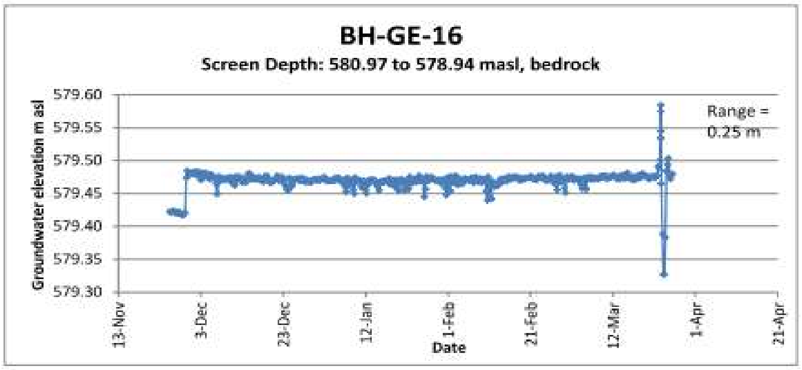
# Appendix F. 2012 Pressure Transducers Data



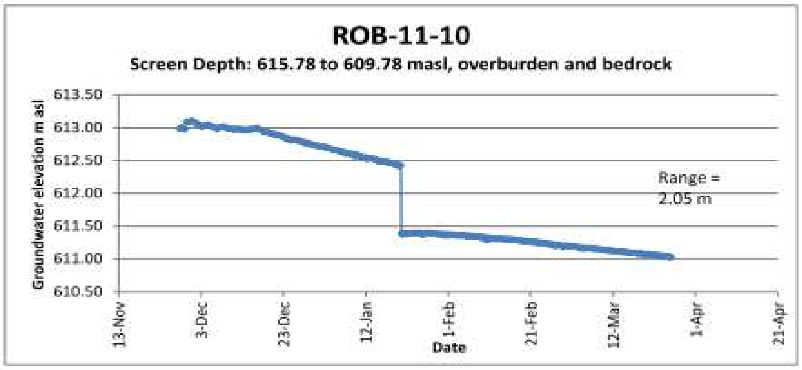
Logger is placed only 0.15 m below the top of the screen



Logger is placed about 1.5 m above the top of the screen

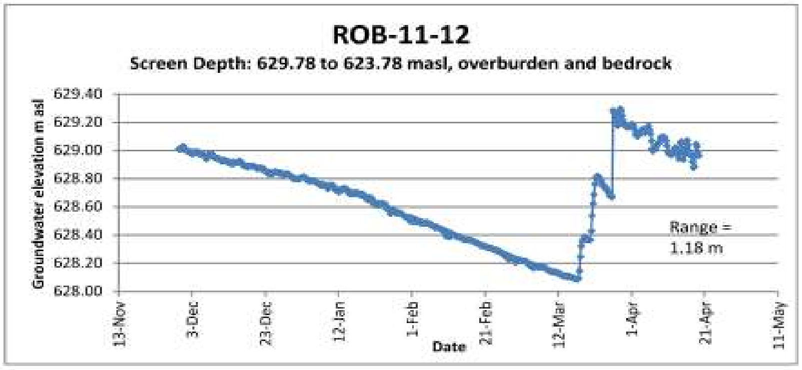


Logger is placed 1.5 m below the top of the screen



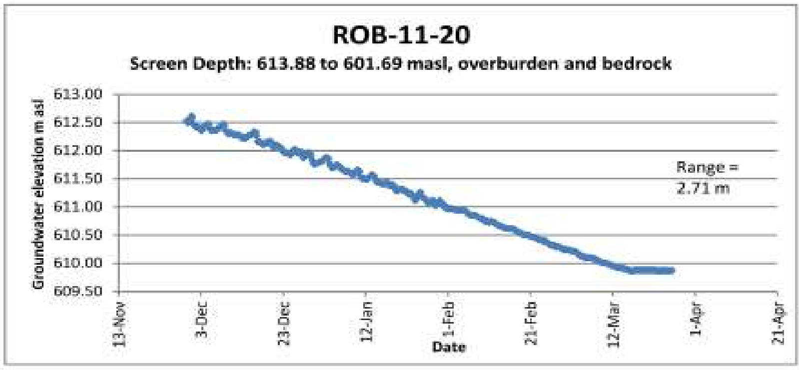
Logger is splaced about 5 m below the top of the screen

Sharp drop occurs after downloading logger data and replacing line



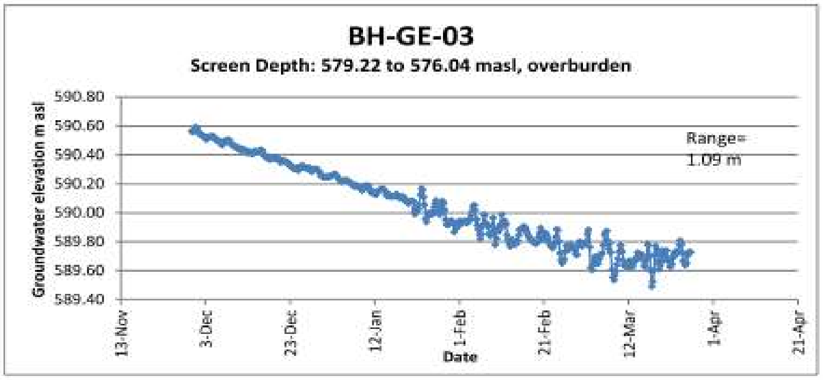
Logger is placed about 5.5 m below top of screen

Recharge could be due to a period of unseasonally warm temperatures causing early snow melt

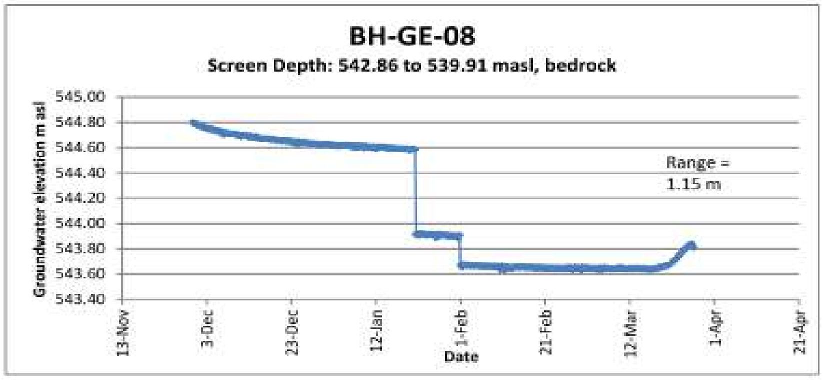


Logger is placed about 4 m below the top of the screen

**Appendix F - Pressure Transducers Data (from Stantec, 2012)**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**

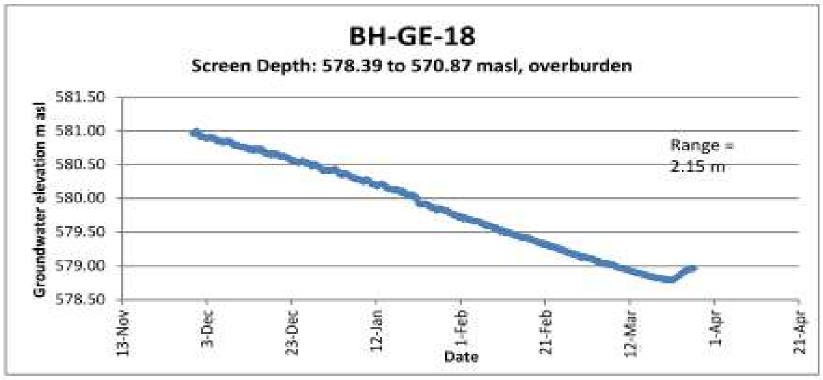


Logger is placed about 5 m above the top of the screen.



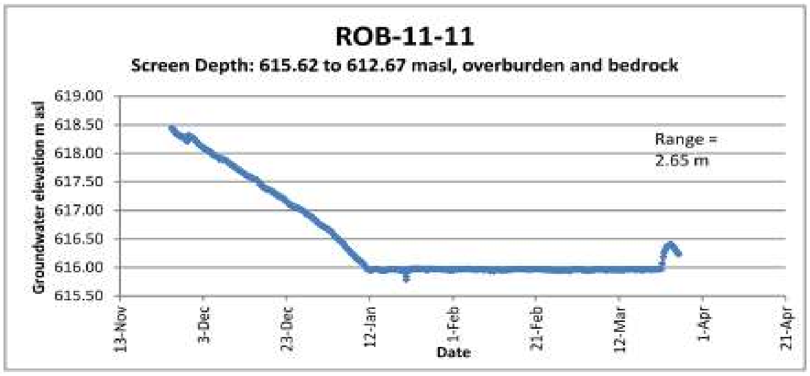
Recharge due to warm temperatures?

Logger is placed about 1.6 m below the top of the screen
The first drop corresponds to taking the logger out for downloading.



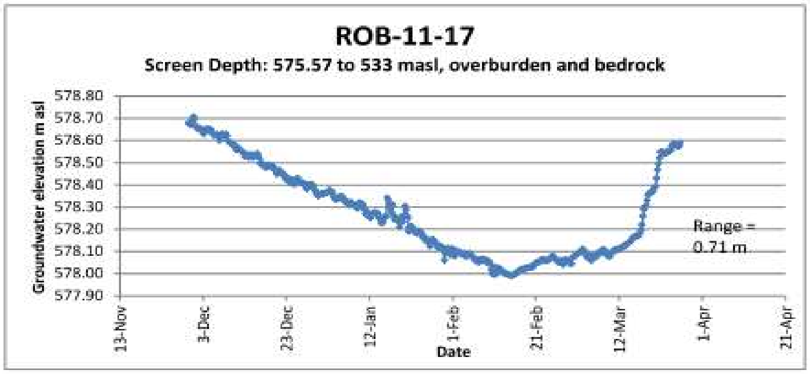
Logger is set at about 2.5 m below the top of the screen

Recharge due to warm temperatures?



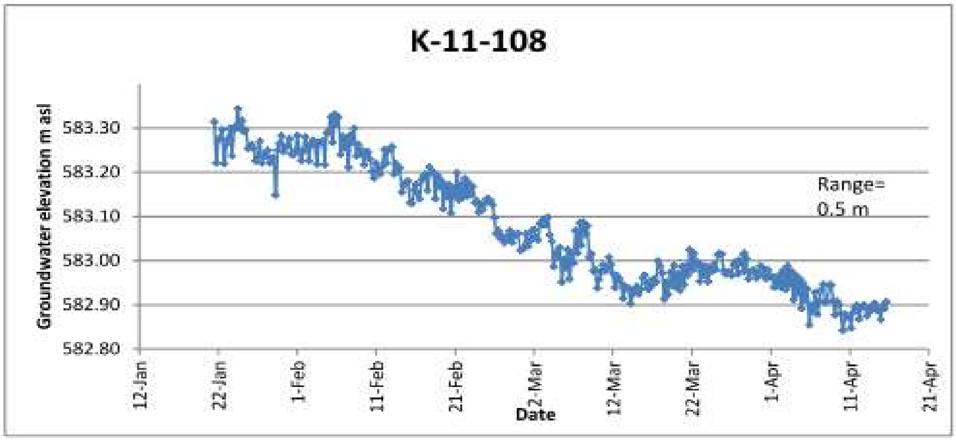
Logger is placed about 1 m below the top of the screen

Well very close to a lake, gw levels may have fallen until reaching equilibrium with

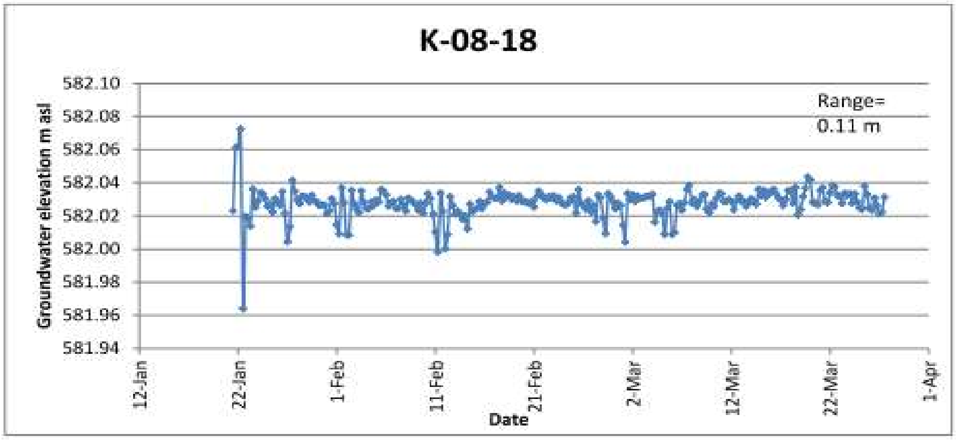


Logger is placed about 2 m belosw the top of the screen

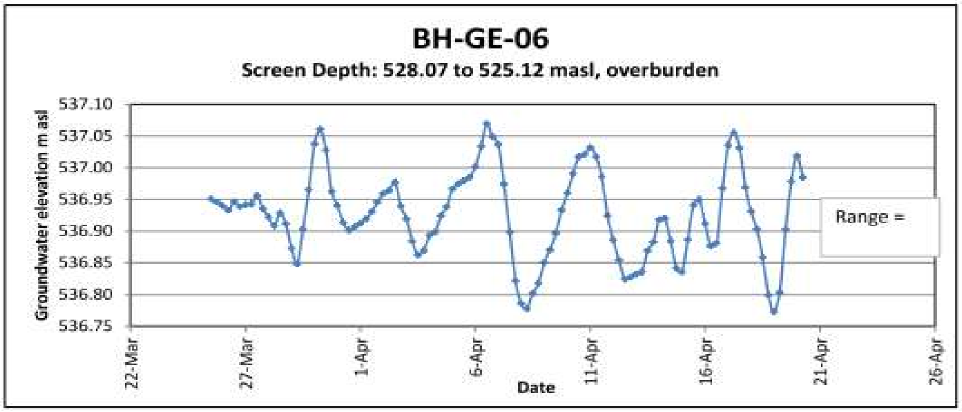
Recharge could be due to a period of unseasonally warm temperatures causing early snow melt



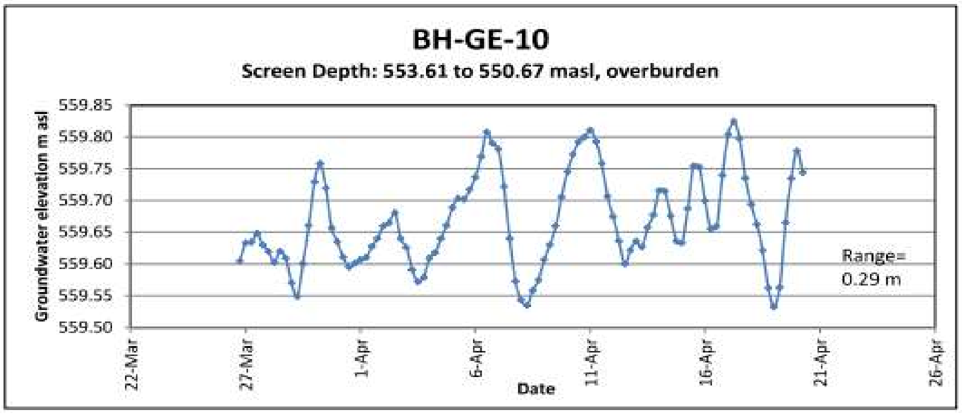
Don't have information on screen depth



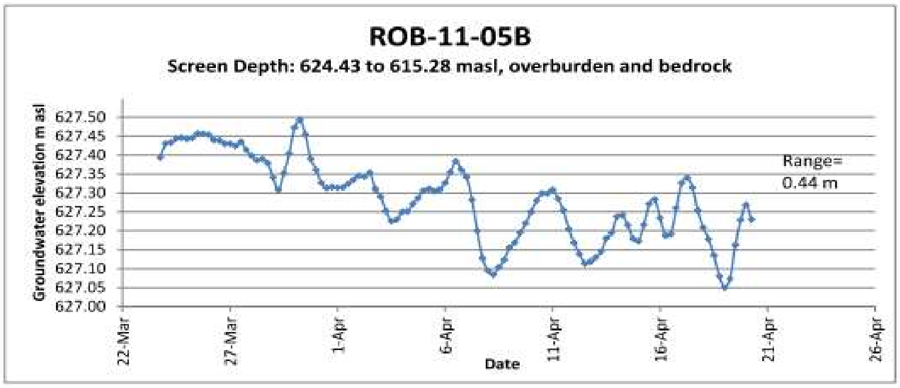
Don't have information on screen depth



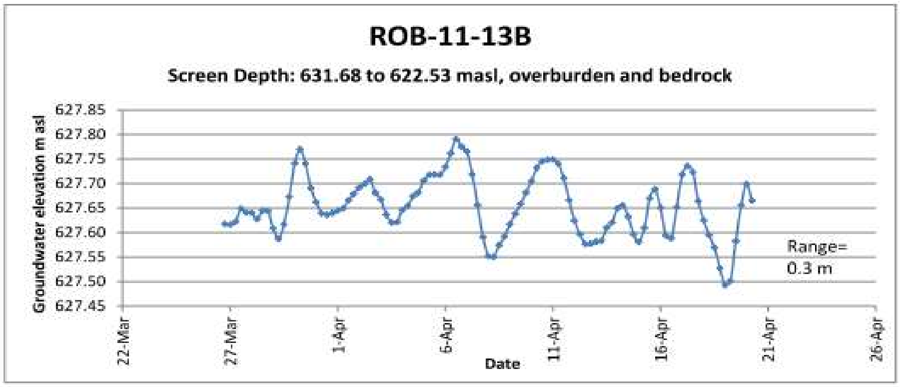
Logger is placed
about 3 m above
the top of the
screen



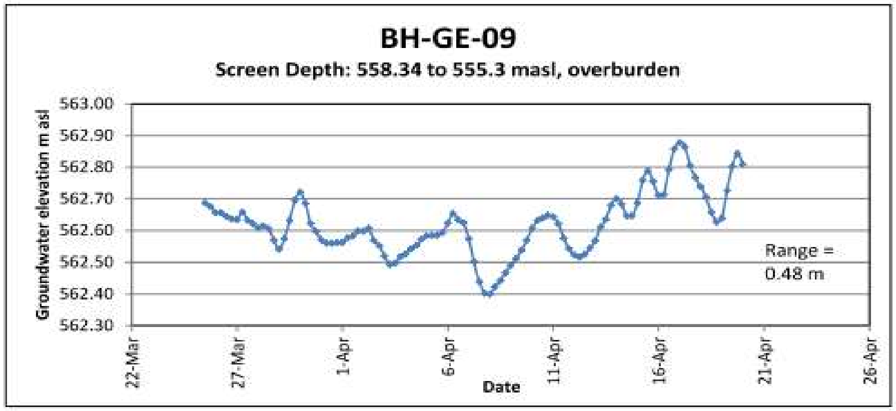
Logger is placed
about 0.5 m
below the top of
the screen



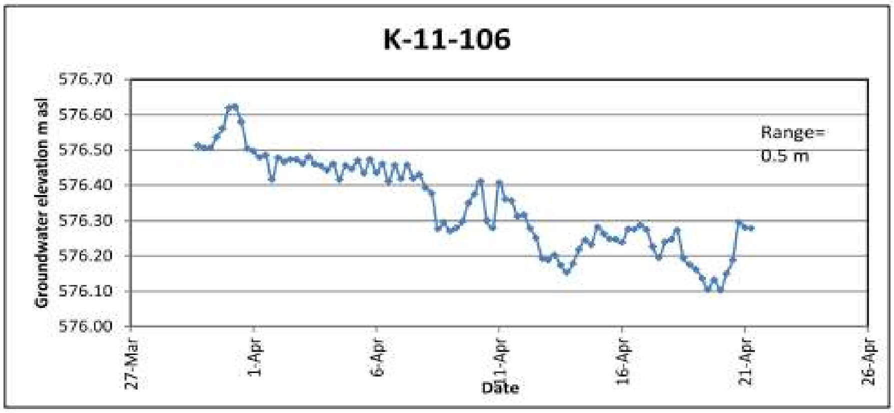
Logger is placed
about 4 m below
the top of the
screen



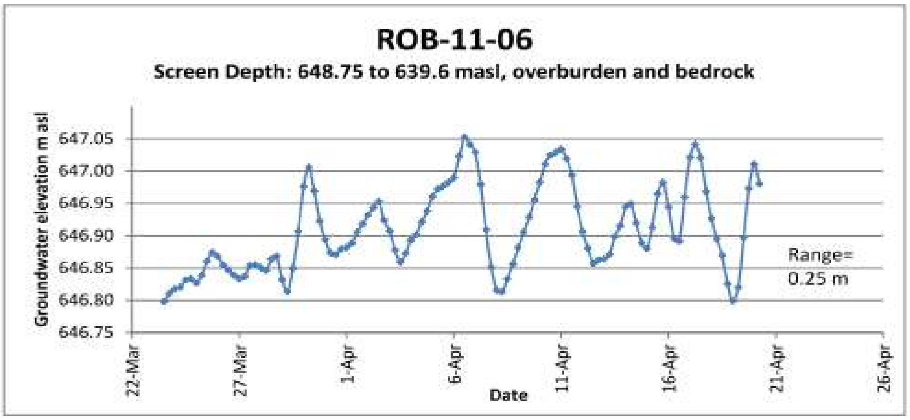
Logger is placed
about 5.5 m
below the top of
the screen



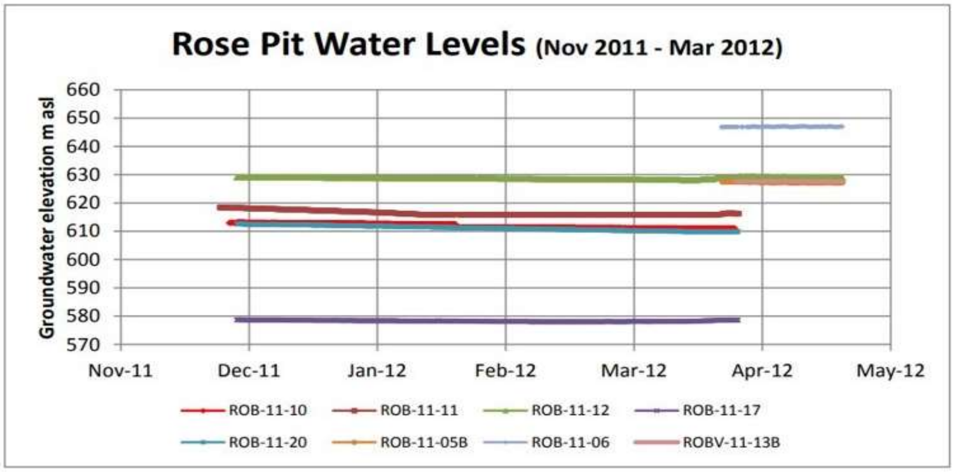
Logger is placed 1.5
m below the top of
the screen



No information on
screen depths



Logger is placed
about 7 m below
the top of the
screen



# Appendix G. 2012 Groundwater Quality

**Appendix G1 : Dissolved Metals in Groundwater in 2012 (from Stantec, 2012)**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**

| | | Location | | ROB-11-02 | ROB-11-05A | ROB-11-05B | ROB-11-08A | ROB-11-08B | ROB-11-10 | ROB-11-11 | ROB-11-11 | ROB-11-12 | ROB-11-13A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth (m) | | 3.1-25.9 | 16.5-19.6 | 3.1-13.7 | 6.8-29.0 | 2.2-9.0 | 0.9-7.6 | 2.2-5.8 | Lab-Dup | 0.9-7.4 | 11.6-15.2 |
| | | Unit | | Till/Bedrock | Bedrock | Overburden | Till/Bedrock | Overburden | Till/Bedrock | Till/Bedrock | | Till/Bedrock | Till/Bedrock |
| Parameters | Units | RDL | GCDWQ[1] | | | | | | | | | | |
| **Aluminum (Al)** | **ug/L** | **5.0** | - | ND | 71.2 | ND | ND | 8.0 | 8.9 | 7.6 | 7.7 | 31.0 | 26.3 |
| **Antimony (Sb)** | **ug/L** | **1.0** | **6** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Arsenic (As)** | **ug/L** | **1.0** | **10** | ND | ND | ND | ND | ND | 1.4 | ND | ND | 1.1 | ND |
| **Barium (Ba)** | **ug/L** | **1.0** | **1000** | 16.1 | 10.7 | 13.2 | 4.6 | 40.6 | 42.0 | 10.6 | 10.8 | 9.1 | 19.2 |
| **Beryllium (Be)** | **ug/L** | **1.0** | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Bismuth (Bi)** | **ug/L** | **2.0** | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Boron (B)** | **ug/L** | **50** | **5000** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Cadmium (Cd)** | **ug/L** | **0.017** | **10** | ND | ND | ND | ND | ND | 0.218 | 0.079 | 0.075 | 0.035 | 0.035 |
| **Chromium (Cr)** | **ug/L** | **1.0** | **50** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Cobalt (Co)** | **ug/L** | **0.40** | - | ND | 1.07 | ND | ND | ND | 2.46 | ND | ND | 2.96 | 1.01 |
| **Copper (Cu)** | **ug/L** | **2.0** | **1000** | ND | 6.7 | 2.3 | ND | 2.8 | 11.3 | 2.3 | 2.4 | 3.6 | 2.8 |
| **Iron (Fe)** | **ug/L** | **50** | **300** | 198 | **1110** | ND | ND | 63 | **382** | 55 | 56 | **2390** | **651** |
| **Lead (Pb)** | **ug/L** | **0.50** | **10** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Manganese (Mn)** | **ug/L** | **2.0** | **50** | **679** | **267** | **174** | ND | **538** | **773** | 46 | 47 | **1130** | **366** |
| **Molybdenum (Mo)** | **ug/L** | **2.0** | - | ND | 20.1 | 2.6 | ND | 15.0 | 11.8 | ND | ND | 12.4 | 5.2 |
| **Nickel (Ni)** | **ug/L** | **2.0** | - | ND | 2.3 | 2.6 | ND | ND | 18.5 | ND | ND | ND | 5.9 |
| **Selenium (Se)** | **ug/L** | **1.0** | **10** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Silver (Ag)** | **ug/L** | **0.10** | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Strontium (Sr)** | **ug/L** | **2.0** | - | 38.5 | 32 | 38.7 | 25.2 | 23.8 | 83.4 | 31.4 | 32.3 | 8 | 24.6 |
| **Thallium (Tl)** | **ug/L** | **0.10** | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Tin (Sn)** | **ug/L** | **2.0** | - | ND | 2.7 | ND | ND | ND | ND | ND | ND | ND | ND |
| **Titanium (Ti)** | **ug/L** | **2.0** | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Uranium (U)** | **ug/L** | **0.10** | **20** | 0.4 | 0.2 | 0.2 | 2.3 | 0.6 | 0.9 | 0.2 | 0.2 | ND | ND |
| **Vanadium (V)** | **ug/L** | **2.0** | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Zinc (Zn)** | **ug/L** | **5.0** | **5000** | 5.1 | 41.7 | 6 | 10.2 | ND | 20.2 | ND | ND | 10.5 | 27.3 |

**Notes:**

1 =Guidelines for Canadian Drinking Water Quality, Health Canada 2012 - On-Line Update Table.

