

**2019 Annual Report — Project 2a (Goodwood)
Québec**



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1 Permits and Authorization

1.1 Project 2a

Project 2a was subject to the impact assessment process; a project authorization was delivered in 2013 and modified in 2017.

In spring 2017, Tata Steel Minerals Canada (TSMC) obtained an authorization certificate for a period of 1 year, with the condition that no effluent was to be produced from the project. In February 2018, a request for a certificate was submitted for long-term operations in the Goodwood pit. Approval was granted in April 2018.

In August 2019, TSMC filed a request for modification to the existing infrastructure with the MELCC. This request presents the repair work required to the Goodwood accumulation basin. Since this is maintenance work on existing infrastructure, the certificate of authorization does not have to be modified.

1.2 Sterile Extraction from Flemming 7 Pit

For safety reasons, a volume of waste rock located in Quebec will have to be extracted once mining of the Flemming 7 orebody (located in NL) resumes. TSMC has a certificate of authorization (no. 92031100000) for this activity and there is no change since the previous year.

2 Operation

2.1 Sterile Extraction from Flemming 7 Pit

Since 2015, operations at the Flemming 7 pit have ceased and the waste rock located in Quebec has still not been extracted.

2.2 Project 2a

TSMC has decided to delay the start of the Sunny project; however, the environmental monitoring activities are ongoing.

There is no ore storage in the province of Quebec. All the ore is transported by haul truck to the DSO3 site (Newfoundland and Labrador) for crushing, screening and shipment. The ore is then transported by train in the form of a concentrate to the port of Sept-Îles for maritime transshipment.

Construction of the Water Treatment Plant was completed in fall 2019. In addition, WSP began drafting repair plans for the Goodwood basin for TSMC's review. These repairs are scheduled for the operational season of 2020.

2.3 Blasting Summary

Table 1 presents the blasts conducted in Quebec in 2019. Blast reports as presented by InstanTel are presented in Appendix II-A. Data are collected using a microphone (UM12242 V 10-87 Micromate ISEE).

Table 1. Summary of blasting done in Québec in 2019

Report Event	Date	Time	Pressure dB (L)	Vibration peak (mm/s)
GD-753-15	2019-05-30	12:03	135.6	0.808
GD-753-16	2019-06-03	12:00	116.9	0.898
GD-753-17	2019-06-15	12:00	126.4	0.74
GD-763-01	2019-07-10	6:30	133.8	0.776
GD-763-02	2019-07-19	12:05	121.63	1.323
GD-753-19/20	2019-07-21	15:00	88.93	12.65
GD-743-18A	2019-07-26	17:15	132.96	0.322
GD-763-03A	2019-08-07	17:47	113.328	0.36
GD-763-03B	2019-08-10	12:24	116.902	0.372
GD-743-15	2019-08-14	12:15	122.4	1.752
GD-763-04	2019-08-21	13:30	118.2	0.373
GD-743-16	2019-09-22	12:00	120.252	2.377
GD-743-18B	2019-09-23	12:00	120.945	0.232
GD-743-17B	2019-09-25	12:15	113.4	0.251
GD-738-01	2019-09-27	13:30	N/A	N/A
GD-738-02	2019-09-29	11:25	132.6	0.41
GD-753-15	2019-05-30	12:03	135.6	0.808
GD-753-16	2019-06-03	12:00	116.9	0.898
GD-753-17	2019-06-15	12:00	126.4	0.74
GD-763-01	2019-07-10	6:30	133.8	0.776

3 Incidents

3.1 2019 Incidents

During the snowmelt, water exfiltration was observed from the basin. Same as last year, it is groundwater accumulated in the unconfined portion of the basin.

Water quality monitoring was done during the event. A sample was taken at the SP-OUT station on May 19 to monitor the environmental impact of the spill. Table 2 presents the results of the exfiltration water analysis. No threshold was exceeded. For three parameters, the detection limit is higher than the quality criterion for the protection of aquatic life (chronic effect), which does not allow to interpret if there is contamination.

The certificates of analysis are presented in Appendix II-B.

No other incidents occurred in 2019 at the Goodwood basin.

Table 2. Results of the water exfiltration analysis, May 19, 2019

Parameters	Unit	Result
Aluminum	ug/L	56
Antimony	ug/L	<1
Arsenic	ug/L	<0.3
Barium	ug/L	<2
Boron	ug/L	<40
Cadmium	ug/L	<0.2
Chromium	ug/L	<1
Cobalt	ug/L	<0.5
Copper	ug/L	<1
Lead	ug/L	<0.5
Manganese	ug/L	38
Mercury	ug/L	<0.01
Molybdenum	ug/L	<1
Nickel	ug/L	<1
Selenium	ug/L	<1
Silver	ug/L	<0.2
Sodium	