2 - ug/L - micrograms per liter;

= not analysed, not applicable or no applicable guideline

**Bold/Shaded = value exceeds applicable criteria**

Detected above

RDL = Reportable Detection Limit

## Appendix G1 : Dissolved Metals in Groundwater in 2012 (from Stantec, 2012)
## Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property
## Hydrogeology and Water Management

| | | Location | | ROB-11-13B | ROB-11-17 | ROB-11-20 | K-11-108 | K-11-113 | K-11-163 | BH-GE-03 | BH-GE-04 | BH-GE-06 | BH-GE-09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth (m) | | 1.4-10.7 | 4.6-47.8 | 1.5-15.0 | | | | 6.4-15.5 | 2.7-11.8 | 3.1-15.8 | 3.4-9.4 |
| | | Unit | | Overburden | Till/Bedrock | Till/Bedrock | Bedrock | Bedrock | Bedrock | Overburden | Till/Bedrock | Overburden | Overburden |
| Parameters | Units | RDL | GCDWQ$^1$ | | | | | | | | | | |
| Aluminum (Al) | ug/L | 5.0 | - | 28.6 | 6.2 | ND | ND | 11.6 | ND | ND | ND | 9.0 | 6.9 |
| Antimony (Sb) | ug/L | 1.0 | 6 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Arsenic (As) | ug/L | 1.0 | 10 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Barium (Ba) | ug/L | 1.0 | 1000 | 31.7 | 28.2 | 30.9 | 4.2 | 17.1 | 10.5 | 43.6 | 10.4 | 4.1 | 21.7 |
| Beryllium (Be) | ug/L | 1.0 | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Bismuth (Bi) | ug/L | 2.0 | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Boron (B) | ug/L | 50 | 5000 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Cadmium (Cd) | ug/L | 0.017 | 10 | 0.09 | 0.043 | ND | ND | 0.037 | 0.026 | ND | ND | ND | 0.029 |
| Chromium (Cr) | ug/L | 1.0 | 50 | ND | ND | ND | ND | 1.4 | ND | ND | ND | ND | ND |
| Cobalt (Co) | ug/L | 0.40 | - | 1.54 | ND | 0.58 | ND | ND | ND | ND | ND | ND | ND |
| Copper (Cu) | ug/L | 2.0 | 1000 | 6.4 | ND | ND | ND | 57.7 | ND | ND | ND | ND | ND |
| Iron (Fe) | ug/L | 50 | 300 | 163 | 93 | **342** | ND | **2120** | **2620** | ND | ND | ND | ND |
| Lead (Pb) | ug/L | 0.50 | 10 | ND | ND | ND | ND | 2.22 | ND | ND | ND | ND | ND |
| Manganese (Mn) | ug/L | 2.0 | 50 | **178** | **243** | **297** | 43.4 | **79.3** | **305** | **254** | 2 | ND | 25.5 |
| Molybdenum (Mo) | ug/L | 2.0 | - | 4.0 | 5.2 | 3.2 | 21.4 | 8.2 | 2.7 | 6.9 | ND | ND | 4.2 |
| Nickel (Ni) | ug/L | 2.0 | - | 10.8 | ND | 3.5 | ND | ND | 2.1 | ND | ND | ND | 4.6 |
| Selenium (Se) | ug/L | 1.0 | 10 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Silver (Ag) | ug/L | 0.10 | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Strontium (Sr) | ug/L | 2.0 | - | 46.0 | 24.4 | 29 | 12.7 | 47.4 | 17.7 | 19.1 | 18.7 | 13.1 | 12.1 |
| Thallium (Tl) | ug/L | 0.10 | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Tin (Sn) | ug/L | 2.0 | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Titanium (Ti) | ug/L | 2.0 | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Uranium (U) | ug/L | 0.10 | 20 | ND | 0.2 | 0.2 | ND | 0.1 | ND | 0.1 | 0.3 | 0.3 | 0.4 |
| Vanadium (V) | ug/L | 2.0 | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc (Zn) | ug/L | 5.0 | 5000 | 16 | ND | 34.6 | ND | 99.1 | 127 | 11.2 | ND | ND | ND |

**Notes:**

1 =Guidelines for Canadian Drinking Water Quality, Health Canada 2012 - On-Line Update Table.

2 - ug/L - micrograms per liter;

= not analysed, not applicable or no applicable guideline

**Bold/Shaded = value exceeds applicable criteria**

Detected above

RDL = Reportable Detection Limit

## Appendix G1 : Dissolved Metals in Groundwater in 2012 (from Stantec, 2012)
Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property
Hydrogeology and Water Management

| | | Location | | BH-GE-10 | BH-GE-18 |
|---|---|---|---|---|---|
| | | Sample Depth (m) | | 2.4-9.2 | 2.4-12.2 |
| | | Unit | | Overburden | Overburden |
| Parameters | Units | RDL | GCDWQ[1] | | |
| Aluminum (Al) | ug/L | 5.0 | - | ND | 6.5 |
| Antimony (Sb) | ug/L | 1.0 | 6 | ND | ND |
| Arsenic (As) | ug/L | 1.0 | 10 | 2.1 | ND |
| Barium (Ba) | ug/L | 1.0 | 1000 | 191.0 | 45.0 |
| Beryllium (Be) | ug/L | 1.0 | - | ND | ND |
| Bismuth (Bi) | ug/L | 2.0 | - | ND | ND |
| Boron (B) | ug/L | 50 | 5000 | ND | ND |
| Cadmium (Cd) | ug/L | 0.017 | 10 | ND | 0.031 |
| Chromium (Cr) | ug/L | 1.0 | 50 | ND | ND |
| Cobalt (Co) | ug/L | 0.40 | - | ND | ND |
| Copper (Cu) | ug/L | 2.0 | 1000 | ND | 2.3 |
| Iron (Fe) | ug/L | 50 | 300 | 241 | 169 |
| Lead (Pb) | ug/L | 0.50 | 10 | ND | ND |
| Manganese (Mn) | ug/L | 2.0 | 50 | **587** | **786** |
| Molybdenum (Mo) | ug/L | 2.0 | - | 10.0 | 11.7 |
| Nickel (Ni) | ug/L | 2.0 | - | 2.0 | ND |
| Selenium (Se) | ug/L | 1.0 | 10 | ND | ND |
| Silver (Ag) | ug/L | 0.10 | - | ND | ND |
| Strontium (Sr) | ug/L | 2.0 | - | 29.4 | 36.5 |
| Thallium (Tl) | ug/L | 0.10 | - | ND | ND |
| Tin (Sn) | ug/L | 2.0 | - | ND | ND |
| Titanium (Ti) | ug/L | 2.0 | - | ND | ND |
| Uranium (U) | ug/L | 0.10 | 20 | 1.1 | 1.0 |
| Vanadium (V) | ug/L | 2.0 | - | ND | ND |
| Zinc (Zn) | ug/L | 5.0 | 5000 | ND | 137 |

**Notes:**

1 =Guidelines for Canadian Drinking Water Quality, Health Canada 2012 - On-Line Update Table.

2 - ug/L - micrograms per liter;

= not analysed, not applicable or no applicable guideline

**Bold/Shaded = value exceeds applicable criteria**

Detected above

RDL = Reportable Detection Limit

**Appendix G2 : General Chemistry in Groundwater in 2012 (from Stantec, 2012)**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**

| | | Location | | ROB-11-02 | ROB-11-05A | ROB-11-05B | ROB-11-08A | ROB-11-08B | ROB-11-08B | ROB-11-10 | ROB-11-11 | ROB-11-11 | ROB-11-12 | ROB-11-13A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth (m) | | 3.1-25.9 | 16.5-19.6 | 3.1-13.7 | 6.8-29.0 | 2.2-9.0 | Lab-Dup | 0.9-7.6 | 2.2-5.8 | Lab-Dup | 0.9-7.4 | 11.6-15.2 |
| | | Unit | | Till/Bedrock | Bedrock | Overburden | Till/Bedrock | Overburden | | Till/Bedrock | Till/Bedrock | | Till/Bedrock | Till/Bedrock |
| Parameters | Units | RDL | GCDWQ[1] | | | | | | | | | | | |
| **Sodium (Na)** | **mg/L** | **0.1** | **200** | 4.1 | 4.3 | 10.2 | 1.7 | 1.3 | - | 3.3 | 0.7 | 0.7 | 0.9 | 4.2 |
| **Potassium (K)** | **mg/L** | **0.1** | - | 3.6 | 3.7 | 3.9 | 1.7 | 4.3 | - | 3.1 | 0.4 | 0.4 | 0.4 | 1.7 |
| **Calcium (Ca)** | **mg/L** | **0.1** | - | 21.4 | 19.6 | 19.2 | 19.1 | 18.5 | - | 34.9 | 19.7 | 20.2 | 6.2 | 13.4 |
| **Magnesium (Mg)** | **mg/L** | **0.1** | - | 8.9 | 6.8 | 4.7 | 8.3 | 7.5 | - | 7.2 | 3.8 | 3.8 | 1.7 | 3.3 |
| **Total Alkalinity (Total as CaCO3)** | **mg/L** | **5.0** | - | 98.0 | 87.0 | 78.0 | 92.0 | 67.0 | - | 110.0 | 82.0 | - | 66.0 | 52.0 |
| **Dissolved Chloride (Cl)** | **mg/L** | **1.0** | **250** | 1.4 | 1.3 | 4.7 | ND | ND | - | 1.4 | ND | - | 1.2 | 1.1 |
| **Dissolved Sulphate (SO4)** | **mg/L** | **2.0** | **500** | 7.4 | 6.4 | 15.0 | 6.7 | 12.0 | - | 24.0 | 6.8 | - | 4.4 | 14.0 |
| **Reactive Silica (SiO2)** | **mg/L** | **0.50** | - | 8.1 | 7.1 | 15.0 | 8.9 | 5.1 | - | 13.0 | 7.3 | - | 14.0 | 9.7 |
| **Orthophosphate (P)** | **mg/L** | **0.010** | - | ND | ND | ND | 0.07 | ND | - | ND | ND | - | ND | ND |
| **Total Phosphorus (P)** | **mg/L** | **0.1** | - | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | 0.33 |
| **Nitrate + Nitrite** | **mg/L** | **0.050** | **10** | ND | 0.08 | 0.12 | 0.05 | ND | - | ND | ND | - | 0.25 | 0.08 |
| **Nitrate (N)** | **mg/L** | **0.050** | **45** | ND | 0.08 | 0.10 | 0.05 | ND | - | ND | ND | - | 0.25 | 0.08 |
| **Nitrite (N)** | **mg/L** | **0.010** | **1** | ND | ND | 0.02 | ND | ND | - | ND | ND | - | ND | ND |
| **Nitrogen (Ammonia Nitrogen)** | **mg/L** | **0.050** | - | ND | 0.40 | 0.85 | ND | ND | - | ND | ND | - | ND | 1.70 |
| **Colour** | **TCU** | **5.0** | **15** | ND | 15 | ND | ND | ND | - | ND | ND | - | **37** | 8.9 |
| **Turbidity** | **NTU** | **3.0** | **2** | 1.5 | 81 | 30 | ND | 90 | 93 | 72 | 660 | - | 120 | 83 |
| **PH** | **pH** | **0.01** | **6.5 to 8.5** | 7.96 | 7.89 | 7.69 | 8.13 | 8.06 | - | 7.88 | 8.08 | - | 7.40 | 7.43 |
| **Conductivity** | **pS/cm** | **1.0** | - | 200 | 180 | 200 | 170 | 150 | - | 250 | 160 | - | 130 | 130 |
| **Total Organic Carbon (C)** | **mg/L** | **5.0** | - | ND | 120 (1) | 13.0 | ND | 0.7 | - | 100.0 | 6.5 (1) | - | 9.9 | 1.6 |
| **Hardness (CaCO3)** | **mg/L** | **1.0** | - | 90 | 77 | 67 | 82 | 77 | - | 120 | 65 | - | 22 | 47 |
| **Calculated TDS** | **mg/L** | **1.0** | **500** | 114 | 103 | 121 | 102 | 89 | - | 154 | 88 | - | 73 | 82 |
| **Bicarb. Alkalinity (calc, as CaCO3)** | **mg/L** | **1.0** | - | 97.0 | 86.0 | 78.0 | 90.6 | 66.4 | - | 110.0 | 81.1 | - | 65.7 | 52.0 |
| **Carb. Alkalinity (calc, as CaCO3)** | **mg/L** | **1.0** | - | ND | ND | ND | 1.2 | ND | - | ND | ND | - | ND | ND |
| **Cation Sum** | **me/L** | - | - | 2.07 | 1.88 | 1.95 | 1.75 | 1.71 | - | 2.57 | 1.33 | - | 0.58 | 1.31 |
| **Anion Sum** | **me/L** | - | - | 2.15 | 1.91 | 2.02 | 1.98 | 1.58 | - | 2.75 | 1.78 | - | 1.46 | 1.36 |
| **Ion Balance (% Difference)** | **%** | - | - | 1.90 | 0.79 | 1.76 | 6.17 | 3.95 | - | 3.38 | 14.50 | - | 43.10 | 1.87 |
| **Langelier Index (@ 4C)** | **N/A** | - | - | -0.32 | -0.48 | -0.74 | -0.23 | -0.44 | - | -0.16 | -0.30 | - | -1.57 | -1.31 |
| **Langelier Index (@ 20C)** | **N/A** | - | - | -0.07 | -0.23 | -0.49 | 0.03 | -0.19 | - | 0.10 | -0.05 | - | -1.32 | -1.06 |
| **Saturation pH (@ 4C)** | **N/A** | - | - | 8.28 | 8.37 | 8.43 | 8.36 | 8.50 | - | 8.04 | 8.38 | - | 8.97 | 8.74 |
| **Saturation pH (@ 20C)** | **N/A** | - | - | 8.03 | 8.12 | 8.18 | 8.11 | 8.25 | - | 7.78 | 8.13 | - | 8.72 | 8.49 |

**Notes:**

1 =Guidelines for Canadian Drinking Water Quality, Health Canada 2012 IOn-Line Update Table.

2 - mg/L - milligrams per liter; uS/cm - microseimens per centimeter; me/L - milliequivalents/Liter; NTU - nephelometer turbidity units; TCU - True Color Units

= not analysed, not applicable or no applicable guideline

**Bold/Shaded = value exceeds applicable criteria**

ND = Not Detected above the RDL

RDL = Reportable Detection Limit

Lab-Dup = Laboratory QA/QC duplicate sample

**Appendix G2 : General Chemistry in Groundwater in 2012 (from Stantec, 2012)**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**

| | | Location | | ROB-11-13B | ROB-11-13B | ROB-11-17 | ROB-11-17 | ROB-11-20 | K-11-108 | K-11-113 | K-11-163 | K-11-163 | BH-GE-03 | BH-GE-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth (m) | | 1.4-10.7 | Lab-Dup | 4.6-47.8 | Lab-Dup | 1.5-15.0 | | | | Lab-Dup | 6.4-15.5 | 2.7-11.8 |
| | | Unit | | Overburden | | Till/Bedrock | | Till/Bedrock | Bedrock | Bedrock | Bedrock | Bedrock | Overburden | Till/Bedrock |
| Parameters | Units | RDL | GCDWQ[1] | | | | | | | | | | | |
| Sodium (Na) | mg/L | 0.1 | 200 | 12.5 | - | 2.1 | - | 1.8 | 2.9 | 4.3 | 2.7 | - | 1.2 | 3.1 |
| Potassium (K) | mg/L | 0.1 | - | 2.9 | - | 2.4 | - | 2.6 | 4.2 | 4.7 | 1.7 | - | 2.0 | 1.2 |
| Calcium (Ca) | mg/L | 0.1 | - | 9.1 | - | 12.3 | - | 11.8 | 8.2 | 16.8 | 19.3 | - | 16.0 | 11.4 |
| Magnesium (Mg) | mg/L | 0.1 | - | 3.4 | - | 3.7 | - | 3.5 | 4.5 | 5.2 | 9.2 | - | 5.7 | 4.9 |
| Total Alkalinity (Total as CaCO3) | mg/L | 5.0 | - | 32.0 | - | 73.0 | 76.0 | 43.0 | 56.0 | 79.0 | 84.0 | 82.0 | 54.0 | 44.0 |
| Dissolved Chloride (Cl) | mg/L | 1.0 | 250 | 5.4 | - | 1.0 | ND | ND | 1.1 | 1.2 | 1.6 | 1.5 | ND | ND |
| Dissolved Sulphate (SO4) | mg/L | 2.0 | 500 | 30.0 | - | 13.0 | 12.0 | 11.0 | ND | 5.7 | 17.0 | 18.0 | 20.0 | 21.0 |
| Reactive Silica (SiO2) | mg/L | 0.50 | - | 9.7 | - | 9.9 | 10.0 | 18.0 | ND | 0.7 | 23.0 | 22.0 | 7.3 | 9.4 |
| Orthophosphate (P) | mg/L | 0.010 | - | ND | - | ND | ND | ND | ND | ND | ND | ND | 0.01 | ND |
| Total Phosphorus (P) | mg/L | 0.1 | - | ND | - | ND | - | ND | ND | ND | ND | - | ND | ND |
| Nitrate + Nitrite | mg/L | 0.050 | 10 | 0.07 | - | ND | ND | ND | ND | ND | ND | ND | ND | 0.05 |
| Nitrate (N) | mg/L | 0.050 | 45 | 0.07 | - | ND | - | ND | ND | ND | ND | - | ND | 0.05 |
| Nitrite (N) | mg/L | 0.010 | 1 | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Nitrogen (Ammonia Nitrogen) | mg/L | 0.050 | - | 0.62 | - | 0.13 | - | ND | ND | 0.13 | 0.16 | - | ND | ND |
| Colour | TCU | 5.0 | 15 | ND | - | ND | ND | ND | ND | 11 | 14 | **19** | ND | ND |
| Turbidity | NTU | 3.0 | 2 | 30 | 35 | 64 | - | 260 | 230 | 150 | 250 | - | 150 | 2.8 |
| PH | pH | 0.01 | 6.5 to 8.5 | 7.26 | - | 8.02 | - | 7.47 | **8.87** | **8.96** | 7.66 | - | 8.05 | 7.64 |
| Conductivity | pS/cm | 1.0 | - | 150 | - | 160 | - | 110 | 100 | 150 | 190 | - | 140 | 130 |
| Total Organic Carbon (C) | mg/L | 5.0 | - | 6.8 | - | 3.0 | - | 1.8 | 9.8 | 9.4 | 9.6 | - | 0.6 | ND |
| Hardness (CaCO3) | mg/L | 1.0 | - | 37 | - | 46 | - | 44 | 39 | 63 | 86 | - | 63 | 49 |
| Calculated TDS | mg/L | 1.0 | 500 | 93 | - | 88 | - | 74 | 54 | 88 | 128 | - | 84 | 77 |
| Bicarb. Alkalinity (calc, as CaCO3) | mg/L | 1.0 | - | 32.0 | - | 71.8 | - | 42.8 | 51.9 | 72.0 | 83.9 | - | 53.1 | 43.3 |
| Carb. Alkalinity (calc, as CaCO3) | mg/L | 1.0 | - | ND | - | ND | - | ND | 3.6 | 6.2 | ND | - | ND | ND |
| Cation Sum | me/L | - | - | 1.40 | - | 1.08 | - | 1.03 | 1.01 | 1.66 | 1.98 | - | 1.37 | 1.14 |
| Anion Sum | me/L | - | - | 1.41 | - | 1.74 | - | 1.08 | 1.15 | 1.73 | 2.09 | - | 1.48 | 1.30 |
| Ion Balance (% Difference) | % | - | - | 0.36 | - | 23.40 | - | 2.37 | 6.48 | 2.06 | 2.70 | - | 3.86 | 6.56 |
| Langelier Index (@ 4C) | N/A | - | - | -1.87 | - | -0.62 | - | -1.41 | -0.07 | 0.46 | -0.74 | - | -0.60 | -1.25 |
| Langelier Index (@ 20C) | N/A | - | - | -1.62 | - | -0.37 | - | -1.15 | 0.19 | 0.71 | -0.49 | - | -0.35 | -0.99 |
| Saturation pH (@ 4C) | N/A | - | - | 9.13 | - | 8.64 | - | 8.88 | 8.94 | 8.50 | 8.40 | - | 8.65 | 8.89 |
| Saturation pH (@ 20C) | N/A | - | - | 8.88 | - | 8.39 | - | 8.62 | 8.68 | 8.25 | 8.15 | - | 8.40 | 8.63 |

**Notes:**

1 =Guidelines for Canadian Drinking Water Quality, Health Canada 2012 IOn-Line Update Table.

2 - mg/L - milligrams per liter; uS/cm - microseimens per centimeter; me/L - milliequivalents/Liter; NTU - nephelometer turbidity units; TCU - True Color Units

= not analysed, not applicable or no applicable guideline

**Bold/Shaded = value exceeds applicable criteria**

ND = Not Detected above the RDL

RDL = Reportable Detection Limit

Lab-Dup = Laboratory QA/QC duplicate sample

## Appendix G2 : General Chemistry in Groundwater in 2012 (from Stantec, 2012)
## Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property
## Hydrogeology and Water Management

| | | Location | | BH-GE-06 | BH-GE-06 | BH-GE-09 | BH-GE-10 | BH-GE-10 | BH-GE-18 |
|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth (m) | | 3.1-15.8 | Lab-Dup | 3.4-9.4 | 2.4-9.2 | Lab-Dup | 2.4-12.2 |
| | | Unit | | Overburden | | Overburden | Overburden | | Overburden |
| **Parameters** | **Units** | **RDL** | **GCDWQ[1]** | | | | | | |
| **Sodium (Na)** | **mg/L** | **0.1** | **200** | 1.0 | - | 0.6 | 1.0 | - | 2.4 |
| **Potassium (K)** | **mg/L** | **0.1** | **-** | 2.1 | - | 1.3 | 2.7 | - | 3.0 |
| **Calcium (Ca)** | **mg/L** | **0.1** | **-** | 10.8 | - | 27.8 | 33.7 | - | 21.3 |
| **Magnesium (Mg)** | **mg/L** | **0.1** | **-** | 3.0 | - | 15.2 | 17.9 | - | 8.0 |
| **Total Alkalinity (Total as CaCO3)** | **mg/L** | **5.0** | **-** | 42.0 | - | 130.0 | 140.0 | - | 92.0 |
| **Dissolved Chloride (Cl)** | **mg/L** | **1.0** | **250** | ND | - | ND | ND | - | 1.5 |
| **Dissolved Sulphate (SO4)** | **mg/L** | **2.0** | **500** | 3.5 | - | 2.1 | 6.1 | - | 10.0 |
| **Reactive Silica (SiO2)** | **mg/L** | **0.50** | **-** | 6.4 | - | 5.6 | 8.1 | - | 6.6 |
| **Orthophosphate (P)** | **mg/L** | **0.010** | **-** | ND | - | ND | ND | - | ND |
| **Total Phosphorus (P)** | **mg/L** | **0.1** | **-** | ND | - | 1.18 | ND | - | ND |
| **Nitrate + Nitrite** | **mg/L** | **0.050** | **10** | ND | - | 0.11 | ND | - | ND |
| **Nitrate (N)** | **mg/L** | **0.050** | **45** | ND | - | 0.11 | ND | - | ND |
| **Nitrite (N)** | **mg/L** | **0.010** | **1** | ND | - | ND | ND | - | ND |
| **Nitrogen (Ammonia Nitrogen)** | **mg/L** | **0.050** | **-** | ND | - | ND | ND | ND | 0.21 |
| **Colour** | **TCU** | **5.0** | **15** | ND | - | ND | ND | - | ND |
| **Turbidity** | **NTU** | **3.0** | **2** | 0.47 | 0.55 | 320 | 140 | - | 15 |
| **PH** | **pH** | **0.01** | **6.5 to 8.5** | 8.15 | - | 8.20 | 8.19 | - | 8.01 |
| **Conductivity** | **pS/cm** | **1.0** | **-** | 89 | - | 260 | 290 | - | 190 |
| **Total Organic Carbon (C)** | **mg/L** | **5.0** | **-** | ND | - | 0.7 | 1.1 | - | 2.4 |
| **Hardness (CaCO3)** | **mg/L** | **1.0** | **-** | 39 | - | 130 | 160 | - | 86 |
| **Calculated TDS** | **mg/L** | **1.0** | **500** | 52 | - | 129 | 156 | - | 109 |
| **Bicarb. Alkalinity (calc, as CaCO3)** | **mg/L** | **1.0** | **-** | 41.0 | - | 120.0 | 140.0 | - | 91.5 |
| **Carb. Alkalinity (calc, as CaCO3)** | **mg/L** | **1.0** | **-** | ND | - | 1.9 | 2.1 | - | ND |
| **Cation Sum** | **me/L** | **-** | **-** | 0.88 | - | 2.69 | 3.28 | - | 1.92 |
| **Anion Sum** | **me/L** | **-** | **-** | 0.91 | - | 2.59 | 2.98 | - | 2.10 |
| **Ion Balance (% Difference)** | **%** | **-** | **-** | 1.68 | - | 1.89 | 4.79 | - | 4.48 |
| **Langelier Index (@ 4C)** | **N/A** | **-** | **-** | -0.77 | - | 0.13 | 0.25 | - | -0.30 |
| **Langelier Index (@ 20C)** | **N/A** | **-** | **-** | -0.51 | - | 0.38 | 0.50 | - | -0.05 |
| **Saturation pH (@ 4C)** | **N/A** | **-** | **-** | 8.92 | - | 8.07 | 7.94 | - | 8.31 |
| **Saturation pH (@ 20C)** | **N/A** | **-** | **-** | 8.66 | - | 7.82 | 7.69 | - | 8.06 |

**Notes:**

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2 - mg/L - milligrams per liter; uS/cm - microseimens per centimeter; me/L - milliequivalents/Liter; NTU - nephelometer turbidity units; TCU - True Color Units

= not analysed, not applicable or no applicable guideline

**Bold/Shaded = value exceeds applicable criteria**

ND = Not Detected above the RDL

RDL = Reportable Detection Limit

Lab-Dup = Laboratory QA/QC duplicate sample

# Appendix H. RBR-12-01 and RBR-12-02 Logs

| HOLEID | ID | From (m) | To (m) | Length (m) | Lithology Description | Formation | Rock Type | Rock Type Grouped |
|---|---|---|---|---|---|---|---|---|
| K-12-190 | RBR-12-01 | 0 | 45.4 | 45.4 |  | MISC | OB | OVB |
| K-12-190 | RBR-12-01 | 45.4 | 48.25 | 2.85 | Weathered.BC, Fractured. | Sokoman | LMHIF | M/HIF |
| K-12-190 | RBR-12-01 | 48.25 | 50.5 | 2.25 | Extreme BC, Vuggy. | Sokoman | QCIF | CIF |
| K-12-190 | RBR-12-01 | 50.5 | 56 | 5.5 | BC, Brittle. Extreme weathered. | Sokoman | SIF | SIF |
| K-12-190 | RBR-12-01 | 56 | 58 | 2 | BC, Brottle, vuggy. Weathered. | Sokoman | QCIF | CIF |
| K-12-190 | RBR-12-01 | 58 | 59.5 | 1.5 | Large size vugs in layuers. Low angle banding. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 59.5 | 68.8 | 9.3 | Large intervals Qz diss Hm up to 50cm. Scattered Mt and VCG Hm laters or fracture filling. Low angle banding. Short transition to HIF. | Sokoman | LHMIF | M/HIF |
| K-12-190 | RBR-12-01 | 68.8 | 82.5 | 13.7 | BC, vuggy, Sand, weathered. High density banding up to 3cm at 25-35deg and large intervals up to 25cm Qz diss oriented xtls Hm. VCG secondary Hm on scattered narrow fractures. Seldom high grade Hm intervals up to 20cm at the beginning. Gradational transit | Sokoman | HIF | HIF |
| K-12-190 | RBR-12-01 | 82.5 | 94.5 | 12 | Strong weathered, BC, cleavage, vuggy layers. High density banding up to 5cm at 30-35deg. Large size vugs in layers. Seldom intervals Mt up to 35% and Hm up to 15%. Short transition to HIF. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 94.5 | 106.5 | 12 | High density thin layers at the beginning and large intervals up to 15cm Qz/diss Hm at the end. Hm diss and VCG in scattered narrow fractures. Seldom sand intervals. Mt seldom thin layers. MIF from 1404.5 to 105. Short transition to MHIF. | Sokoman | HIF | HIF |
| K-12-190 | RBR-12-01 | 106.5 | 110 | 3.5 | Low angle banding and vuggy layuers up to 5cm at 40 to 50deg. BC and weathered. Mt/Hm diss within Qz and filling fractures up to CG.Short transition to MIF. | Sokoman | MHIF | M/HIF |
| K-12-190 | RBR-12-01 | 110 | 121.5 | 11.5 | Large intervals up to 30cm Qz diss Mt and vuggy layers. Hm +/- Mt filling narrow fractures. Hm diss increase to the end.Weathered and BC. Seldom white Qz lenses. Sharp ending. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 121.5 | 127.7 | 6.2 | High density Mt thin layers up to 1cm at 35 to 50deg. Mt high density layers and diss related to Qz intervals.Scattered white Qz narrow lenses. 125.5m weathered HBGGN 3cm. Sharp transition to MIF. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 127.7 | 133.5 | 5.8 | High density layers up to 2cm at 30-40cm. VFG Qz/Si/Mt. Verry competent core. Grunerite as silicate. Carb/Sil increase to the end up to 30%. Sharp ending. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 133.5 | 139 | 5.5 | Banding up to 6cm at 40deg. Mt diss and thin layers. Carb in layers and oriented Xtls and spots. Hm diss in some Qz intervals. Sharp ending. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 139 | 145 | 6 | Broken banding and banding up to 5cm at 40deg. Grunerite>>cumingtunite. | Sokoman | CSIF | SIF |
| K-12-190 | RBR-12-01 | 145 | 148 | 3 | Broken banding and banding up to 5cm at low angle up to 35deg. Advanced decarbonation. Grunerite>cumingtonite. | Sokoman | QCIF | CIF |
| K-12-190 | RBR-12-01 | 148 | 154 | 6 | Broken banding and banding up to 10cm at 30deg. Advanced decarbonation scattered intervals. | Sokoman | CSIF | SIF |
| K-12-190 | RBR-12-01 | 154 | 158.2 | 4.2 | Thin relict banding up to 0.5cm at 30deg. advanced decarbonation to complete replacement of carbonate. grunerite>>cumingtonite.Sharp ending in strong weatheredQCIF. | Sokoman | QSIF | SIF |
| K-12-190 | RBR-12-01 | 158.2 | 160.2 | 2 | Intense BC,weathered. | Sokoman | QCIF | CIF |
| K-12-190 | RBR-12-01 | 160.2 | 173.5 | 13.3 | Broken banding and banding up to 5cm at low angle up to 35deg. Carb>50% in some intervals. Carb/sil ratio different intervals. Moderate to advanced decarbonation. Sharp ending in weathered HBGGN. | Sokoman | QCIF | CIF |
| K-12-190 | RBR-12-01 | 173.5 | 174 | 0.5 | Weathered. Gar up to VCG.BC. | Post-Iron dyke/sill | HBG_GN | HBG_GN |
| K-12-190 | RBR-12-01 | 174 | 181 | 7 | Banding up to 6cm. Advanced decarbonation. Leached carb intervals. Qz/Sil-Carb ratio up to 2 in some intervals.Grunerite>>cumingtonite. | Sokoman | QSIF | SIF |
| K-12-190 | RBR-12-01 | 181 | 182.3 | 1.3 | Banding and broken banding up to 4cm at 35-40deg. Cleavage and fractured. Mt diss within qz banding. Advanced decarbonation at the end. Gradational transition to MIF. | Sokoman | LMQCIF | CIF |
| K-12-190 | RBR-12-01 | 182.3 | 186.9 | 4.6 | Banding and broken banding up to 5cm at 35-40deg. Cleavage and fractured, BC. Vuggy layers. Mt diss within Qz layers and seldom thin layers up to 2cm. Scaterred Pyrite on thin fractures. Short transition to MIF. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 186.9 | 190.7 | 3.8 | From banding to broken banding and tight folded up to 6cm at 30 to 40deg. Cleavage, sand and vuggy layers. Mt diss large intervals up to 20cm and thin layers. Transitional To MSIF. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 190.7 | 198.4 | 7.7 | Banding to wavy banding at 40 deg. Mt is disseminated up to FG or in layers up to 1 cm related to silicates/carbonates layers. Fibrous mineral at the end. Short transitional to HMIF. | Sokoman | MSIF | SIF |
| K-12-190 | RBR-12-01 | 198.4 | 200 | 1.6 | Banding to wavy and tight folded bands. White qz lences and boudinage. Hm up to MG in wavy layers related to fibrous min. Sharp ending in MIF. | Sokoman | HMIF | M/HIF |
| K-12-190 | RBR-12-01 | 200 | 215 | 15 | Banding to broken banding and boudinage. Mt diss oriented xtls and thin layers up to 1cm. Sil up to 20% in some intervals. High density layers at the end. Gradational transition. | Sokoman | MIF | MIF |
| K-12-190 | RBR-12-01 | 215 | 224 | 9 | Broken banding, wavy, tight folding and banding up to 5cm at 35-45deg. Scattered verry narrow HBGGN up to 3cm. Scattered vuggy layers. Mt oriented xtls and thin layers. Sharp ending in qz/mt sand. Lost hole. | Sokoman | MSIF | SIF |

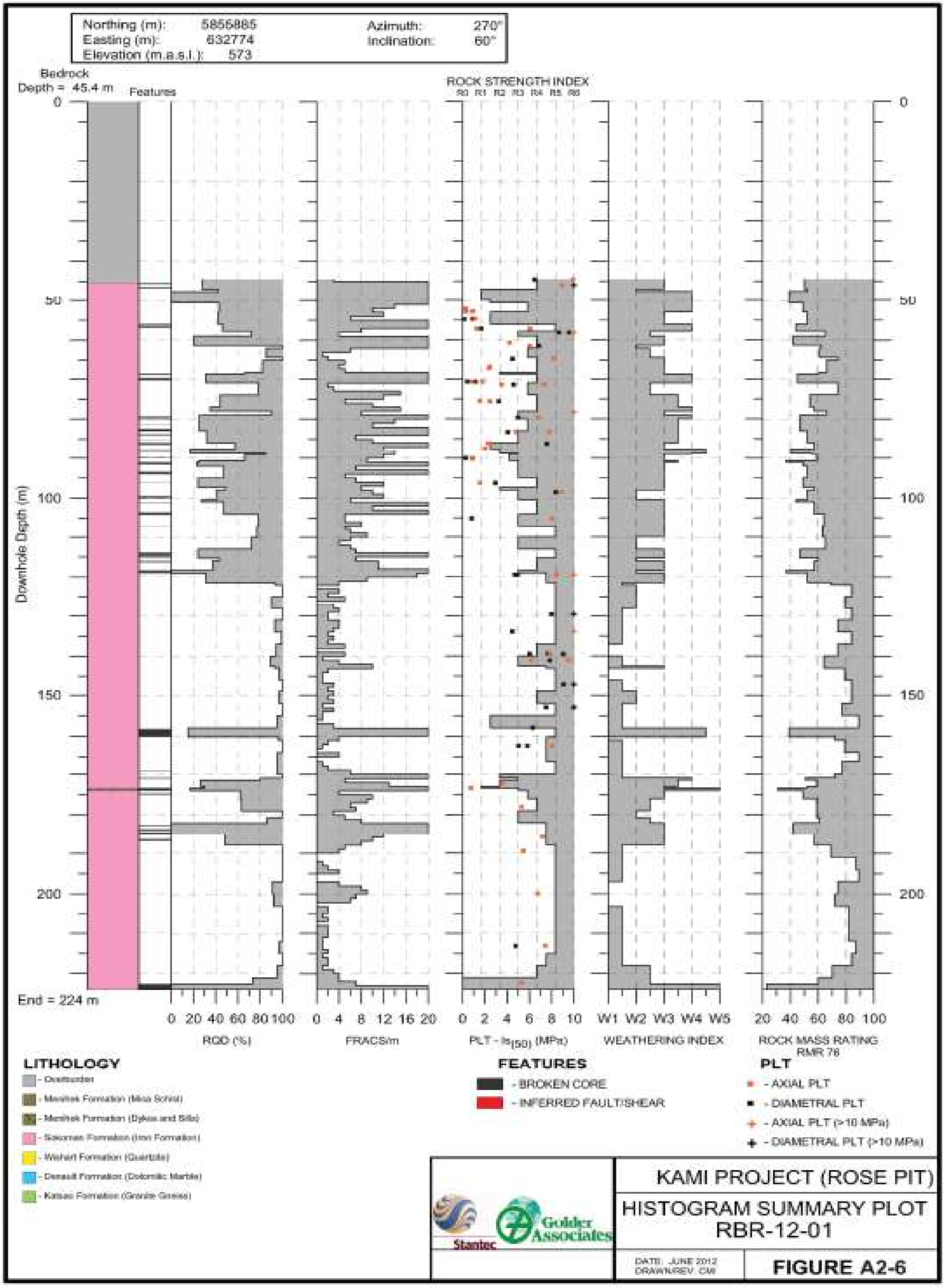
**Appendix H1 : Geotechnical Logging**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**

| HOLEID | ID | From (m) | To (m) | Length (m) | Lithology Description | Formation | Rock Type | Rock Type Grouped |
|---|---|---|---|---|---|---|---|---|
| K-12-194 | RBR-12-02 | 0 | 16 | 16 |  | MISC | OB | OVB |
| K-12-194 | RBR-12-02 | 16 | 23 | 7 | Extreme BC. Silic weathered to Chlorite. Missing core. Lithology from fragments. | Sokoman | SIF | SIF |
| K-12-194 | RBR-12-02 | 23 | 25 | 2 | Relict banding up to 5cm at 45deg. Incipient decarbonation. Short transition to SIF. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 25 | 34 | 9 | Fractured, BC relict banding. Strong weathered intervals. No pattern texture. Patches of grunerite +/- cumingtonite, dolomite and qz following a relict banding. Ch on fr and joints. Short transition to QCIF. | Sokoman | SIF | SIF |
| K-12-194 | RBR-12-02 | 34 | 38.6 | 4.6 | Relict banding and banding up to 4cm at 50-60deg. Sil up to 50% , 60cm interval. Sil 90% replaced by Chlorite. Fractured. Breciated. BC intervals. Sharp ending in a narrow HBGGN. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 38.6 | 42 | 3.4 | !0cm HBGGN at the beginning. Ga up to 1cm disseminated. Several narrow HBGGN up to 10cm. | Menihek Fm (HW) | GF_B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 42 | 54.5 | 12.5 | Several HBGGN intervals up to 50cm. Scattred Gf. Slickensided. Chlorite on cleavage. Sharp ending in QCIF. | Menihek Fm (HW) | B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 54.5 | 55.7 | 1.2 | Banding at 50deg. Chlorite an silicates. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 55.7 | 62 | 6.3 | Several HBGGN intervals up to 80cm with GA diss up to 0.5cm. Chlorite weathering related to HBGGN. | Menihek Fm (HW) | B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 62 | 64.5 | 2.5 | Ga aligned xtls up to 0.2mm. Several Bi-Ms-Qz schist intervals up to 30cm. Sharp ending. | Post-Iron dyke/sill | HBG_GN | HBG_GN |
| K-12-194 | RBR-12-02 | 64.5 | 66.6 | 2.1 | Very fine grain. Scattered thin qz layers. Short Gf intervals sevage. Sharp ending. | Menihek Fm (HW) | B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 66.6 | 69 | 2.4 | FG to MG grain size. Scattered thin qz layers. Sharp ending. | Post-Iron dyke/sill | HBG_GN | HBG_GN |
| K-12-194 | RBR-12-02 | 69 | 85.5 | 16.5 | FG to MG grain size. Few GF-BI-MS-QZ schist intervals up to 40cm. Scattered Qz thin layers. Gradational ending. | Post-Iron dyke/sill | HBG_GN | HBG_GN |
| K-12-194 | RBR-12-02 | 85.5 | 86.8 | 1.3 | FG grain size. Several low GA diss intervals. Seldom Qz thin layers. Sharp ending. | Menihek Fm (HW) | B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 86.8 | 91 | 4.2 | Ga oriented xtls in layers. FG to MG grain size. Sharp ending. | Post-Iron dyke/sill | HBG_GN | HBG_GN |
| K-12-194 | RBR-12-02 | 91 | 97 | 6 | FG grain size. Ga diss up to HBGGN composition in several intervals. Scattered Qz thin layers. GF schist narrow layers up to 10cm.Short transition to HBGGN. | Menihek Fm (HW) | B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 97 | 101.8 | 4.8 | FG to MG grain size. From 100 to 101.8 Large GF schist intervals up to 50cm, and Ga xtls up to 1cm. Broken to brecciated at the nend. Sharp ending. | Post-Iron dyke/sill | HBG_GN | HBG_GN |
| K-12-194 | RBR-12-02 | 101.8 | 111.5 | 9.7 | Several short Gf schist intervals. Slickensides and BC first 5m. VFG to FG grain size. | Menihek Fm (HW) | B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 111.5 | 121 | 9.5 | Foliated to 40deg. Scattered narrow Gf intervals.Seldom low grade Ga diss intervals. Sharp ending in GF schist and then QCIF. | Menihek Fm (HW) | MS_B_SCH | SCH |
| K-12-194 | RBR-12-02 | 121 | 121.5 | 0.5 |  | Menihek Fm (HW) | GF_B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 121.5 | 122.7 | 1.2 | Narrow HBGGN up to 5cm at the beginning and almost every 10cm. Sharp ending. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 122.7 | 134.3 | 11.6 | Several Gf schist and HBGGN intervals up to 50cm. | Menihek Fm (HW) | MS_B_SCH | SCH |
| K-12-194 | RBR-12-02 | 134.3 | 143.5 | 9.2 | High Ms content. Gf low grade pervasive and seldom narrow bands medium grade.Several Ga diss intervals. Fractured along core at the end. CG Qz lenses at the end. Sharp ending. | Menihek Fm (HW) | GF_B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 143.5 | 144.3 | 0.8 | Pegmatitic CG QZ and Ms alternating with Ms schist. Scattered sulphide filling thin fractures. Sharp ending. | Menihek Fm (HW) | MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 144.3 | 162.1 | 17.8 | Seldom narrow CG Qz lenses at the beginning. GF schist up to 30cm intervals at the beginning. Sharp ending. | Menihek Fm (HW) | MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 162.1 | 169.1 | 7 | FG up to MG Ga in layers up to 25%. Short GF interval at the beginning. Scattered thin Qz layers. Sharp ending. | Menihek Fm (HW) | HBG_GN-Menihek | HBG_GN |
| K-12-194 | RBR-12-02 | 169.1 | 185.5 | 16.4 | HBGGN-Gf sch-Bi&Ms sch alternating large intervals.Strong wethered intervals at the beginning and intense weathered from 177.5m to the end. | Menihek Fm (HW) | GF_B_MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 185.5 | 194 | 8.5 | Extreme weathered. Large BC and gauge intervals. Sharp ending in Gf schist. | Menihek Fm (HW) | MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 194 | 200.2 | 6.2 | 50cm high Gf at the beginning. Weathered, BC, brittle. Sharp ending. | Menihek Fm (HW) | HBG_GN-Menihek | HBG_GN |
| K-12-194 | RBR-12-02 | 200.2 | 214.6 | 14.4 | Broken banding, wavy and banding up to 5cm at 50deg. Carb up to 50% at the end. Advanced decarbonation. Fractured. Strong weathered at the edges. Sharp ending. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 214.6 | 218 | 3.4 | Gf content. Ga up to 2cm in layers. Moderate weathered and BC. Low angle schistosity up to 45deg. | Menihek Fm (HW) | HBG_GN-Menihek | HBG_GN |
| K-12-194 | RBR-12-02 | 218 | 219.3 | 1.3 | White Qz lenses up to 20cm aty low angle and HBGGN narrow intervals. HBGGN made up from Ga&Qz intervals. | Menihek Fm (HW) | HBG_GN-Menihek | HBG_GN |
| K-12-194 | RBR-12-02 | 219.3 | 223.7 | 4.4 | Ga up to 20% in layers. Gf rich intervals. Possible MS_BI schist with Ga.Sharp ending. | Menihek Fm (HW) | HBG_GN-Menihek | HBG_GN |
| K-12-194 | RBR-12-02 | 223.7 | 227 | 3.3 | High density layers up to 3cm at 50deg. Silicates extreme weathered in Chlorite. Mt diss and thin layers. | Sokoman | MIF | MIF |

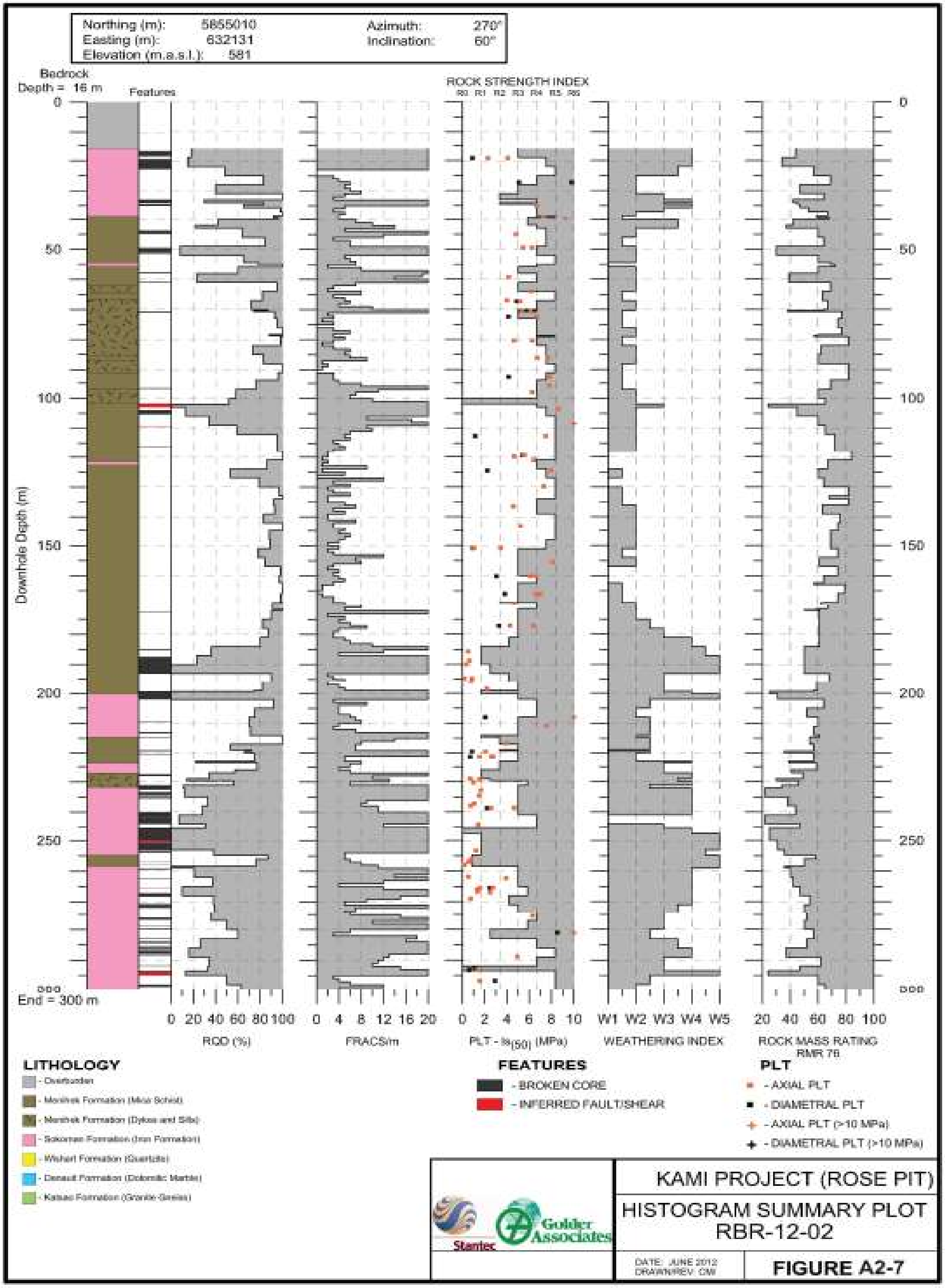
**Appendix H1 : Geotechnical Logging**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**

| HOLEID | ID | From (m) | To (m) | Length (m) | Lithology Description | Formation | Rock Type | Rock Type Grouped |
|---|---|---|---|---|---|---|---|---|
| K-12-194 | RBR-12-02 | 227 | 231.8 | 4.8 | HBGGN/SIF/Gf schist alternating intervals up to 50cm. Weathered and BC. Sharp ending. | Post-Iron dyke/sill | HBG_GN | HBG_GN |
| K-12-194 | RBR-12-02 | 231.8 | 245.5 | 13.7 | Extreme weathered. Cb complete leached out. Vuggy layers. BC. Qz up to 90% intervals. Gradational transition. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 245.5 | 250 | 4.5 | Extreme BC. Missing core, poor recovery. Vuggy layers. Sand intervals. Lithology reconstitute from fragments. Gradational trensition. | Sokoman | QZT | QZT |
| K-12-194 | RBR-12-02 | 250 | 254.8 | 4.8 | Alternating of Qz and MS-Qz schist. Weathered, BC, brittle. Poor recovery. Sand intervals. Sharp ending. | Sokoman | QZT | QZT |
| K-12-194 | RBR-12-02 | 254.8 | 258.4 | 3.6 | Weathered, brittle. Sharp ending. | Menihek Fm (HW) | MS_SCH | SCH |
| K-12-194 | RBR-12-02 | 258.4 | 265.7 | 7.3 | Relict banding up to 5cm at 50deg. High density vuggy layers up to 2cm. Weathered and BC. Scattered Mt thin layers, weathered to Goetite. Sharp ending. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 265.7 | 268 | 2.3 | Moderate density layers up to 4cm at 50deg. Vuggy layers. Mt diss within Qz layers. BC on cleavage. MS traces filling vugs. Short transition to QCIF. | Sokoman | LMIF | MIF |
| K-12-194 | RBR-12-02 | 268 | 292 | 24 | Broken banding and banding up to 5cm at 50deg. Vuggy and porous bands. Silicates increase to the end. Disseminated within Qz bands a soft, gray matalic mineral up to 5%. Bluish-gray streak?!?!?! BC intervals.Thinup to 5cm scattered HBGGN. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 292 | 295 | 3 | Fault zone. Extreme BC. Missing core. Sand&clay intervals. Weathered. | Sokoman | QZT | QZT |
| K-12-194 | RBR-12-02 | 295 | 298.7 | 3.7 | Several relict banding intervals at 50deg. Unknow gray min diss up to 5% in some intervals. BC intervals. Gradational ending. | Sokoman | QCIF | CIF |
| K-12-194 | RBR-12-02 | 298.7 | 300 | 1.3 | Banding up to 3cm at 50deg. High density layers. Advanced decarbonation. EOH. | Sokoman | QSIF | SIF |

**Appendix H2 : Histogram Summary Plot (from Stantec, 2012)**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**



**Appendix H2 : Histogram Summary Plot (from Stantec, 2012)**
**Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property**
**Hydrogeology and Water Management**



KAMI PROJECT (ROSE PIT)

HISTOGRAM SUMMARY PLOT
RBR-12-02

FIGURE A2-7

# BOREHOLE RECORD RBR-12-01

PAGE 1 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/6/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855885.2 E 632773.6
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, ◪ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) | STRATA PLOT | WATER LEVEL | SAMPLE TYPE & No. | STRUCTURE | RECOVERY TOTAL CORE % (80 60 40 20) | RECOVERY SOLID CORE % (80 60 40 20) | R.Q.D. % (80 60 40 20) | FRACT. INDEX PER 1m (5 10 15 20) | ROCK STRENGTH INDEX (R4 R3 R2 R1) | WEATHERING INDEX (W1 W2 W3 W4) | DISCONTINUITY DATA DIP w.r.t. CORE AXIS (30 60 90) | DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION | RMR (80 60 40 20) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 573.2 | OVERBURDEN: Not logged. | ▨ | ▽ | | | | | | | | | | | | |

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25

# BOREHOLE RECORD RBR-12-01

DATUM NAD 27, Zone 19U

CLIENT Alderon Iron Ore Corp.

PROJECT Kami Iron Ore Project

LOCATION Kami Site, Labrador West, NL

ELEVATION: 573.2

INCLINATION: -60

AZIMUTH 270

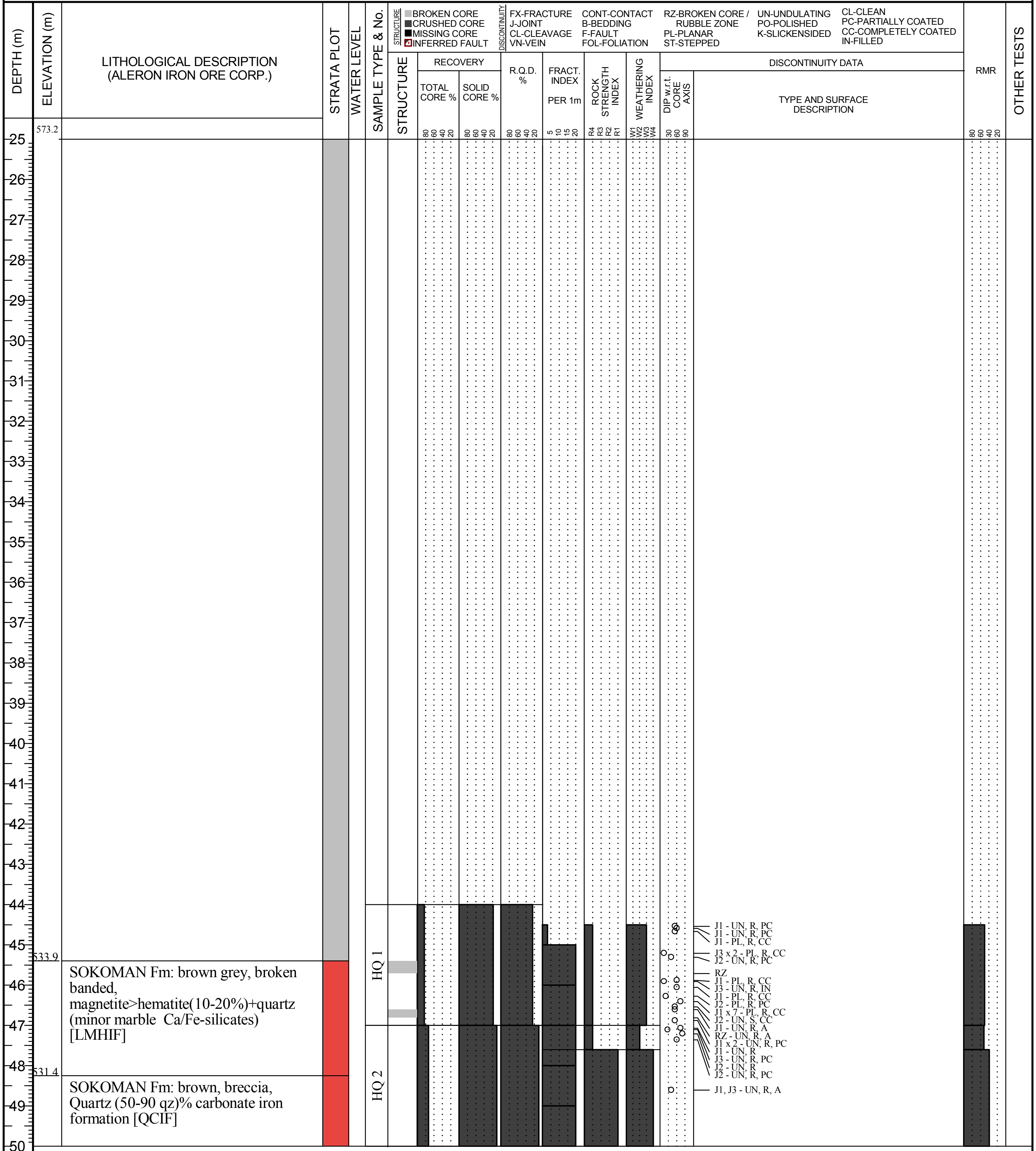
LOCATION: N 5855885.2 E 632773.6

PROJECT No. 121614000-305

DRILLING DATE 3/6/2012

DRILL RIG Major 50 (AVD)

CONTRACTOR Major Drilling



533.9 SOKOMAN Fm: brown grey, broken banded, magnetite>hematite(10-20%)+quartz (minor marble Ca/Fe-silicates) [LMHIF]

531.4 SOKOMAN Fm: brown, breccia, Quartz (50-90 qz)% carbonate iron formation [QCIF]

J1 - UN, R, PC
J1 - UN, R, PC
J1 - PL, R, CC
J3 x 2 - PL, R, CC
J2 - UN, R, PC
RZ
J1 - PL, R, CC
J3 - UN, R, IN
J1 - PL, R, CC
J2 - PL, R, PC
J1 x 7 - PL, R, CC
J2 - UN, S, CC
J1 - UN, R, A
RZ - UN, R, A
J1 x 2 - UN, R, PC
J1 - UN, R
J3 - UN, R, PC
J2 - UN, R
J2 - UN, R, PC
J1, J3 - UN, R, A

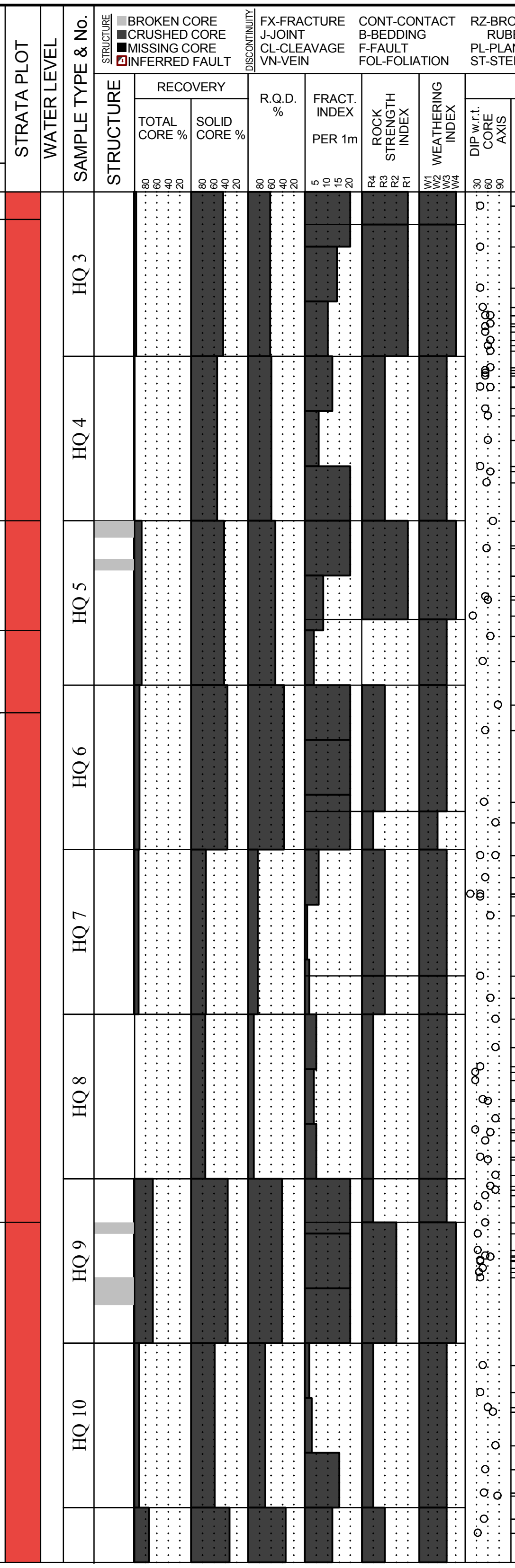
**Stantec**

# BOREHOLE RECORD RBR-12-01

PAGE 3 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855885.2 E 632773.6
PROJECT No. 121614000-305
DRILLING DATE 3/6/2012
DRILL RIG Major 50 (AVD)
CONTRACTOR Major Drilling

| STRUCTURE | DISCONTINUITY | | | | | |
|---|---|---|---|---|---|---|
| ▨ BROKEN CORE | FX-FRACTURE | CONT-CONTACT | RZ-BROKEN CORE / RUBBLE ZONE | UN-UNDULATING | CL-CLEAN | |
| ■ CRUSHED CORE | J-JOINT | B-BEDDING | PL-PLANAR | PO-POLISHED | PC-PARTIALLY COATED | |
| ■ MISSING CORE | CL-CLEAVAGE | F-FAULT | ST-STEPPED | K-SLICKENSIDED | CC-COMPLETELY COATED | |
| ◩ INFERRED FAULT | VN-VEIN | FOL-FOLIATION | | | IN-FILLED | |

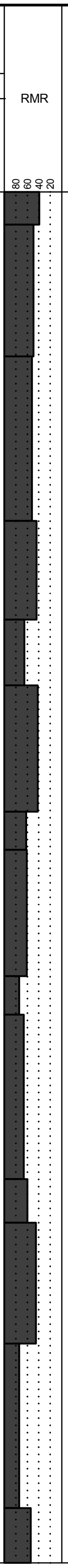
| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|---|
| | 573.2 | |
| 50.5 | 529.5 | SOKOMAN Fm: dark green, broken banded, Fe-Ca silicates >50% w/ qzt marble + minor Fe oxide [SIF] |
| 56 | 524.7 | SOKOMAN Fm: brown grey, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF] |
| 58 | 523.0 | SOKOMAN Fm: dark grey, thick banded (4-64 mm), magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF] |
| 59.5 | 521.7 | SOKOMAN Fm: grey, massive banded >64 mm, hematite>magnetite (HM+MT 10-20%) quartzite (minor marble Ca/Fe silicates) [LHMIF] |
| 68.7 | 513.6 | SOKOMAN Fm: brown grey, thick banded (4-64 mm), hematite >20%-quartzite (minor marble Ca/Fe silicates) [HIF] |



DISCONTINUITY DATA

TYPE AND SURFACE DESCRIPTION

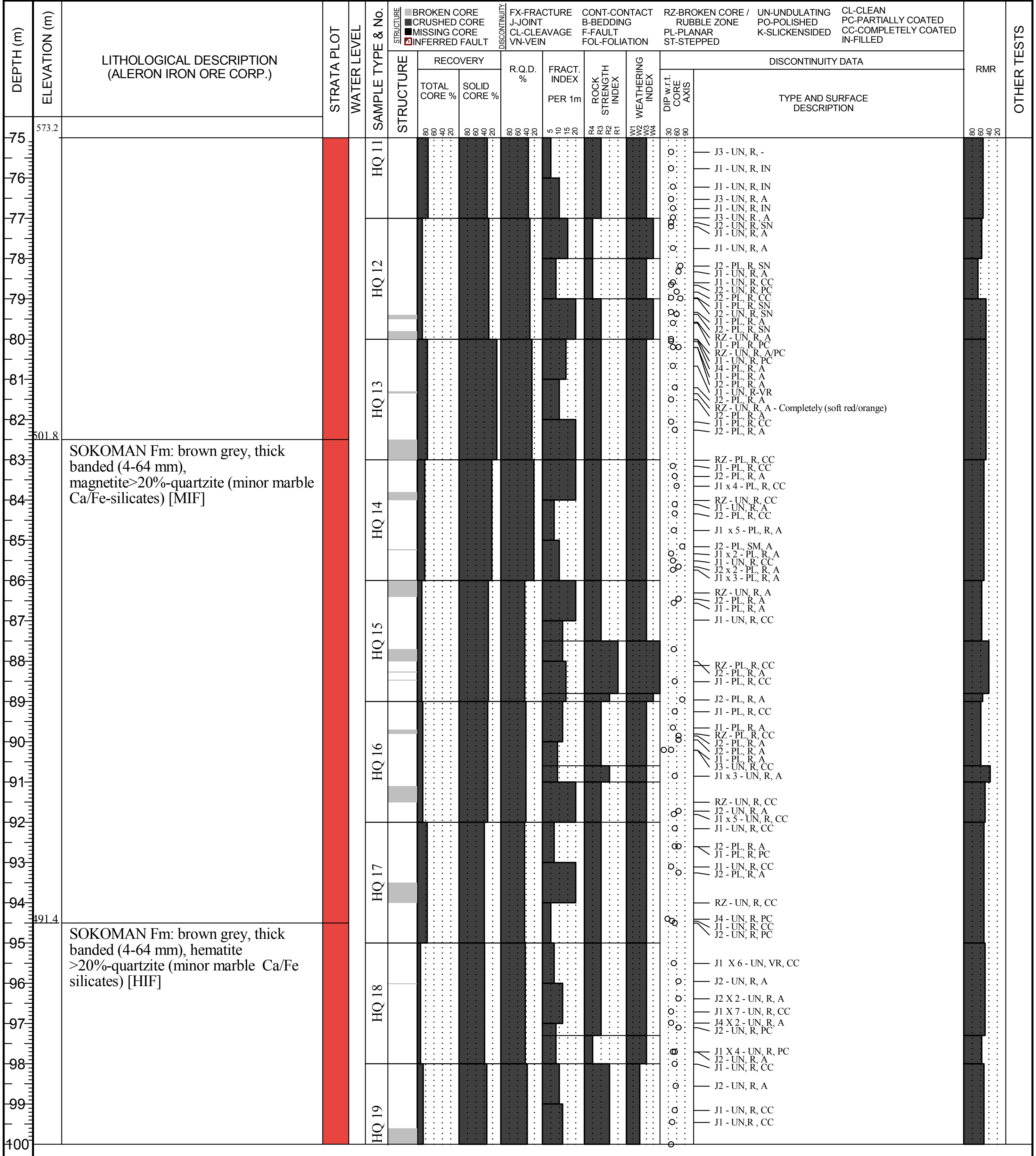
J1, J2 - UN, R, A
J1, J2 - UN, K, CC
J1 - UN, K, CC
J1 - UN, K, CC
J1 - UN, K, CC
J2 - PL, R, -
J2 - PL, R, CC
J1 - UN, R , A
J1 - UN, R , A
J1 - UN, R , A
J1 - UN, R , A
J1 - UN, R , A
J2 - PL, R, A
J1 - PL, R, A
J1 - UN, R , CC
J1 - UN, K, CC
J1 x 3 - UN, R, A
J2 - PL, R, A
J1 x 2 - UN, K, CC
J1 - PL, R, A
J1 x 2 - UN, K, CC
J2 - UN, R, PC
J1 - PL, R, CL
J1 x 4 - UN, K, CC
J2 x 2 - UN, K, CC
RZ - UN, R, A
J1 x 4 - UN, R, A
RZ - UN, R, A
J1 x 4 - UN, R, A
J2 - UN, R, A
J3 - UN, R, A
J1 - UN, R, A
J1 x 3 - UN, R, IN (vuggy)
J2 x 2 - UN, R, A
J1 - UN, R, IN (vuggy)
J1 - PL, R, A
J2 - UN, R, A
J1 - UN, R, A
J2 - PL, R, A
J4 - UN, R, A
J1 - UN, R, A
J3 - UN, R, A
J2 - PL, R, CC
J1 - UN, R, A
J1 - PL, R, A
J2 - PL, R, PC
J1 - PL, R, A
J2 - PL, R, A
J2 - UN, R, PC
J1 - UN, R, PC
J1 - UN, R, CC
J1 - UN, R, A
J1 - UN, R, A
J1 - UN, R, A
J3 - UN, R, A
J1 - PL, R, A
J1 - UN, R, A
J3 - UN, R, A
J1 - UN, R, A
J2 - ST, R, A
J2 - UN, R, A
J2 - UN, R, A
J1 - UN, R, A
J1 - UN, R, A
J1 - UN, R, A
J1 - PL, R, A
J1 - PL, R, A
J1 - PL, R, A
J1 - PL, R, A
J1 - PL, R, A
J3 - PL, R, A
J1 - UN, R, A
J1 - PL, R, A
J1 - PL, R, A
J1 - PL, R, A
J1 - UN, R, PC
J1 - UN, R, A
J2 - PL, R, PC
J2 - PL, R, A
J1 - PL, R, CC
J1 - UN, R, PC
J2 - UN, R, A
J1 - UN, R, A
J3 - UN, R, A



# BOREHOLE RECORD RBR-12-01

PAGE 4 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/6/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855885.2 E 632773.6
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE ■ CRUSHED CORE ■ MISSING CORE ▨ INFERRED FAULT
DISCONTINUITY: FX-FRACTURE J-JOINT CL-CLEAVAGE VN-VEIN
CONT-CONTACT B-BEDDING F-FAULT FOL-FOLIATION
RZ-BROKEN CORE / RUBBLE ZONE PL-PLANAR ST-STEPPED
UN-UNDULATING PO-POLISHED K-SLICKENSIDED
CL-CLEAN PC-PARTIALLY COATED CC-COMPLETELY COATED IN-FILLED



501.8
SOKOMAN Fm: brown grey, thick banded (4-64 mm), magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF]

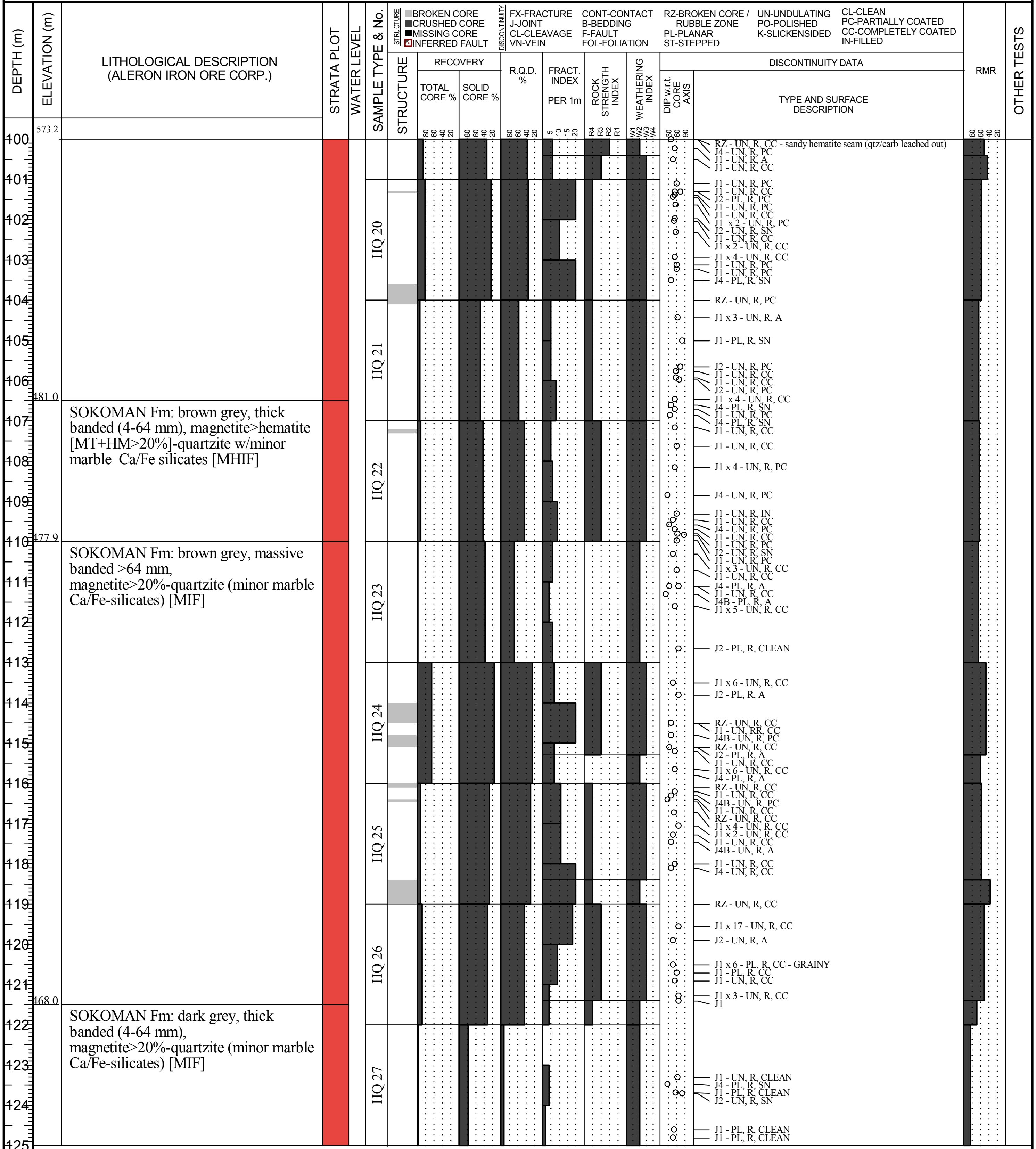
491.4
SOKOMAN Fm: brown grey, thick banded (4-64 mm), hematite >20%-quartzite (minor marble Ca/Fe silicates) [HIF]

J3 - UN, R, -
J1 - UN, R, IN
J1 - UN, R, IN
J3 - UN, R, A
J1 - UN, R, IN
J3 - UN, R , A
J2 - UN, R, SN
J1 - UN, R, A
J1 - UN, R, A
J2 - PL, R, SN
J1 - UN, R, A
J1 - UN, R, CC
J2 - UN, R, PC
J2 - PL, R, CC
J1 - PL, R, SN
J2 - UN, R, SN
J1 - PL, R, A
J2 - PL, R, SN
RZ - UN, R, A
J1 - PL, R, PC
RZ - UN, R, A/PC
J1 - UN, R, PC
J4 - PL, R, A
J1 - PL, R, A
J2 - PL, R, A
J1 - UN, R-VR
J2 - PL, R, A
RZ - UN, R, A - Completely (soft red/orange)
J2 - PL, R, A
J1 - PL, R, CC
J2 - PL, R, A
RZ - PL, R, CC
J1 - PL, R, CC
J2 - PL, R, A
J1 x 4 - PL, R, CC
RZ - UN, R, CC
J1 - UN, R, A
J2 - PL, R, CC
J1 x 5 - PL, R, A
J2 - PL, SM, A
J1 x 2 - PL, R, A
J1 - UN, R, CC
J2 x 2 - PL, R, A
J1 x 3 - PL, R, A
RZ - UN, R, A
J2 - PL, R, A
J1 - PL, R, A
J1 - UN, R, CC
RZ - PL, R, CC
J2 - PL, R, A
J1 - PL, R, CC
J2 - PL, R, A
J1 - PL, R, CC
J1 - PL, R, A
RZ - PL, R, CC
J2 - PL, R, A
J2 - PL, R, A
J1 - PL, R, A
J3 - UN, R, CC
J1 x 3 - UN, R, A
RZ - UN, R, CC
J2 - UN, R, A
J1 x 5 - UN, R, CC
J1 - UN, R, CC
J2 - PL, R, A
J1 - PL, R, PC
J1 - UN, R, CC
J2 - PL, R, A
RZ - UN, R, CC
J4 - UN, R, PC
J1 - UN, R, CC
J2 - UN, R, PC
J1 X 6 - UN, VR, CC
J2 - UN, R, A
J2 X 2 - UN, R, A
J1 X 7 - UN, R, CC
J4 X 2 - UN, R, A
J2 - UN, R, PC
J1 X 4 - UN, R, PC
J2 - UN, R, A
J1 - UN, R, CC
J2 - UN, R, A
J1 - UN, R, CC
J1 - UN,R , CC

# BOREHOLE RECORD RBR-12-01

DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/6/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855885.2 E 632773.6
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, ☒ INFERRED FAULT
DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED



481.0 SOKOMAN Fm: brown grey, thick banded (4-64 mm), magnetite>hematite [MT+HM>20%]-quartzite w/minor marble Ca/Fe silicates [MHIF]

477.9 SOKOMAN Fm: brown grey, massive banded >64 mm, magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF]

468.0 SOKOMAN Fm: dark grey, thick banded (4-64 mm), magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF]

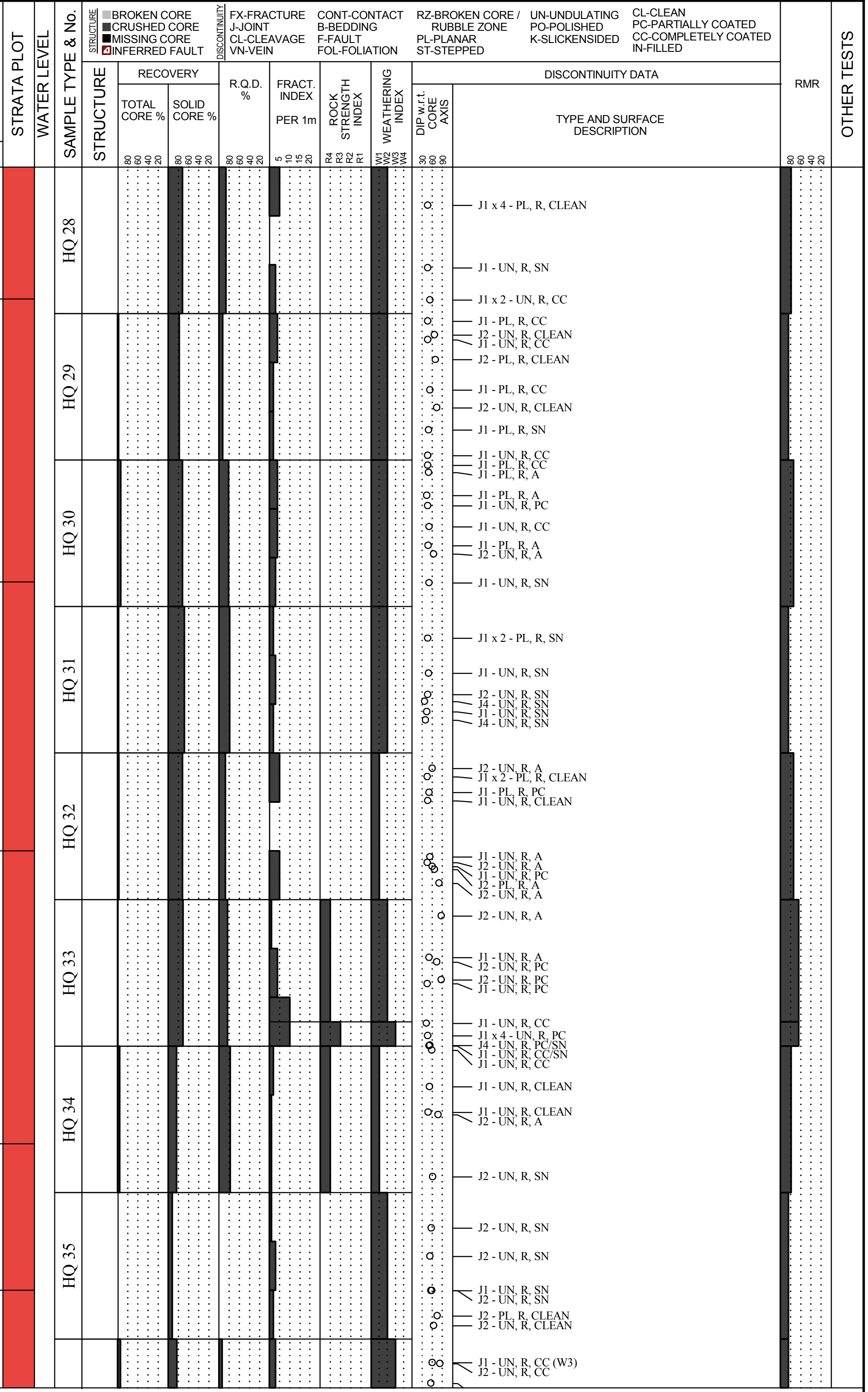
RZ - UN, R, CC - sandy hematite seam (qtz/carb leached out)
J4 - UN, R, PC
J1 - UN, R, A
J1 - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, CC
J2 - PL, R, PC
J1 - UN, R, PC
J1 - UN, R, CC
J1 x 2 - UN, R, PC
J2 - UN, R, SN
J1 - UN, R, CC
J1 x 2 - UN, R, CC
J1 x 4 - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, PC
J4 - PL, R, SN
RZ - UN, R, PC
J1 x 3 - UN, R, A
J1 - PL, R, SN
J2 - UN, R, PC
J1 - UN, R, CC
J1 - UN, R, CC
J2 - UN, R, PC
J1 x 4 - UN, R, CC
J4 - PL, R, SN
J1 - UN, R, PC
J4 - PL, R, SN
J1 - UN, R, CC
J1 - UN, R, CC
J1 x 4 - UN, R, PC
J4 - UN, R, PC
J1 - UN, R, IN
J1 - UN, R, CC
J4 - UN, R, PC
J1 - UN, R, CC
J1 - UN, R, PC
J2 - UN, R, SN
J1 - UN, R, PC
J1 x 3 - UN, R, CC
J1 - UN, R, CC
J4 - PL, R, A
J1 - UN, R, CC
J4B - PL, R, A
J1 x 5 - UN, R, CC
J2 - PL, R, CLEAN
J1 x 6 - UN, R, CC
J2 - PL, R, A
RZ - UN, R, CC
J1 - UN, RR, CC
J4B - UN, R, PC
RZ - UN, R, CC
J2 - PL, R, A
J1 - UN, R, CC
J1 x 6 - UN, R, CC
J4 - PL, R, A
RZ - UN, R, CC
J1 - UN, R, CC
J4B - UN, R, PC
J1 - UN, R, CC
RZ - UN, R, CC
J1 x 4 - UN, R, CC
J1 x 2 - UN, R, CC
J1 - UN, R, CC
J4B - UN, R, A
J1 - UN, R, CC
J4 - UN, R, CC
RZ - UN, R, CC
J1 x 17 - UN, R, CC
J2 - UN, R, A
J1 x 6 - PL, R, CC - GRAINY
J1 - PL, R, CC
J1 - UN, R, CC
J1 x 3 - UN, R, CC
J1
J1 - UN, R, CLEAN
J4 - PL, R, SN
J1 - PL, R, CLEAN
J2 - UN, R, SN
J1 - PL, R, CLEAN
J1 - PL, R, CLEAN

# BOREHOLE RECORD RBR-12-01

PAGE 6 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/6/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855885.2 E 632773.6
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, ▨ INFERRED FAULT
DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|---|
| 125 | 573.2 | |
| | 462.6 | SOKOMAN Fm: dark grey, thick banded (4-64 mm), magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF] |
| | 457.6 | SOKOMAN Fm: dark grey, thick banded (4-64 mm), magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF] |
| | 452.8 | SOKOMAN Fm: light greenish-grey, broken banded, carbonate > 50% + silicate iron formation [CSIF] |
| | 447.6 | SOKOMAN Fm: dark green grey, thick banded (4-64 mm), Quartz (50-90 qz)% carbonate iron formation [QCIF] |
| | 445.0 | SOKOMAN Fm: light grey, broken banded, carbonate > 50% + silicate iron formation [CSIF] |
| 150 | | |



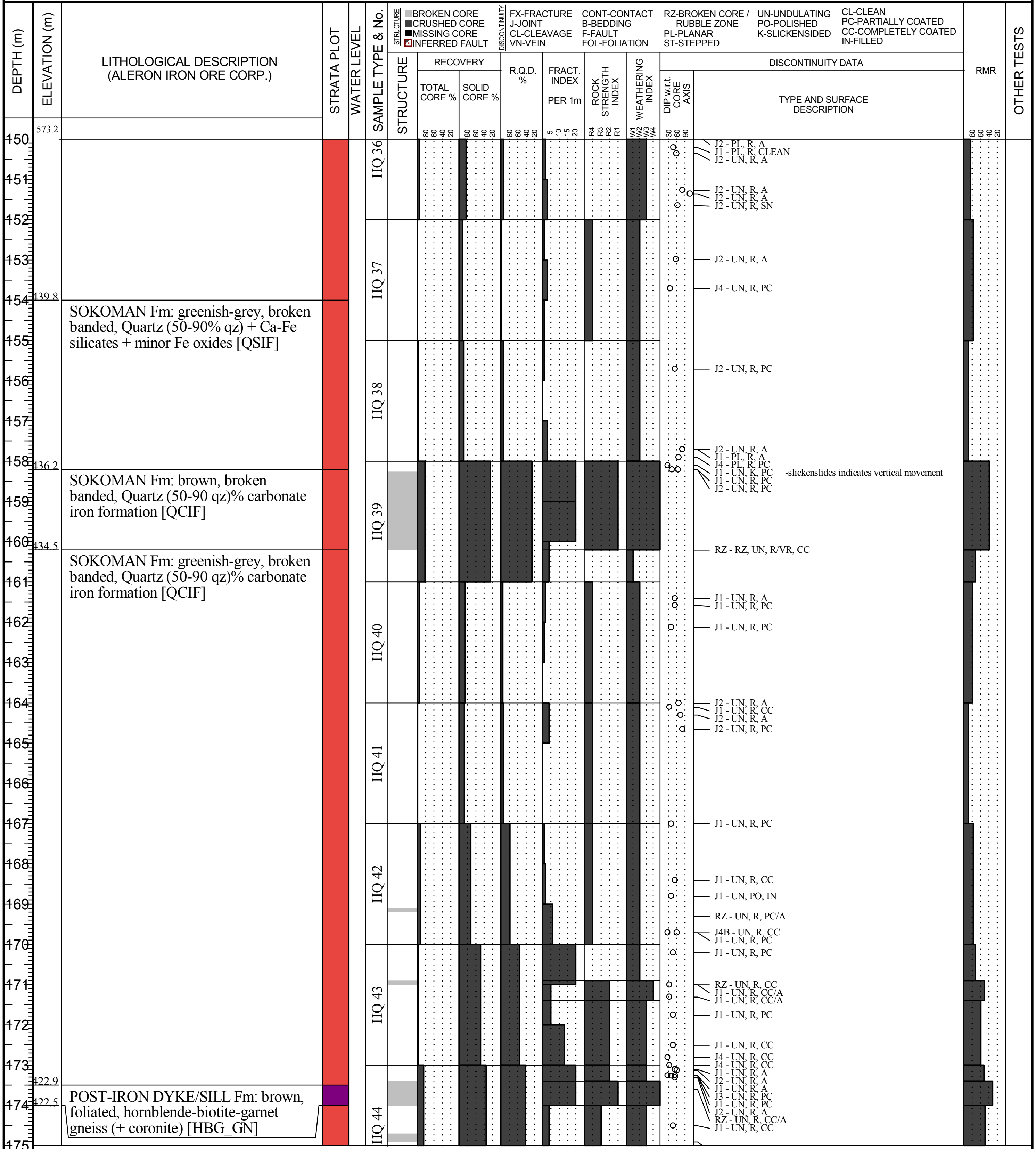
J1 x 4 - PL, R, CLEAN
J1 - UN, R, SN
J1 x 2 - UN, R, CC
J1 - PL, R, CC
J2 - UN, R, CLEAN
J1 - UN, R, CC
J2 - PL, R, CLEAN
J1 - PL, R, CC
J2 - UN, R, CLEAN
J1 - PL, R, SN
J1 - UN, R, CC
J1 - PL, R, CC
J1 - PL, R, A
J1 - PL, R, A
J1 - UN, R, PC
J1 - UN, R, CC
J1 - PL, R, A
J2 - UN, R, A
J1 - UN, R, SN
J1 x 2 - PL, R, SN
J1 - UN, R, SN
J2 - UN, R, SN
J4 - UN, R, SN
J1 - UN, R, SN
J4 - UN, R, SN
J2 - UN, R, A
J1 x 2 - PL, R, CLEAN
J1 - PL, R, PC
J1 - UN, R, CLEAN
J1 - UN, R, A
J2 - UN, R, A
J1 - UN, R, PC
J2 - PL, R, A
J2 - UN, R, A
J2 - UN, R, A
J1 - UN, R, A
J2 - UN, R, PC
J2 - UN, R, PC
J1 - UN, R, PC
J1 - UN, R, CC
J1 x 4 - UN, R, PC
J4 - UN, R, PC/SN
J1 - UN, R, CC/SN
J1 - UN, R, CC
J1 - UN, R, CLEAN
J1 - UN, R, CLEAN
J2 - UN, R, A
J2 - UN, R, SN
J2 - UN, R, SN
J2 - UN, R, SN
J1 - UN, R, SN
J2 - UN, R, SN
J2 - PL, R, CLEAN
J2 - UN, R, CLEAN
J1 - UN, R, CC (W3)
J2 - UN, R, CC

# BOREHOLE RECORD RBR-12-01

PAGE 7 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
LOCATION Kami Site, Labrador West, NL
INCLINATION: -60 AZIMUTH 270
ELEVATION: 573.2
LOCATION: N 5855885.2 E 632773.6
PROJECT No. 121614000-305
DRILLING DATE 3/6/2012
DRILL RIG Major 50 (AVD)
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, ◪ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED



LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.)

| ELEVATION (m) | LITHOLOGICAL DESCRIPTION |
|---|---|
| 573.2 | |
| 439.8 | SOKOMAN Fm: greenish-grey, broken banded, Quartz (50-90% qz) + Ca-Fe silicates + minor Fe oxides [QSIF] |
| 436.2 | SOKOMAN Fm: brown, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF] |
| 434.5 | SOKOMAN Fm: greenish-grey, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF] |
| 422.9 | POST-IRON DYKE/SILL Fm: brown, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN] |
| 422.5 | |

TYPE AND SURFACE DESCRIPTION

J2 - PL, R, A
J1 - PL, R, CLEAN
J2 - UN, R, A
J2 - UN, R, A
J2 - UN, R, A
J2 - UN, R, SN
J2 - UN, R, A
J4 - UN, R, PC
J2 - UN, R, PC
J2 - UN, R, A
J1 - PL, R, A
J4 - PL, R, PC
J1 - UN, K, PC -slickenslides indicates vertical movement
J1 - UN, R, PC
J2 - UN, R, PC
RZ - RZ, UN, R/VR, CC
J1 - UN, R, A
J1 - UN, R, PC
J1 - UN, R, PC
J2 - UN, R, A
J1 - UN, R, CC
J2 - UN, R, A
J2 - UN, R, PC
J1 - UN, R, PC
J1 - UN, R, CC
J1 - UN, PO, IN
RZ - UN, R, PC/A
J4B - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, PC
RZ - UN, R, CC
J1 - UN, R, CC/A
J1 - UN, R, CC/A
J1 - UN, R, PC
J1 - UN, R, CC
J4 - UN, R, CC
J4 - UN, R, CC
J1 - UN, R, A
J2 - UN, R, A
J1 - UN, R, A
J3 - UN, R, PC
J1 - UN, R, PC
J2 - UN, R, A
RZ - UN, R, CC/A
J1 - UN, R, CC

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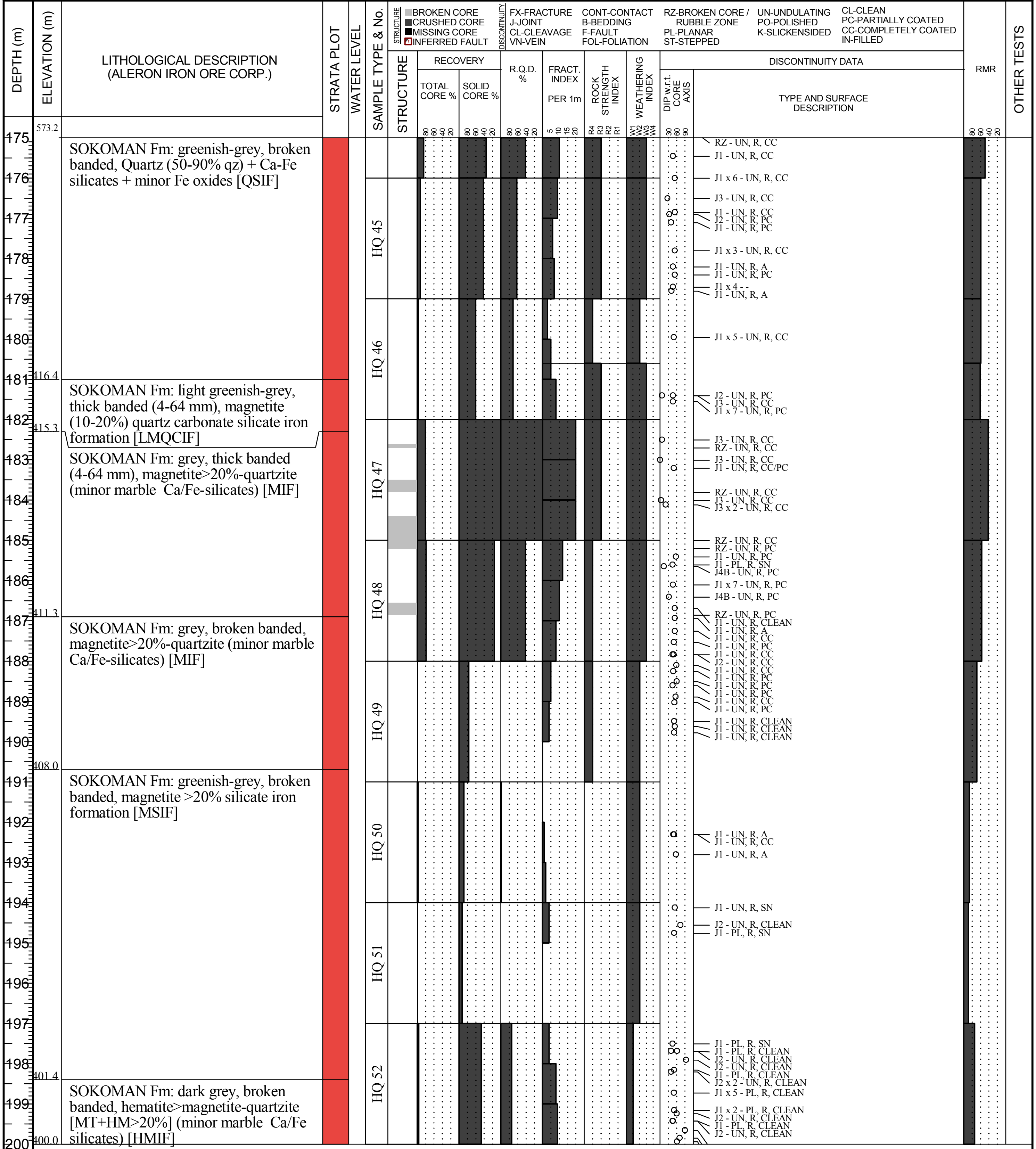
# BOREHOLE RECORD RBR-12-01

PAGE 8 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/6/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855885.2 E 632773.6
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, 🟥 INFERRED FAULT
DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN; CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION; RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED; UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED; CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED



LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.)

| ELEVATION (m) | LITHOLOGICAL DESCRIPTION |
|---|---|
| 573.2 | SOKOMAN Fm: greenish-grey, broken banded, Quartz (50-90% qz) + Ca-Fe silicates + minor Fe oxides [QSIF] |
| 416.4 | SOKOMAN Fm: light greenish-grey, thick banded (4-64 mm), magnetite (10-20%) quartz carbonate silicate iron formation [LMQCIF] |
| 415.3 | SOKOMAN Fm: grey, thick banded (4-64 mm), magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF] |
| 411.3 | SOKOMAN Fm: grey, broken banded, magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF] |
| 408.0 | SOKOMAN Fm: greenish-grey, broken banded, magnetite >20% silicate iron formation [MSIF] |
| 401.4 | SOKOMAN Fm: dark grey, broken banded, hematite>magnetite-quartzite [MT+HM>20%] (minor marble Ca/Fe silicates) [HMIF] |
| 400.0 | |

DISCONTINUITY DATA

RZ - UN, R, CC
J1 - UN, R, CC
J1 x 6 - UN, R, CC
J3 - UN, R, CC
J1 - UN, R, CC
J2 - UN, R, PC
J1 - UN, R, PC
J1 x 3 - UN, R, CC
J1 - UN, R, A
J1 - UN, R, PC
J1 x 4 - -
J1 - UN, R, A
J1 x 5 - UN, R, CC
J2 - UN, R, PC
J3 - UN, R, CC
J1 x 7 - UN, R, PC
J3 - UN, R, CC
RZ - UN, R, CC
J3 - UN, R, CC
J1 - UN, R, CC/PC
RZ - UN, R, CC
J3 - UN, R, CC
J3 x 2 - UN, R, CC
RZ - UN, R, CC
RZ - UN, R, PC
J1 - UN, R, PC
J1 - PL, R, SN
J4B - UN, R, PC
J1 x 7 - UN, R, PC
J4B - UN, R, PC
RZ - UN, R, PC
J1 - UN, R, CLEAN
J1 - UN, R, A
J1 - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, CC
J2 - UN, R, CC
J1 - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, PC
J1 - UN, R, PC
J1 - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, CLEAN
J1 - UN, R, CLEAN
J1 - UN, R, CLEAN
J1 - UN, R, A
J1 - UN, R, CC
J1 - UN, R, A
J1 - UN, R, SN
J2 - UN, R, CLEAN
J1 - PL, R, SN
J1 - PL, R, SN
J1 - PL, R, CLEAN
J2 - UN, R, CLEAN
J2 - UN, R, CLEAN
J1 - PL, R, CLEAN
J2 x 2 - UN, R, CLEAN
J1 x 5 - PL, R, CLEAN
J1 x 2 - PL, R, CLEAN
J2 - UN, R, CLEAN
J1 - PL, R, CLEAN
J2 - UN, R, CLEAN

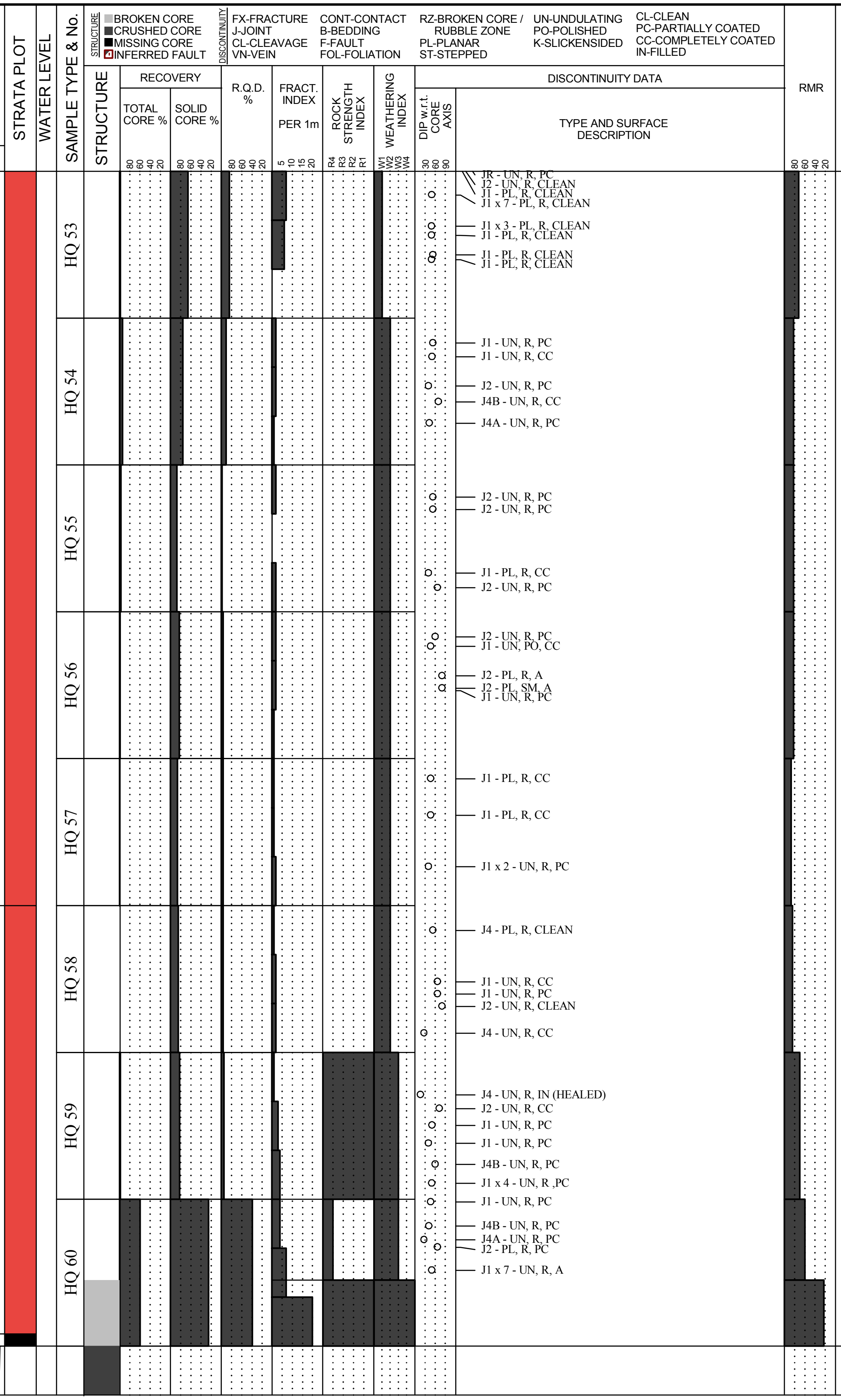
# Stantec BOREHOLE RECORD RBR-12-01

PAGE 9 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
PROJECT No. 121614000-305
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
DRILLING DATE 3/6/2012
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855885.2 E 632773.6
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE ■ CRUSHED CORE ■ MISSING CORE ◪ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) | SAMPLE TYPE & No. |
|---|---|---|---|
| 200 | 573.2 | SOKOMAN Fm: dark grey, broken banded, magnetite>20%-quartzite (minor marble Ca/Fe-silicates) [MIF] | HQ 53<br>HQ 54<br>HQ 55<br>HQ 56<br>HQ 57 |
| 215 | 387.0 | SOKOMAN Fm: dark greyish-green, broken banded, magnetite >20% silicate iron formation [MSIF] | HQ 58<br>HQ 59<br>HQ 60 |
|  | 379.4 |  |  |
| 224 | 379.2 | DECOMPOSED/CRUSHED ZONE: Dark gray, poorly graded sand (SP) material; magnetic; non-cohesive; |  |



DISCONTINUITY DATA — TYPE AND SURFACE DESCRIPTION

JR - UN, R, PC
J2 - UN, R, CLEAN
J1 - PL, R, CLEAN
J1 x 7 - PL, R, CLEAN
J1 x 3 - PL, R, CLEAN
J1 - PL, R, CLEAN
J1 - PL, R, CLEAN
J1 - PL, R, CLEAN
J1 - UN, R, PC
J1 - UN, R, CC
J2 - UN, R, PC
J4B - UN, R, CC
J4A - UN, R, PC
J2 - UN, R, PC
J2 - UN, R, PC
J1 - PL, R, CC
J2 - UN, R, PC
J2 - UN, R, PC
J1 - UN, PO, CC
J2 - PL, R, A
J2 - PL, SM, A
J1 - UN, R, PC
J1 - PL, R, CC
J1 - PL, R, CC
J1 x 2 - UN, R, PC
J4 - PL, R, CLEAN
J1 - UN, R, CC
J1 - UN, R, PC
J2 - UN, R, CLEAN
J4 - UN, R, CC
J4 - UN, R, IN (HEALED)
J2 - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, PC
J4B - UN, R, PC
J1 x 4 - UN, R ,PC
J1 - UN, R, PC
J4B - UN, R, PC
J4A - UN, R, PC
J2 - PL, R, PC
J1 x 7 - UN, R, A

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# BOREHOLE RECORD RBR-12-01

PAGE 10 of 10
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/6/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 573.2
DRILL RIG Major 50 (AVD)
INCLINATION: -60 AZIMUTH 270 LOCATION: N 5855885.2 E 632773.6
CONTRACTOR Major Drilling

| STRUCTURE | DISCONTINUITY | | | | |
|---|---|---|---|---|---|
| BROKEN CORE | FX-FRACTURE | CONT-CONTACT | RZ-BROKEN CORE / RUBBLE ZONE | UN-UNDULATING | CL-CLEAN |
| CRUSHED CORE | J-JOINT | B-BEDDING | PL-PLANAR | PO-POLISHED | PC-PARTIALLY COATED |
| MISSING CORE | CL-CLEAVAGE | F-FAULT | ST-STEPPED | K-SLICKENSIDED | CC-COMPLETELY COATED |
| INFERRED FAULT | VN-VEIN | FOL-FOLIATION | | | IN-FILLED |

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) | STRATA PLOT | WATER LEVEL | SAMPLE TYPE & No. | STRUCTURE | RECOVERY TOTAL CORE % (80 60 40 20) | RECOVERY SOLID CORE % (80 60 40 20) | R.Q.D. % (80 60 40 20) | FRACT. INDEX PER 1m (5 10 15 20) | ROCK STRENGTH INDEX (R4 R3 R2 R1) | WEATHERING INDEX (W1 W2 W3 W4) | DISCONTINUITY DATA DIP w.r.t. CORE AXIS (30 60 90) | DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION | RMR (80 60 40 20) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 225 | 573.2 | - Planar upper boundary approximately 35° to core axis (parallel to J1)<br>- Artesian flow rate increases upon intersection of seam.<br>- Bottom 27 m of drill rods fill with sand material and hole is abandoned.<br>End of Borehole<br>- Hole abandoned at approximately 224.0 m depth along borehole in decomposed/crushed seam to avoid risk of losing drill rods.<br>- Flowing artesian conditions encountered in bedrock. Artesian flow rate increases upon intersection of sand seam at 223.7 m depth along hole. | | | | | | | | | | | | | | |

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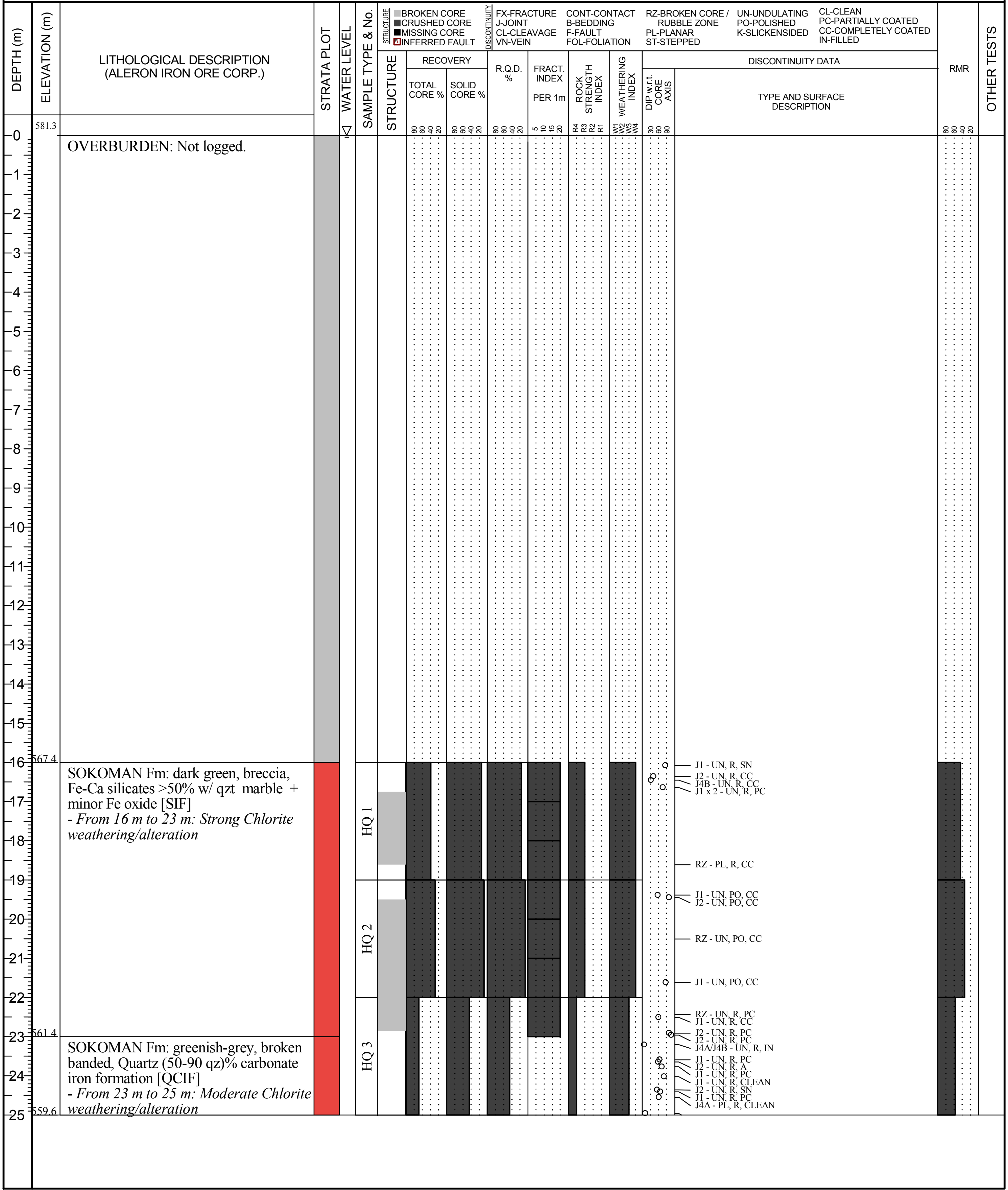
# BOREHOLE RECORD RBR-12-02

PAGE 1 of 13
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
PROJECT No. 121614000-305
DRILLING DATE 3/17/2012
DRILL RIG Major 50 (AVD)
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, 🟥 INFERRED FAULT

DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED



OVERBURDEN: Not logged.

SOKOMAN Fm: dark green, breccia, Fe-Ca silicates >50% w/ qzt marble + minor Fe oxide [SIF]
*- From 16 m to 23 m: Strong Chlorite weathering/alteration*

SOKOMAN Fm: greenish-grey, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF]
*- From 23 m to 25 m: Moderate Chlorite weathering/alteration*

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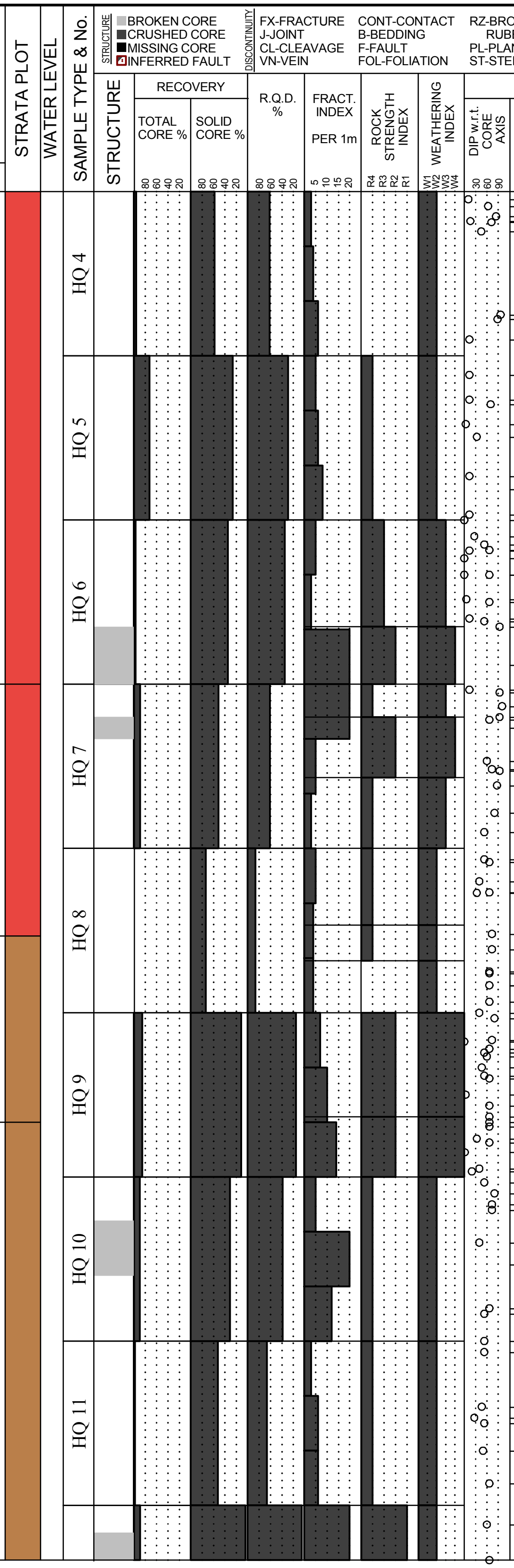
# BOREHOLE RECORD RBR-12-02

DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
PROJECT No. 121614000-305
LOCATION Kami Site, Labrador West, NL
DRILLING DATE 3/17/2012
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, ◩ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|---|
| 25 | 581.3 | SOKOMAN Fm: greenish-grey, broken banded, Fe-Ca silicates >50% w/ qzt marble + minor Fe oxide [SIF]<br>*- From 25 m to 34 m: Strong Chlorite weathering/alteration* |
| 34 | 551.9 | SOKOMAN Fm: light greenish-grey, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF]<br>*- From 34.7 m to 35 m: Strong Chlorite weathering/alteration*<br>*- From 35 m to 38.6 m: Weak Chlorite weathering/alteration* |
| 38.6 | 547.9 | MENIHEK Fm: dark grey, foliated, graphitic biotite-muscovite quartz schist often w/ Fe-sulfides [GF_B_MS_SCH] |
| 42 | 544.9 | MENIHEK Fm: dark greenish-grey, foliated, biotite-muscovite quartz schist often w/ Fe-sulfides [B_MS_SCH] |



DEPTH (m): 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

DISCONTINUITY DATA — TYPE AND SURFACE DESCRIPTION

J4B - UN, R, CC
J3 - UN, R, IN
J1 x 4 - UN, PO, CC
J1 - UN, PO, CC
J4B - UN, PO, CC
J2 - UN, K, CC
J4B - UN, K, CC
J2 - UN, R, PC
J2 - UN, R, PC
J4B - UN, PO, CC
J4A - UN, R, CC
J4 - UN, R, CC
J1 x 7 - UN, K, CC
J4B - UN, R, CC
J1 - UN, SM, CC
J4A x 2 - UN, R, CC
J4B - UN, R, CC
J4B - UN, R, CC - Partial biotite covering
J4B - UN, R, CC - Partial biotite covering
J4B - UN, R, CC - Partial biotite covering
J1 - UN, R, PC
J2 - UN, R, CC
J4 - UN, R, CC
J4 - UN, R, CC
J4 - UN, R, CC
J2 - UN, R, CC
J4 - UN, R, CC
J2 - UN, R, CC, chlorite
J4 - PL, PO, CC, chlorite
J1 - UN, R, CC
J1 - UN, R, CC
RZ - PL, K, CC (CHLORITE), UN, K, CC (CHLORITE)
J4 - UN, K, CC
J1 - PL, K, CC (CONTACT JOINT)
J2 - UN, SS, CC
J1 - UN, PO, CC (CONTACT JOINT
J1 - PL, K, CC (CHLORITE)
RZ - PL, SS, CC (CHLORITE)
J4 - UN, R, CC
J1 - UN, PO, CC (CHLORITE)
J1 - PL, PO, CC, chlorite
J1 - PL, PO, CC - 35.7M CONTACT, 70 DEGREES
J1 - UN, PO, CC
J1 - UN, A, CC
J2 - PL, R, PC
J1 - UN, K, CC
J4 - UN, R, PC
J1 - UN, K, PC
J2 - UN, R, CC
J1 - UN, R, CC - GRAPHITE
J1 - UN, SM, CC -GRAPHITE
J1 - UN, R, CC - GRAPHITE/MUSCOVITE
J1 - UN, PO, CC -GRAPHITE
J1 - UN, R, CC
RZ - UN, R, CC/A
J1 - UN, SM, CC - GRAPHITE
J4 - UN, PO, CC
J1 - UN, PO, CC
J1 - UN, R, CC
J3 - UN, R, CC
J1 - PL, K, CC
J1 - UN, R, CC
J1 - UN, PO, CC
J1 - UN, R, CC
J1 - UN, PO, CC
J2 - UN, R, CC
J3 - UN, R, CC
J1 - PL, PO, CC
J1 - UN, K, CC
J2 - UN, R, CC
J2 - UN, R, CC
J1 - UN, K, CC
J1 - PL, PO, CC
J1 x 3 - UN, PO, CC
J1 x 4 - UN, PO, CC
J3 - UN, PO, CC
J2 - UN, PO, CC
J1 - UN, K, CC
J1 - UN, R, CC
J4 - UN, R, PC
J1 x 4 - UN, PO, CC
RZ - UN, PO, CC
J1 x 12 - UN, PO, CC
J1 - UN, PO, CC
J1 - UN, K, CC
J1 - UN, K, CC
J1 x 2 - UN, R, CC
J2 - UN, R, CC
J1 - UN, PO, CC
J1 x 8 - UN, K, CC
J2 - UN, R, PC
J1 x 4 - UN, PO, CC

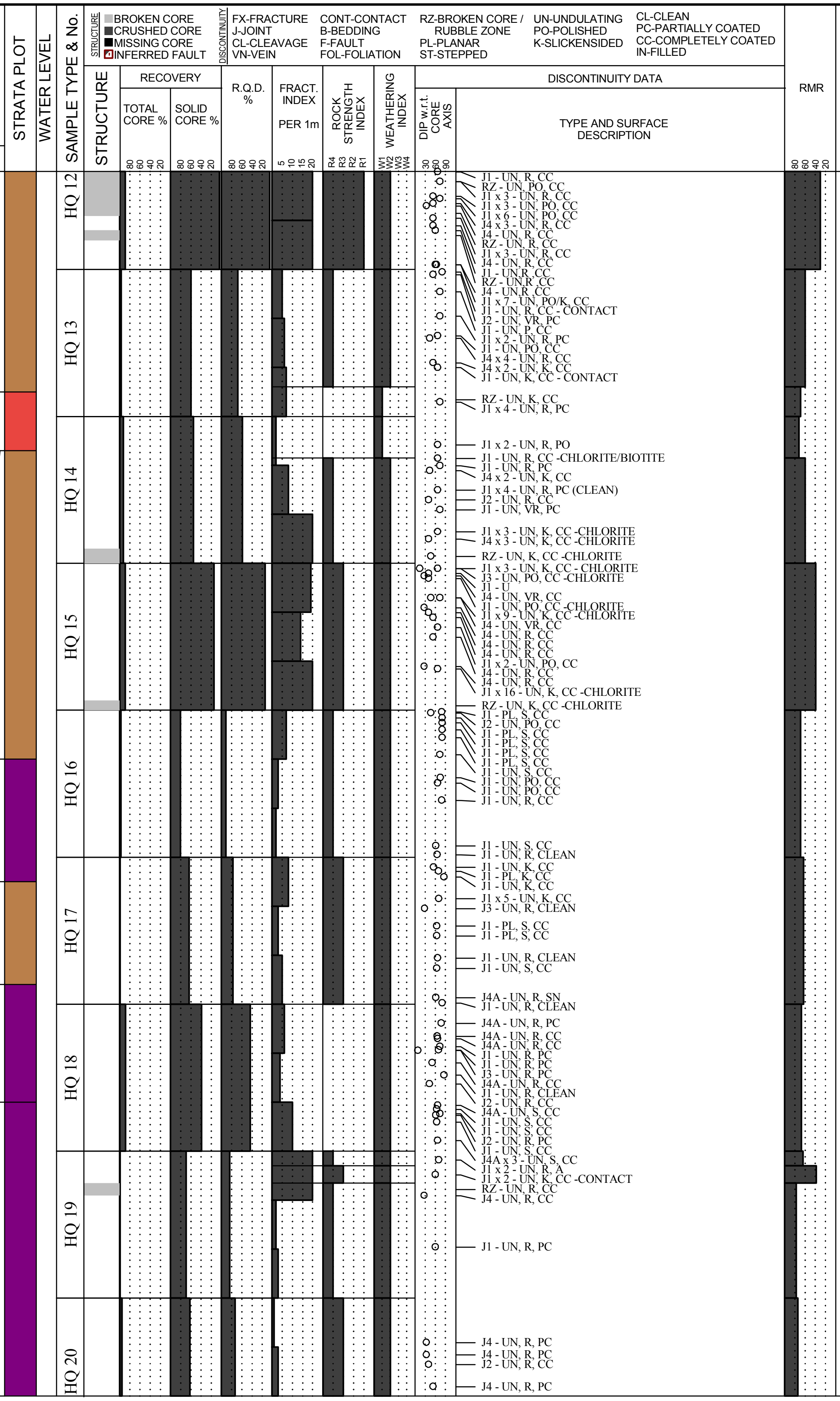
RMR 80 60 40 20

OTHER TESTS

# Stantec BOREHOLE RECORD RBR-12-02

PAGE 3 of 13
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
PROJECT No. 121614000-305
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILLING DATE 3/17/2012
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|---|
| 50 | 581.3 | |
| 54.5 | 534.1 | SOKOMAN Fm: light greenish-grey, thick banded (4-64 mm), Quartz (50-90 qz)% carbonate iron formation [QCIF]<br>*- From 54.5 m to 55.8 m: Weak Chlorite weathering/alteration* |
| 55.8 | 533.1 | MENIHEK Fm: dark green brown, foliated, biotite-muscovite quartz schist often w/ Fe-sulfides [B_MS_SCH] |
| 62 | 527.6 | POST-IRON DYKE/SILL Fm: dark green grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN] |
| 64.5 | 525.4 | MENIHEK Fm: dark green, foliated, biotite-muscovite quartz schist often w/ Fe-sulfides [B_MS_SCH] |
| 66.5 | 523.6 | POST-IRON DYKE/SILL Fm: dark green grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN] |
| 69 | 521.5 | POST-IRON DYKE/SILL Fm: dark green grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN] |



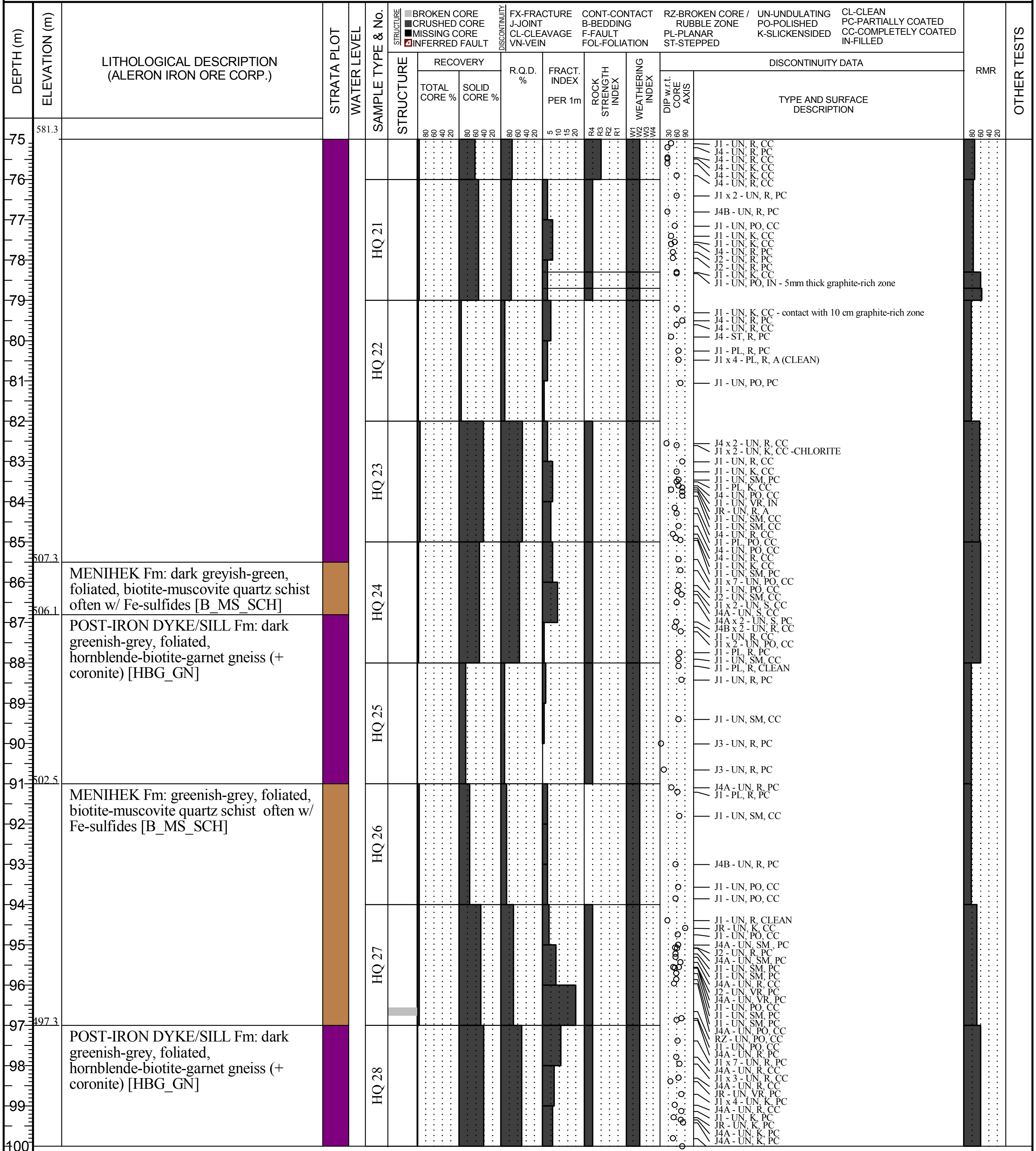
J1 - UN, R, CC
RZ - UN, PO, CC
J1 x 3 - UN, R, CC
J1 x 3 - UN, PO, CC
J1 x 6 - UN, PO, CC
J4 x 3 - UN, R, CC
J4 - UN, R, CC
RZ - UN, R, CC
J1 x 3 - UN, R, CC
J4 - UN, R, CC
J1 - UN,R ,CC
RZ - UN,R ,CC
J4 - UN,R ,CC
J1 x 7 - UN, PO/K, CC
J1 - UN, R, CC - CONTACT
J2 - UN, VR, PC
J1 - UN, P, CC
J1 x 2 - UN, R, PC
J1 - UN, PO, CC
J4 x 4 - UN, R, CC
J4 x 2 - UN, K, CC
J1 - UN, K, CC - CONTACT
RZ - UN, K, CC
J1 x 4 - UN, R, PC
J1 x 2 - UN, R, PO
J1 - UN, R, CC -CHLORITE/BIOTITE
J1 - UN, R, PC
J4 x 2 - UN, K, CC
J1 x 4 - UN, R, PC (CLEAN)
J2 - UN, R, CC
J1 - UN, VR, PC
J1 x 3 - UN, K, CC -CHLORITE
J4 x 3 - UN, K, CC -CHLORITE
RZ - UN, K, CC -CHLORITE
J1 x 3 - UN, K, CC - CHLORITE
J3 - UN, PO, CC -CHLORITE
J1 - U
J4 - UN, VR, CC
J1 - UN, PO, CC -CHLORITE
J1 x 9 - UN, K, CC -CHLORITE
J4 - UN, VR, CC
J4 - UN, R, CC
J4 - UN, R, CC
J4 - UN, R, CC
J1 x 2 - UN, PO, CC
J4 - UN, R, CC
J4 - UN, R, CC
J1 x 16 - UN, K, CC -CHLORITE
RZ - UN, K, CC -CHLORITE
J1 - PL, S, CC
J2 - UN, PO, CC
J1 - PL, S, CC
J1 - PL, S, CC
J1 - PL, S, CC
J1 - PL, S, CC
J1 - UN, S, CC
J1 - UN, PO, CC
J1 - UN, PO, CC
J1 - UN, R, CC
J1 - UN, S, CC
J1 - UN, R, CLEAN
J1 - UN, K, CC
J1 - PL, K, CC
J1 - UN, K, CC
J1 x 5 - UN, K, CC
J3 - UN, R, CLEAN
J1 - PL, S, CC
J1 - PL, S, CC
J1 - UN, R, CLEAN
J1 - UN, S, CC
J4A - UN, R, SN
J1 - UN, R, CLEAN
J4A - UN, R, PC
J4A - UN, R, CC
J4A - UN, R, CC
J1 - UN, R, PC
J1 - UN, R, PC
J3 - UN, R, PC
J4A - UN, R, CC
J1 - UN, R, CLEAN
J2 - UN, R, CC
J4A - UN, S, CC
J1 - UN, S, CC
J1 - UN, S, CC
J2 - UN, R, PC
J1 - UN, S, CC
J4A x 3 - UN, S, CC
J1 x 2 - UN, R, A
J1 x 2 - UN, K, CC -CONTACT
RZ - UN, R, CC
J4 - UN, R, CC
J1 - UN, R, PC
J4 - UN, R, PC
J4 - UN, R, PC
J2 - UN, R, CC
J4 - UN, R, PC

# BOREHOLE RECORD RBR-12-02

PAGE 4 of 13
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/17/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE ■ CRUSHED CORE ■ MISSING CORE ◪ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED



| ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|
| 507.3 | MENIHEK Fm: dark greyish-green, foliated, biotite-muscovite quartz schist often w/ Fe-sulfides [B_MS_SCH] |
| 506.1 | POST-IRON DYKE/SILL Fm: dark greenish-grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN] |
| 502.5 | MENIHEK Fm: greenish-grey, foliated, biotite-muscovite quartz schist often w/ Fe-sulfides [B_MS_SCH] |
| 497.3 | POST-IRON DYKE/SILL Fm: dark greenish-grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN] |

TYPE AND SURFACE DESCRIPTION

J1 - UN, R, CC
J4 - UN, R, PC
J4 - UN, R, CC
J4 - UN, K, CC
J4 - UN, K, CC
J4 - UN, R, CC
J1 x 2 - UN, R, PC
J4B - UN, R, PC
J1 - UN, PO, CC
J1 - UN, K, CC
J1 - UN, K, CC
J4 - UN, R, PC
J2 - UN, R, PC
J2 - UN, R, PC
J1 - UN, K, CC
J1 - UN, PO, IN - 5mm thick graphite-rich zone
J1 - UN, K, CC - contact with 10 cm graphite-rich zone
J4 - UN, R, PC
J4 - UN, R, CC
J4 - ST, R, PC
J1 - PL, R, PC
J1 x 4 - PL, R, A (CLEAN)
J1 - UN, PO, PC
J4 x 2 - UN, R, CC
J1 x 2 - UN, K, CC -CHLORITE
J1 - UN, R, CC
J1 - UN, K, CC
J1 - UN, SM, PC
J1 - PL, K, CC
J4 - UN, PO, CC
J1 - UN, VR, IN
JR - UN, R, A
J1 - UN, SM, CC
J1 - UN, SM, CC
J4 - UN, R, CC
J1 - PL, PO, CC
J4 - UN, PO, CC
J4 - UN, R, CC
J1 - UN, K, CC
J1 - UN, SM, PC
J1 x 7 - UN, PO, CC
J1 - UN, PO, CC
J2 - UN, SM, CC
J1 x 2 - UN, S, CC
J4A - UN, S, CC
J4A x 2 - UN, S, PC
J4B x 2 - UN, R, CC
J1 - UN, R, CC
J1 x 2 - UN, PO, CC
J1 - PL, R, PC
J1 - UN, SM, CC
J1 - PL, R, CLEAN
J1 - UN, R, PC
J1 - UN, SM, CC
J3 - UN, R, PC
J3 - UN, R, PC
J4A - UN, R, PC
J1 - PL, R, PC
J1 - UN, SM, CC
J4B - UN, R, PC
J1 - UN, PO, CC
J1 - UN, PO, CC
J1 - UN, R, CLEAN
JR - UN, K, CC
J1 - UN, PO, CC
J4A - UN, SM , PC
J2 - UN, R, PC
J4A - UN, SM, PC
J1 - UN, SM, PC
J1 - UN, SM, PC
J4A - UN, R, CC
J2 - UN, VR, PC
J4A - UN, VR, PC
J1 - UN, PO, CC
J1 - UN, SM, PC
J1 - UN, SM, PC
J4A - UN, PO, CC
RZ - UN, PO, CC
J1 - UN, PO, CC
J4A - UN, R, PC
J1 x 7 - UN, R, PC
J4A - UN, R, CC
J1 x 3 - UN, R, CC
J4A - UN, R, CC
JR - UN, VR, PC
J1 x 4 - UN, K, PC
J4A - UN, R, CC
J1 - UN, K, PC
JR - UN, K, PC
J4A - UN, K, PC
J4A - UN, K, PC

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# BOREHOLE RECORD RBR-12-02

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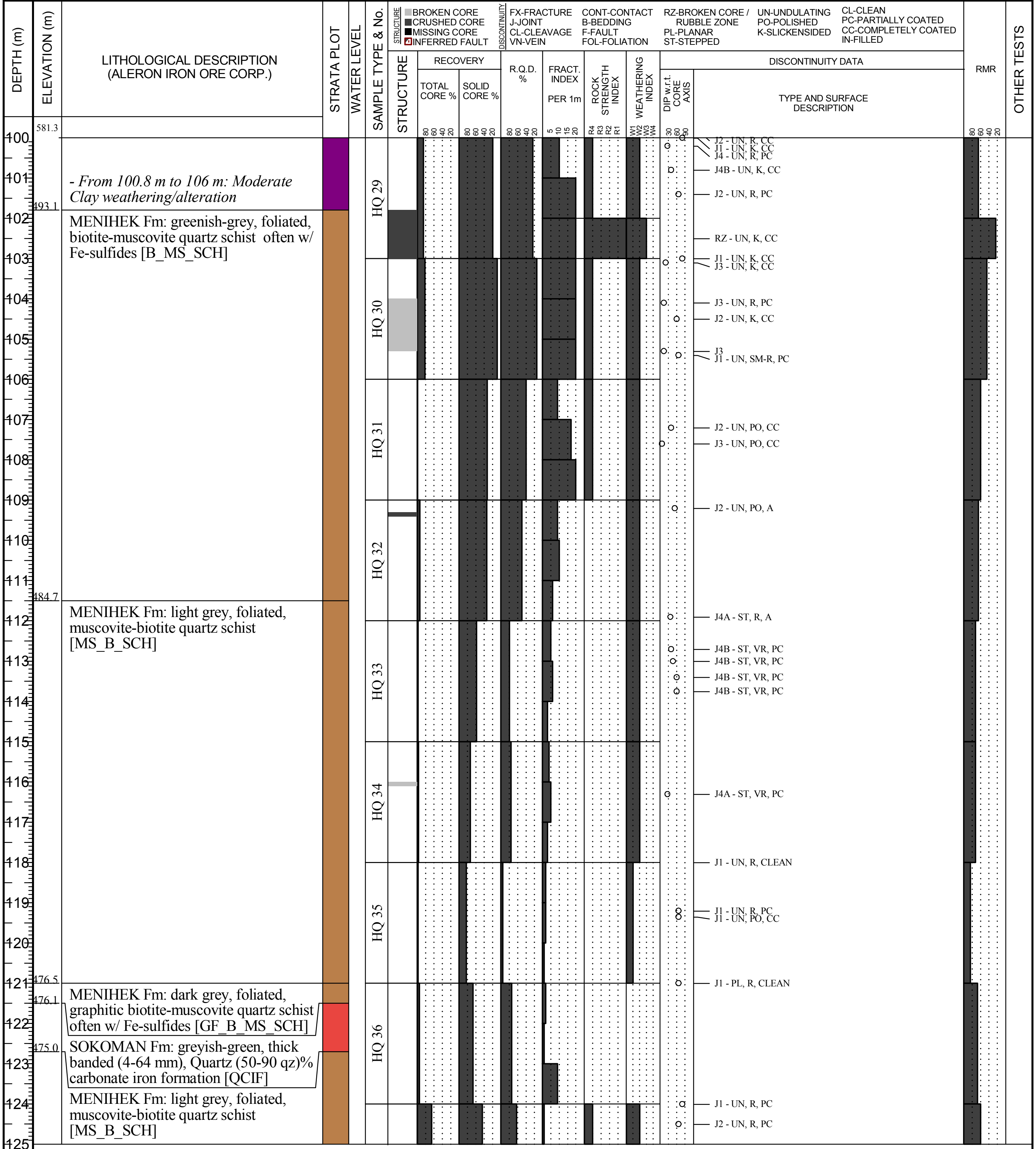
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/17/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE ■ CRUSHED CORE ■ MISSING CORE ◪ INFERRED FAULT
DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED



| ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|
| 581.3 | *- From 100.8 m to 106 m: Moderate Clay weathering/alteration* |
| 493.1 | MENIHEK Fm: greenish-grey, foliated, biotite-muscovite quartz schist often w/ Fe-sulfides [B_MS_SCH] |
| 484.7 | MENIHEK Fm: light grey, foliated, muscovite-biotite quartz schist [MS_B_SCH] |
| 476.5 | MENIHEK Fm: dark grey, foliated, graphitic biotite-muscovite quartz schist often w/ Fe-sulfides [GF_B_MS_SCH] |
| 476.1 | SOKOMAN Fm: greyish-green, thick banded (4-64 mm), Quartz (50-90 qz)% carbonate iron formation [QCIF] |
| 475.0 | MENIHEK Fm: light grey, foliated, muscovite-biotite quartz schist [MS_B_SCH] |

TYPE AND SURFACE DESCRIPTION

J2 - UN, R, CC
J1 - UN, K, CC
J4 - UN, R, PC
J4B - UN, K, CC
J2 - UN, R, PC
RZ - UN, K, CC
J1 - UN, K, CC
J3 - UN, K, CC
J3 - UN, R, PC
J2 - UN, K, CC
J3
J1 - UN, SM-R, PC
J2 - UN, PO, CC
J3 - UN, PO, CC
J2 - UN, PO, A
J4A - ST, R, A
J4B - ST, VR, PC
J4B - ST, VR, PC
J4B - ST, VR, PC
J4B - ST, VR, PC
J4A - ST, VR, PC
J1 - UN, R, CLEAN
J1 - UN, R, PC
J1 - UN, PO, CC
J1 - PL, R, CLEAN
J1 - UN, R, PC
J2 - UN, R, PC

**Stantec**

# BOREHOLE RECORD RBR-12-02

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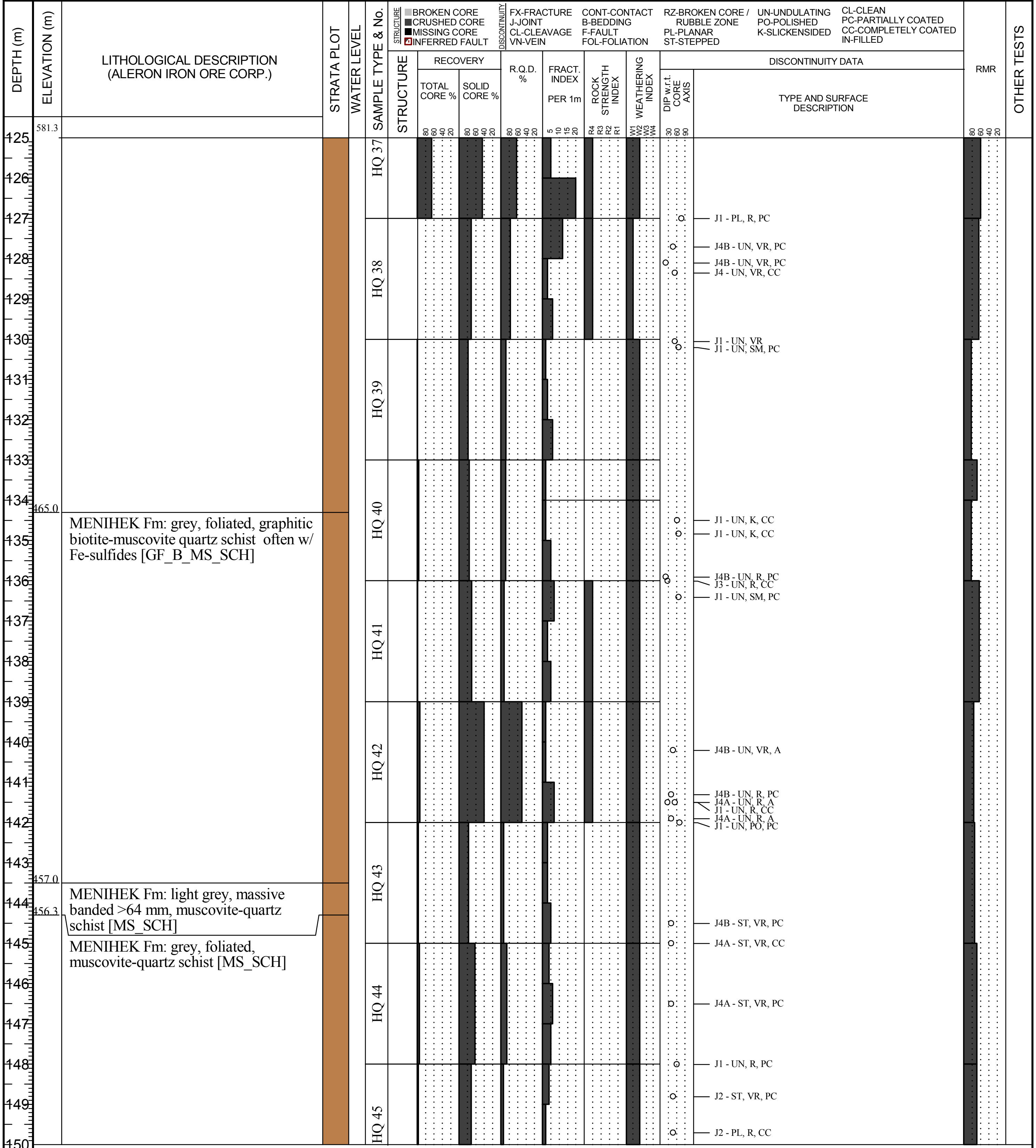
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/17/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE ■ CRUSHED CORE ■ MISSING CORE ☒ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED



465.0 — MENIHEK Fm: grey, foliated, graphitic biotite-muscovite quartz schist often w/ Fe-sulfides [GF_B_MS_SCH]

457.0 — MENIHEK Fm: light grey, massive banded >64 mm, muscovite-quartz schist [MS_SCH]

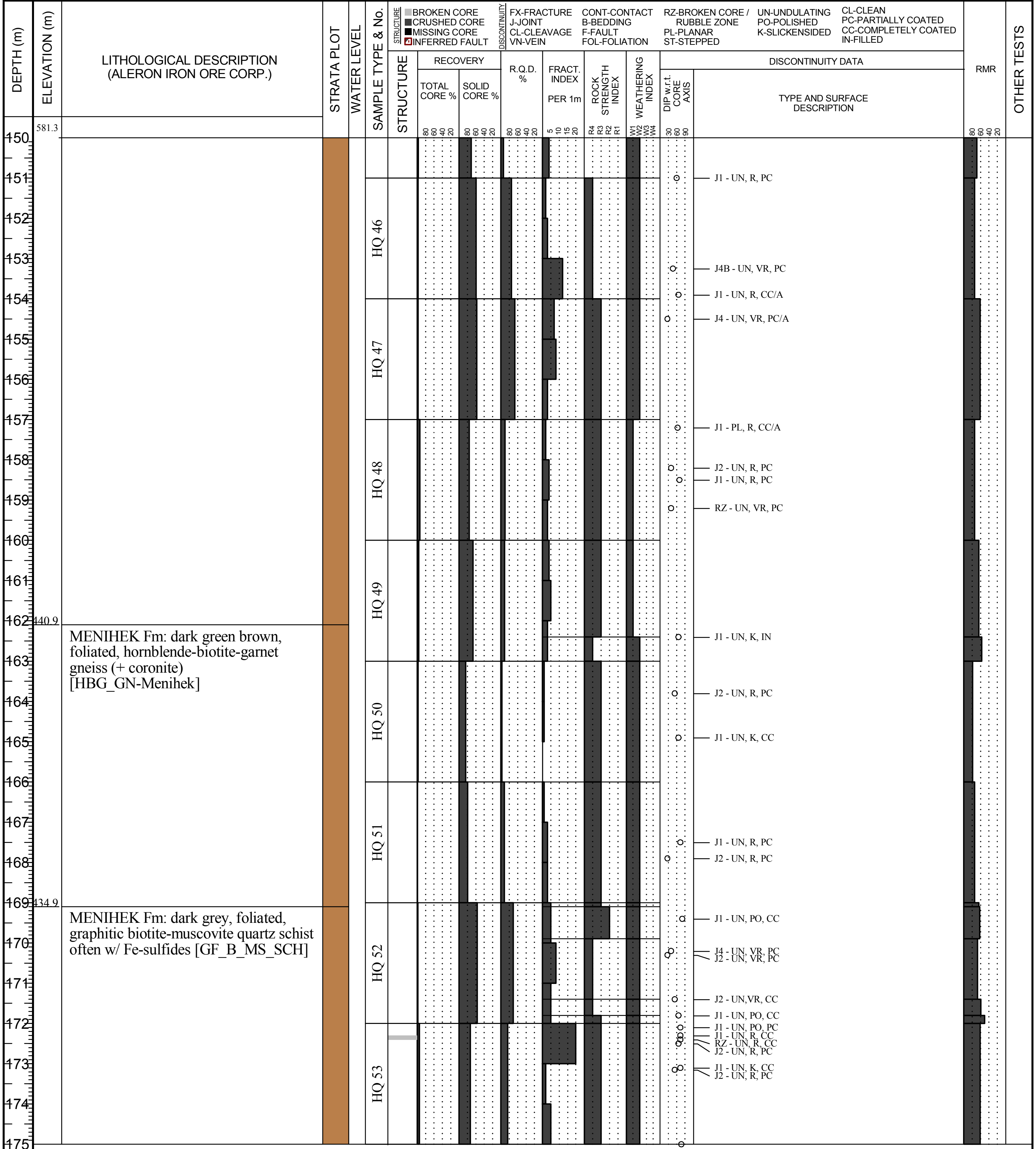
456.3 — MENIHEK Fm: grey, foliated, muscovite-quartz schist [MS_SCH]

J1 - PL, R, PC
J4B - UN, VR, PC
J4B - UN, VR, PC
J4 - UN, VR, CC
J1 - UN, VR
J1 - UN, SM, PC
J1 - UN, K, CC
J1 - UN, K, CC
J4B - UN, R, PC
J3 - UN, R, CC
J1 - UN, SM, PC
J4B - UN, VR, A
J4B - UN, R, PC
J4A - UN, R, A
J1 - UN, R, CC
J4A - UN, R, A
J1 - UN, PO, PC
J4B - ST, VR, PC
J4A - ST, VR, CC
J4A - ST, VR, PC
J1 - UN, R, PC
J2 - ST, VR, PC
J2 - PL, R, CC

# BOREHOLE RECORD RBR-12-02

DATUM NAD 27, Zone 19U

CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
PROJECT No. 121614000-305
DRILLING DATE 3/17/2012
DRILL RIG Major 50 (AVD)
CONTRACTOR Major Drilling



162 440.9 MENIHEK Fm: dark green brown, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN-Menihek]

169 434.9 MENIHEK Fm: dark grey, foliated, graphitic biotite-muscovite quartz schist often w/ Fe-sulfides [GF_B_MS_SCH]

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# BOREHOLE RECORD RBR-12-02

PAGE 8 of 13
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT Kami Iron Ore Project
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
PROJECT No. 121614000-305
DRILLING DATE 3/17/2012
DRILL RIG Major 50 (AVD)
CONTRACTOR Major Drilling

| STRUCTURE | DISCONTINUITY | | | | |
|---|---|---|---|---|---|
| ▒ BROKEN CORE<br>■ CRUSHED CORE<br>■ MISSING CORE<br>◩ INFERRED FAULT | FX-FRACTURE<br>J-JOINT<br>CL-CLEAVAGE<br>VN-VEIN | CONT-CONTACT<br>B-BEDDING<br>F-FAULT<br>FOL-FOLIATION | RZ-BROKEN CORE / RUBBLE ZONE<br>PL-PLANAR<br>ST-STEPPED | UN-UNDULATING<br>PO-POLISHED<br>K-SLICKENSIDED | CL-CLEAN<br>PC-PARTIALLY COATED<br>CC-COMPLETELY COATED<br>IN-FILLED |

DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.)

581.3

- From 177.5 m to 178.2 m: Moderate Clay weathering/alteration

- From 178.7 m to 179 m: Strong Limonite weathering/alteration
- From 179 m to 183 m: Weak Clay weathering/alteration

- From 183.5 m to 187 m: Moderate Clay weathering/alteration

420.7

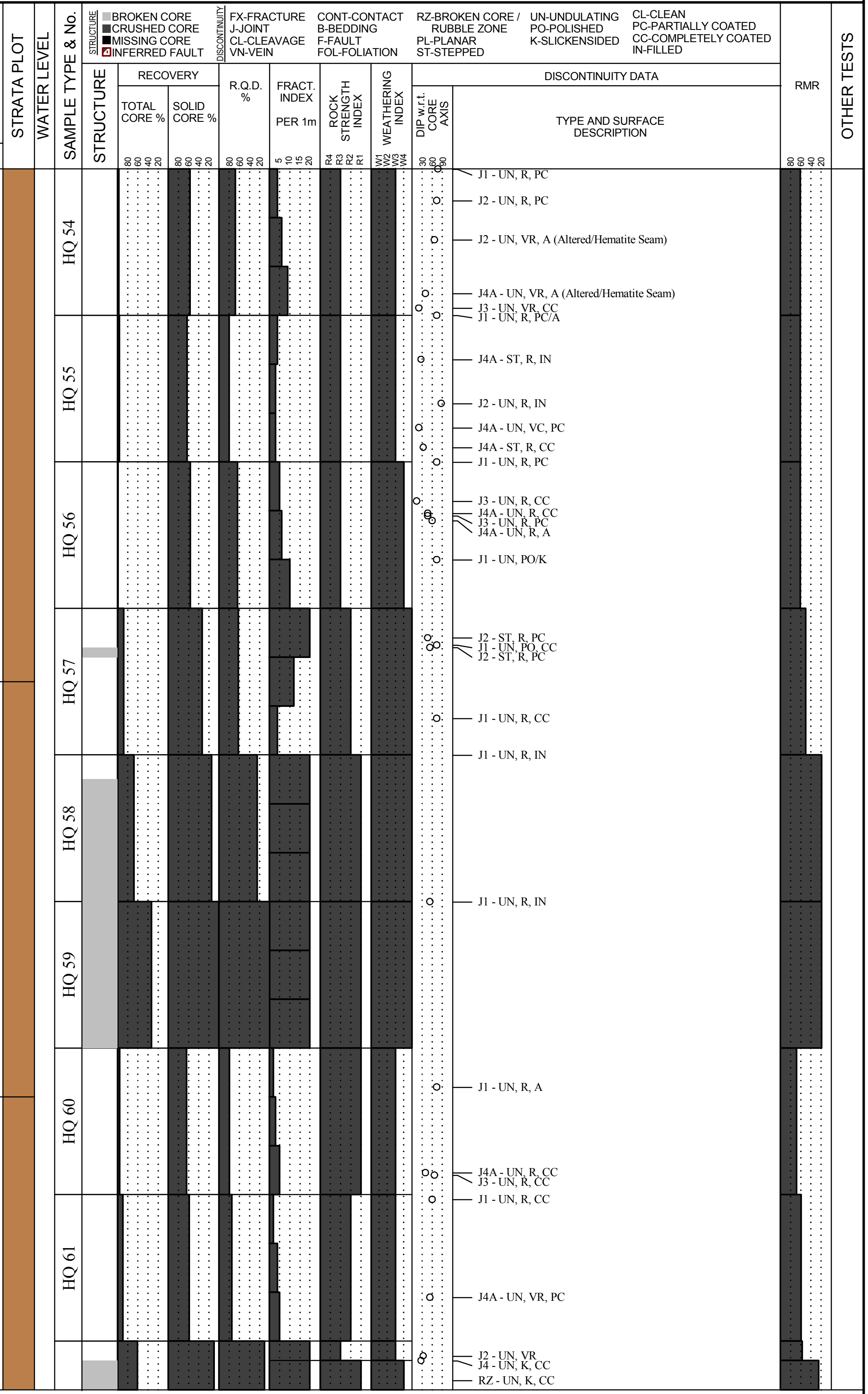
MENIHEK Fm: brown grey, foliated, muscovite-quartz schist [MS_SCH]

- From 187 m to 192.5 m: Intense Clay weathering/alteration

- From 192.5 m to 200.2 m: Weak Clay weathering/alteration

413.3

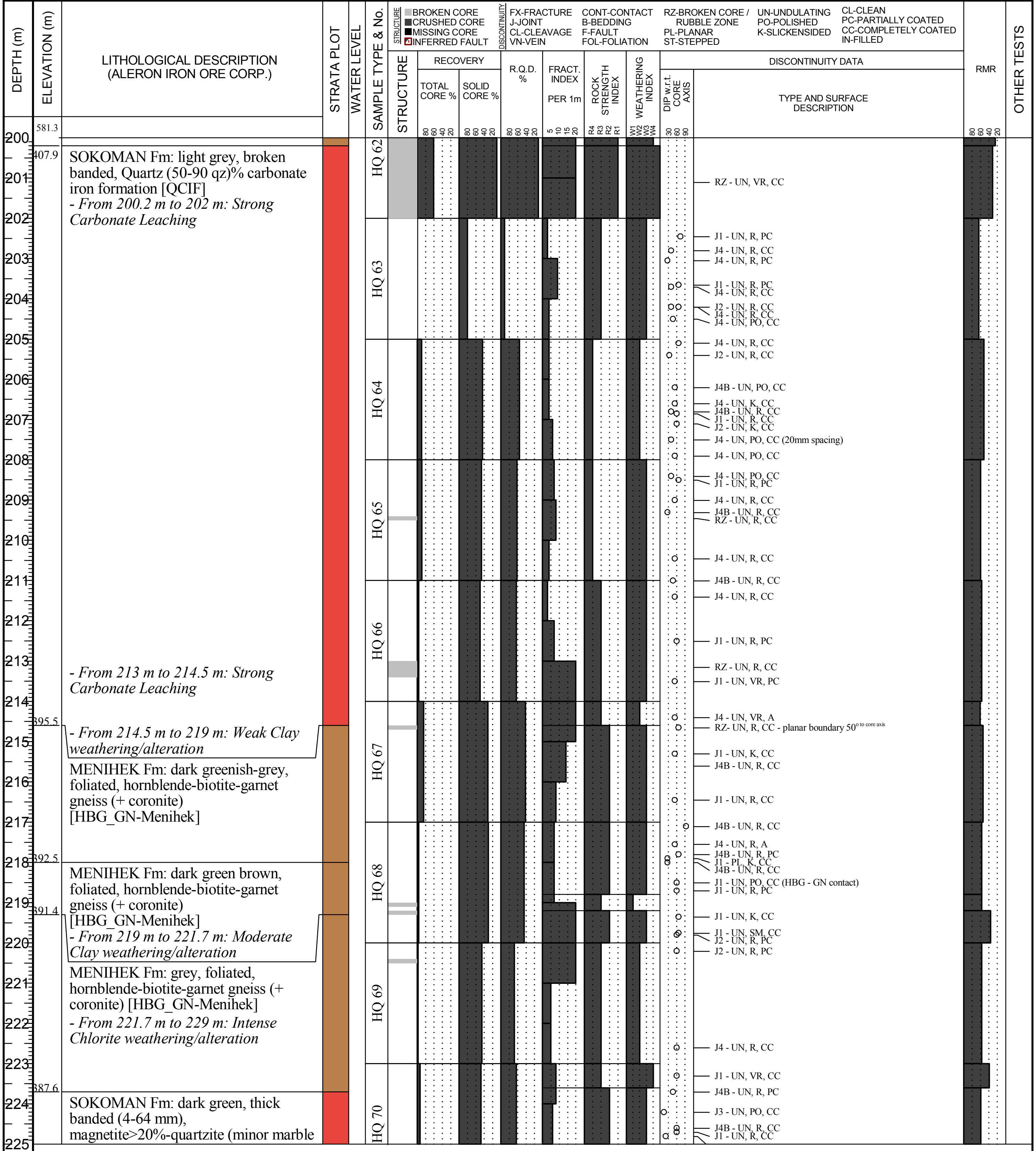
MENIHEK Fm: dark greyish-green, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN-Menihek]



J1 - UN, R, PC
J2 - UN, R, PC
J2 - UN, VR, A (Altered/Hematite Seam)
J4A - UN, VR, A (Altered/Hematite Seam)
J3 - UN, VR, CC
J1 - UN, R, PC/A
J4A - ST, R, IN
J2 - UN, R, IN
J4A - UN, VC, PC
J4A - ST, R, CC
J1 - UN, R, PC
J3 - UN, R, CC
J4A - UN, R, CC
J3 - UN, R, PC
J4A - UN, R, A
J1 - UN, PO/K
J2 - ST, R, PC
J1 - UN, PO, CC
J2 - ST, R, PC
J1 - UN, R, CC
J1 - UN, R, IN
J1 - UN, R, IN
J1 - UN, R, A
J4A - UN, R, CC
J3 - UN, R, CC
J1 - UN, R, CC
J4A - UN, VR, PC
J2 - UN, VR
J4 - UN, K, CC
RZ - UN, K, CC

# BOREHOLE RECORD RBR-12-02

DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/17/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling



SOKOMAN Fm: light grey, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF]
*- From 200.2 m to 202 m: Strong Carbonate Leaching*

*- From 213 m to 214.5 m: Strong Carbonate Leaching*

*- From 214.5 m to 219 m: Weak Clay weathering/alteration*

MENIHEK Fm: dark greenish-grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN-Menihek]

MENIHEK Fm: dark green brown, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN-Menihek]
*- From 219 m to 221.7 m: Moderate Clay weathering/alteration*

MENIHEK Fm: grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN-Menihek]
*- From 221.7 m to 229 m: Intense Chlorite weathering/alteration*

SOKOMAN Fm: dark green, thick banded (4-64 mm), magnetite>20%-quartzite (minor marble

RZ - UN, VR, CC
J1 - UN, R, PC
J4 - UN, R, CC
J4 - UN, R, PC
J1 - UN, R, PC
J4 - UN, R, CC
J2 - UN, R, CC
J4 - UN, R, CC
J4 - UN, PO, CC
J4 - UN, R, CC
J2 - UN, R, CC
J4B - UN, PO, CC
J4 - UN, K, CC
J4B - UN, R, CC
J1 - UN, R, CC
J2 - UN, K, CC
J4 - UN, PO, CC (20mm spacing)
J4 - UN, PO, CC
J4 - UN, PO, CC
J1 - UN, R, PC
J4 - UN, R, CC
J4B - UN, R, CC
RZ - UN, R, CC
J4 - UN, R, CC
J4B - UN, R, CC
J4 - UN, R, CC
J1 - UN, R, PC
RZ - UN, R, CC
J1 - UN, VR, PC
J4 - UN, VR, A
RZ- UN, R, CC - planar boundary 50° to core axis
J1 - UN, K, CC
J4B - UN, R, CC
J1 - UN, R, CC
J4B - UN, R, CC
J4 - UN, R, A
J4B - UN, R, PC
J1 - PL, K, CC
J4B - UN, R, CC
J1 - UN, PO, CC (HBG - GN contact)
J1 - UN, R, PC
J1 - UN, K, CC
J1 - UN, SM, CC
J2 - UN, R, PC
J2 - UN, R, PC
J4 - UN, R, CC
J1 - UN, VR, CC
J4B - UN, R, PC
J3 - UN, PO, CC
J4B - UN, R, CC
J1 - UN, R, CC

**Stantec**

# BOREHOLE RECORD RBR-12-02

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DATUM NAD 27, Zone 19U

CLIENT Alderon Iron Ore Corp.

PROJECT No. 121614000-305

PROJECT Kami Iron Ore Project

DRILLING DATE 3/17/2012

LOCATION Kami Site, Labrador West, NL

ELEVATION: 581.3

DRILL RIG Major 50 (AVD)

INCLINATION: -60

AZIMUTH 270

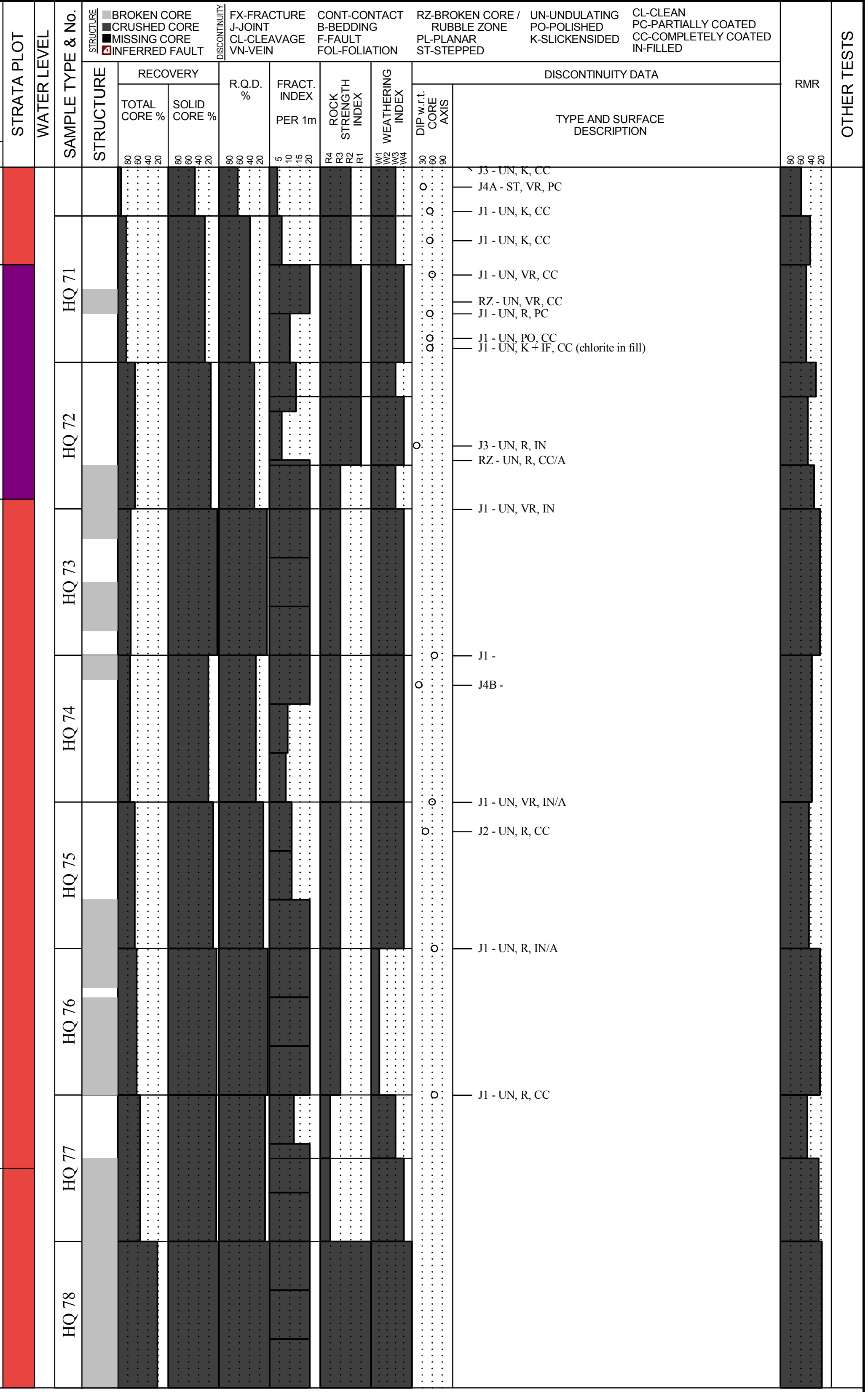
LOCATION: N 5855010.4 E 632131.2

CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE ■ CRUSHED CORE ■ MISSING CORE ◩ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE J-JOINT CL-CLEAVAGE VN-VEIN CONT-CONTACT B-BEDDING F-FAULT FOL-FOLIATION RZ-BROKEN CORE / RUBBLE ZONE PL-PLANAR ST-STEPPED UN-UNDULATING PO-POLISHED K-SLICKENSIDED CL-CLEAN PC-PARTIALLY COATED CC-COMPLETELY COATED IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|---|
| 225 | 581.3 | Ca/Fe-silicates) [MIF] |
| 227 | 384.7 | POST-IRON DYKE/SILL Fm: greenish-grey, foliated, hornblende-biotite-garnet gneiss (+ coronite) [HBG_GN]<br>*- From 229 m to 232 m: Moderate Clay weathering/alteration* |
| 232 | 380.6 | SOKOMAN Fm: dark brown, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF]<br>*- From 232 m to 244 m: Intense Limonite weathering/alteration*<br>*- From 244 m to 245.5 m: Moderate Limonite weathering/alteration* |
| 245.5 | 368.7 | SOKOMAN Fm: light grey, broken banded, quartzite( >90% qz + mica carbonate other) [QZT]<br>*- From 245.5 m to 253 m: Weak Limonite weathering/alteration* |
| 250 | 364.8 | |



DISCONTINUITY DATA — TYPE AND SURFACE DESCRIPTION:

- J3 - UN, K, CC
- J4A - ST, VR, PC
- J1 - UN, K, CC
- J1 - UN, K, CC
- J1 - UN, VR, CC
- RZ - UN, VR, CC
- J1 - UN, R, PC
- J1 - UN, PO, CC
- J1 - UN, K + IF, CC (chlorite in fill)
- J3 - UN, R, IN
- RZ - UN, R, CC/A
- J1 - UN, VR, IN
- J1 -
- J4B -
- J1 - UN, VR, IN/A
- J2 - UN, R, CC
- J1 - UN, R, IN/A
- J1 - UN, R, CC

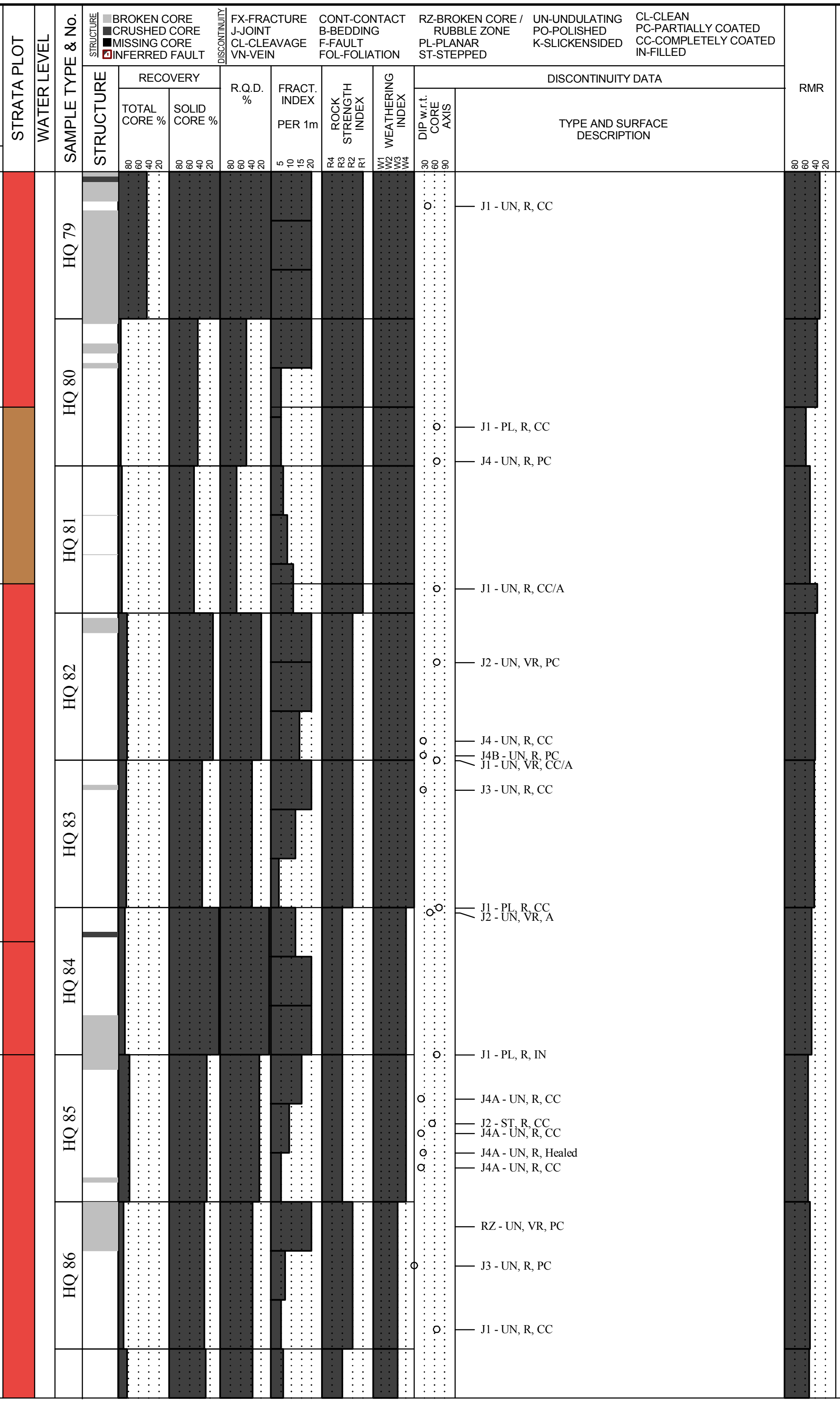
**Stantec**

# BOREHOLE RECORD RBR-12-02

PAGE 11 of 13
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/17/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, ☒ INFERRED FAULT
DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|---|
| 250 | 581.3 | SOKOMAN Fm: brown variable green, broken banded, quartzite( >90% qz + mica carbonate other) [QZT]<br>*- From 253 m to 254.8 m: Strong Clay weathering/alteration* |
| 254.8 | 360.6 | MENIHEK Fm: brown grey, foliated, muscovite-quartz schist [MS_SCH]<br>*- From 254.8 m to 258.4 m: Moderate Clay weathering/alteration* |
| 258.4 | 357.5 | SOKOMAN Fm: brown grey, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF]<br>*- From 258.4 m to 265.8 m: Strong Limonite weathering/alteration* |
| 265.8 | 351.2 | SOKOMAN Fm: dark grey, thick banded (4-64 mm), magnetite(10-20%)-quartzite (minor marble Ca/Fe-silicates) [LMIF]<br>*- From 265.8 m to 272 m: Strong Carbonate Leaching* |
| 268 | 349.2 | SOKOMAN Fm: grey, thick banded (4-64 mm), Quartz (50-90 qz)% carbonate iron formation [QCIF]<br>*- From 272 m to 281 m: Moderate Carbonate Leaching* |



J1 - UN, R, CC
J1 - PL, R, CC
J4 - UN, R, PC
J1 - UN, R, CC/A
J2 - UN, VR, PC
J4 - UN, R, CC
J4B - UN, R, PC
J1 - UN, VR, CC/A
J3 - UN, R, CC
J1 - PL, R, CC
J2 - UN, VR, A
J1 - PL, R, IN
J4A - UN, R, CC
J2 - ST, R, CC
J4A - UN, R, CC
J4A - UN, R, Healed
J4A - UN, R, CC
RZ - UN, VR, PC
J3 - UN, R, PC
J1 - UN, R, CC

**Stantec**

# BOREHOLE RECORD RBR-12-02

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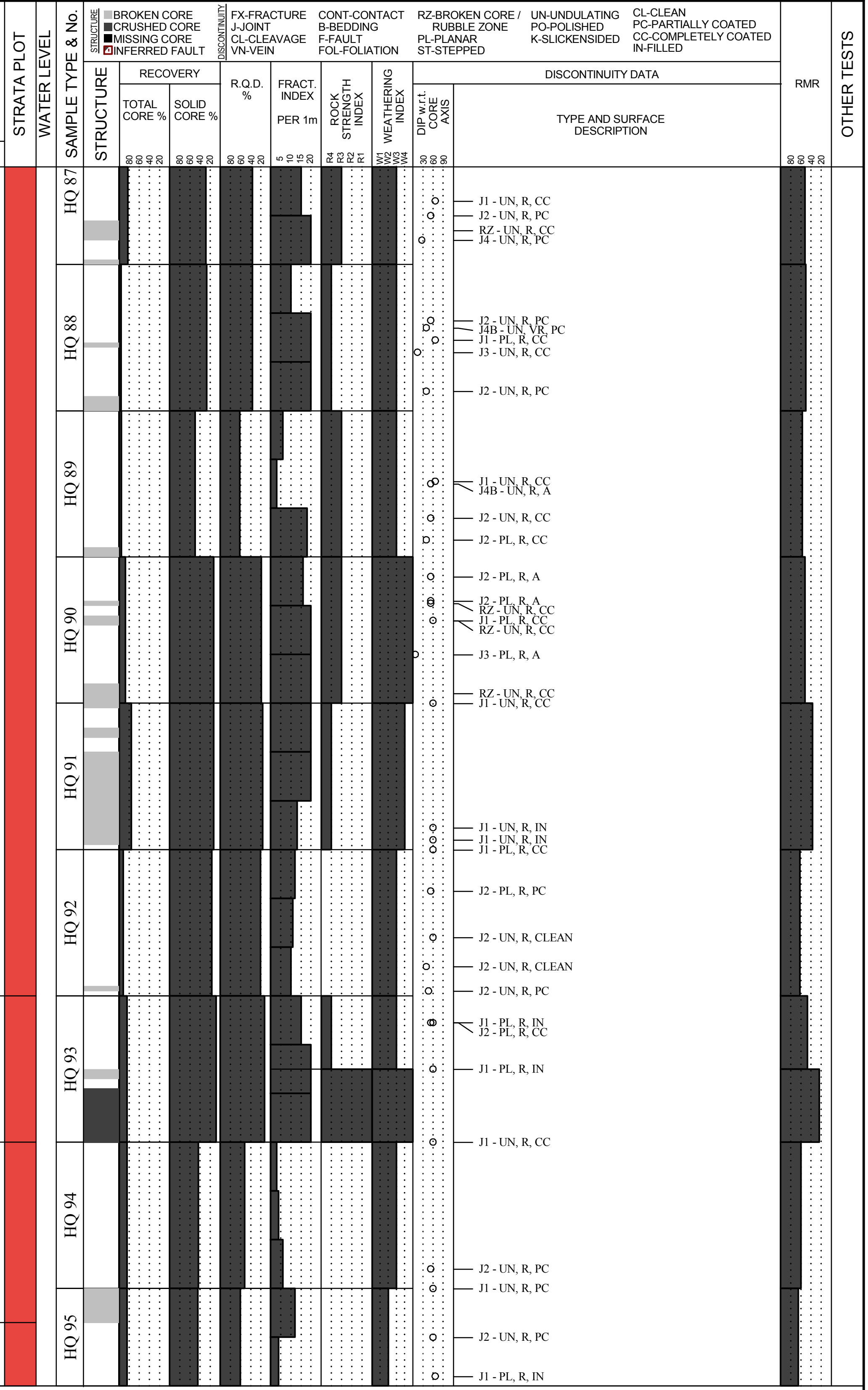
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/17/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE, ■ CRUSHED CORE, ■ MISSING CORE, ☒ INFERRED FAULT
DISCONTINUITY: FX-FRACTURE, J-JOINT, CL-CLEAVAGE, VN-VEIN, CONT-CONTACT, B-BEDDING, F-FAULT, FOL-FOLIATION, RZ-BROKEN CORE / RUBBLE ZONE, PL-PLANAR, ST-STEPPED, UN-UNDULATING, PO-POLISHED, K-SLICKENSIDED, CL-CLEAN, PC-PARTIALLY COATED, CC-COMPLETELY COATED, IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) |
|---|---|---|
| 275 | 581.3 | |
| 281 | | *- From 281 m to 293.5 m: Moderate Carbonate Leaching* |
| 292 | 328.4 | SOKOMAN Fm: brown grey, thick banded (4-64 mm), quartzite( >90% qz + mica carbonate other) [QZT]<br>*- From 293.5 m to 295 m: Strong Carbonate Leaching* |
| 295 | 325.8 | SOKOMAN Fm: light grey, broken banded, Quartz (50-90 qz)% carbonate iron formation [QCIF]<br>*- From 295 m to 299 m: Weak Carbonate Leaching* |
| 298.7 | 322.6 | SOKOMAN Fm: greenish-grey, thick banded (4-64 mm), Quartz (50-90% qz) + Ca-Fe silicates + minor Fe oxides |
| 300 | 321.5 | |



J1 - UN, R, CC
J2 - UN, R, PC
RZ - UN, R, CC
J4 - UN, R, PC
J2 - UN, R, PC
J4B - UN, VR, PC
J1 - PL, R, CC
J3 - UN, R, CC
J2 - UN, R, PC
J1 - UN, R, CC
J4B - UN, R, A
J2 - UN, R, CC
J2 - PL, R, CC
J2 - PL, R, A
J2 - PL, R, A
RZ - UN, R, CC
J1 - PL, R, CC
RZ - UN, R, CC
J3 - PL, R, A
RZ - UN, R, CC
J1 - UN, R, CC
J1 - UN, R, IN
J1 - UN, R, IN
J1 - PL, R, CC
J2 - PL, R, PC
J2 - UN, R, CLEAN
J2 - UN, R, CLEAN
J2 - UN, R, PC
J1 - PL, R, IN
J2 - PL, R, CC
J1 - PL, R, IN
J1 - UN, R, CC
J2 - UN, R, PC
J1 - UN, R, PC
J2 - UN, R, PC
J1 - PL, R, IN

**Stantec**

# BOREHOLE RECORD RBR-12-02

PAGE 13 of 13
DATUM NAD 27, Zone 19U
CLIENT Alderon Iron Ore Corp.
PROJECT No. 121614000-305
PROJECT Kami Iron Ore Project
DRILLING DATE 3/17/2012
LOCATION Kami Site, Labrador West, NL
ELEVATION: 581.3
DRILL RIG Major 50 (AVD)
INCLINATION: -60
AZIMUTH 270
LOCATION: N 5855010.4 E 632131.2
CONTRACTOR Major Drilling

STRUCTURE: ▨ BROKEN CORE ■ CRUSHED CORE ■ MISSING CORE ☒ INFERRED FAULT

DISCONTINUITY: FX-FRACTURE J-JOINT CL-CLEAVAGE VN-VEIN CONT-CONTACT B-BEDDING F-FAULT FOL-FOLIATION RZ-BROKEN CORE / RUBBLE ZONE PL-PLANAR ST-STEPPED UN-UNDULATING PO-POLISHED K-SLICKENSIDED CL-CLEAN PC-PARTIALLY COATED CC-COMPLETELY COATED IN-FILLED

| DEPTH (m) | ELEVATION (m) | LITHOLOGICAL DESCRIPTION (ALERON IRON ORE CORP.) | STRATA PLOT | WATER LEVEL | SAMPLE TYPE & No. | STRUCTURE | RECOVERY TOTAL CORE % (80 60 40 20) | RECOVERY SOLID CORE % (80 60 40 20) | R.Q.D. % (80 60 40 20) | FRACT. INDEX PER 1m (5 10 15 20) | ROCK STRENGTH INDEX (R4 R3 R2 R1) | WEATHERING INDEX (W1 W2 W3 W4) | DISCONTINUITY DATA DIP w.r.t. CORE AXIS (30 60 90) | DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION | RMR (80 60 40 20) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 300 | 581.3 | [QSIF]<br>*- From 299 m to 300 m: Weak Chlorite weathering/alteration* | | | | | | | | | | | | | | |
| 301 | | End of Borehole<br>- Borehole terminated at target depth of 300 m along borehole.<br>- Flowing artesian conditions encountered in overburden and bedrock. | | | | | | | | | | | | | | |
| 302 | | | | | | | | | | | | | | | | |
| 303 | | | | | | | | | | | | | | | | |
| 304 | | | | | | | | | | | | | | | | |
| 305 | | | | | | | | | | | | | | | | |
| 306 | | | | | | | | | | | | | | | | |
| 307 | | | | | | | | | | | | | | | | |
| 308 | | | | | | | | | | | | | | | | |
| 309 | | | | | | | | | | | | | | | | |
| 310 | | | | | | | | | | | | | | | | |
| 311 | | | | | | | | | | | | | | | | |
| 312 | | | | | | | | | | | | | | | | |
| 313 | | | | | | | | | | | | | | | | |
| 314 | | | | | | | | | | | | | | | | |
| 315 | | | | | | | | | | | | | | | | |
| 316 | | | | | | | | | | | | | | | | |
| 317 | | | | | | | | | | | | | | | | |
| 318 | | | | | | | | | | | | | | | | |
| 319 | | | | | | | | | | | | | | | | |
| 320 | | | | | | | | | | | | | | | | |
| 321 | | | | | | | | | | | | | | | | |
| 322 | | | | | | | | | | | | | | | | |
| 323 | | | | | | | | | | | | | | | | |
| 324 | | | | | | | | | | | | | | | | |
| 325 | | | | | | | | | | | | | | | | |

# Appendix I. RBR-12-01 & RBR-12-02 Packer Results

# Appendix I : Summary of Borehole Packer Permeability Tests, RBR-12-01 RBR-12-02
## Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property
## Hydrogeology and Water Management

| RBR-12-01 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Top interval depth along borehole (m) | Bottom interval depth along borehole (m) | Mid Interval depth along borehole (m) | Mid vertical interval depth (m) | Mid vertical interval depth in the bedrock (m) | K (m/s) | Geometric Mean K (m/s) | Min. K (m/s) | Max. K (m/s) |
| 48 | 62 | 55 | 48 | 9 | 1.1E-06 | 1.5E-06 | 1.3E-07 | 5.3E-06 |
| 62 | 74 | 68 | 59 | 20 | 2.4E-06 | | | |
| 74 | 86 | 80 | 69 | 30 | 3.1E-06 | | | |
| 87 | 98 | 93 | 80 | 41 | 1.9E-06 | | | |
| 96 | 110 | 103 | 89 | 50 | 2.3E-06 | | | |
| 110 | 122 | 116 | 100 | 61 | 5.3E-06 | | | |
| 120 | 134 | 127 | 110 | 71 | 6.6E-07 | | | |
| 132 | 146 | 139 | 121 | 81 | 6.2E-07 | | | |
| 146 | 158 | 152 | 132 | 92 | na | | | |
| 158 | 170 | 164 | 142 | 103 | na | | | |
| 168 | 182 | 175 | 152 | 112 | 5.3E-06 | | | |
| 181 | 194 | 188 | 163 | 123 | 4.9E-06 | | | |
| 192 | 206 | 199 | 172 | 133 | 1.3E-07 | | | |
| 204 | 218 | 211 | 183 | 144 | 3.6E-07 | | | |
| RBR-12-02 | | | | | | | | |
| 23 | 32 | 28 | 24 | 10 | 9.4E-07 | 1.5E-06 | 8.6E-08 | 8.0E-06 |
| 29 | 43 | 36 | 31 | 17 | 2.3E-06 | | | |
| 41 | 55 | 48 | 42 | 28 | 6.4E-07 | | | |
| 55 | 67 | 61 | 53 | 39 | 9.0E-07 | | | |
| 65 | 79 | 72 | 62 | 49 | 2.7E-06 | | | |
| 77 | 91 | 84 | 73 | 59 | 9.5E-07 | | | |
| 89 | 103 | 96 | 83 | 69 | 1.3E-06 | | | |
| 101 | 115 | 108 | 94 | 80 | 2.0E-06 | | | |
| 113 | 127 | 120 | 104 | 90 | 3.2E-06 | | | |
| 125 | 139 | 132 | 114 | 101 | 4.4E-06 | | | |
| 137 | 151 | 144 | 125 | 111 | 7.3E-06 | | | |
| 149 | 163 | 156 | 135 | 121 | 2.9E-06 | | | |
| 161 | 175 | 168 | 146 | 132 | 6.0E-06 | | | |
| 173 | 187 | 180 | 156 | 142 | 8.6E-08 | | | |
| 185 | 199 | 192 | 166 | 153 | 1.8E-07 | | | |
| 197 | 211 | 204 | 177 | 163 | 1.1E-06 | | | |
| 209 | 223 | 216 | 187 | 173 | 8.0E-06 | | | |
| 221 | 235 | 228 | 198 | 184 | 3.0E-06 | | | |
| 233 | 247 | 240 | 208 | 194 | 1.3E-06 | | | |
| 254 | 262 | 258 | 224 | 210 | 4.6E-06 | | | |
| 260 | 274 | 267 | 231 | 217 | 6.2E-07 | | | |
| 272 | 286 | 279 | 242 | 228 | 2.2E-06 | | | |
| 284 | 300 | 292 | 253 | 239 | 3.0E-07 | | | |

Outside range of Packer injection Method; K exceeds about 1x10-5 m/s

RBR-12-01 and RBR-12-2 are located in more fractured bedrock area / fault zone

| | X NAD27 Zone 19 UTM | Y NAD27 Zone 19 UTM | ground elevation (m asl) | elevation - bedrock | OB thickness | bottom elevation | Dip | Azimuth |
|---|---|---|---|---|---|---|---|---|
| RBR-12-01 | 632774 | 5855885 | 573 | 534 | 39 | 379 | -60 | 270 |
| RBR-12-02 | 632131 | 5855010 | 581 | 567 | 14 | 322 | -60 | 270 |

# Appendix J. Simulated and Measured Hydraulic Heads

## Appendix J : Hydraulic head elevation (Observed vs Simulated)
## Pre-Feasibility Study of the Kamistiatusset (Kami) Iron Ore Property
## Hydrogeology and Water Management

| ID | Observed hydraulic heads (m) | Simulated hydraulic heads (m) | hobs - hsim (m) |
|---|---|---|---|
| **ROB-11-01A** | 571.00 | 575.48 | 4 |
| **ROB-11-01B** | 571.00 | 575.32 | 4 |
| **ROB-11-02** | 568.60 | 573.66 | 5 |
| **ROB-11-03** | 576.73 | 578.53 | 2 |
| **ROB-11-04** | 594.98 | 594.46 | 1 |
| **ROB-11-05A** | 625.56 | 619.38 | 6 |
| **ROB-11-05B** | 627.40 | 620.17 | 7 |
| **ROB-11-06** | 643.91 | 642.27 | 2 |
| **ROB-11-07** | 596.92 | 584.38 | 13 |
| **ROB-11-08A** | 580.65 | 585.07 | 4 |
| **ROB-11-08B** | 578.83 | 585.07 | 6 |
| **ROB-11-09** | 590.60 | 592.14 | 2 |
| **ROB-11-10** | 610.35 | 609.09 | 1 |
| **ROB-11-11** | 613.55 | 613.43 | 0 |
| **ROB-11-12** | 628.36 | 630.98 | 3 |
| **ROB-11-13A** | 628.11 | 631.15 | 3 |
| **ROB-11-13B** | 627.83 | 631.86 | 4 |
| **ROB-11-14** | 605.97 | 605.50 | 0 |
| **ROB-11-16** | 571.05 | 572.64 | 2 |
| **ROB-11-17** | 580.13 | 581.74 | 2 |
| **ROB-11-18** | 574.30 | 582.94 | 9 |
| **K-08-10** | 627.60 | 614.15 | 13 |
| **K-08-18** | 583.17 | 595.45 | 12 |
| **K-11-106** | 576.72 | 593.28 | 17 |
| **K-11-108** | 583.87 | 585.92 | 2 |
| **K-11-113** | 583.05 | 591.06 | 8 |
| **K-11-145** | 625.32 | 611.88 | 13 |
| **K-11-147** | 628.10 | 616.30 | 12 |
| **K-11-163** | 578.20 | 577.58 | 1 |

| | |
|---|---|
| **h obs max (m)** | 644 |
| **h obs min (m)** | 569 |
| **Mean absolute error MAE (m)** | 5.4 |

**AtkinsRéalis**
Minerals and Metals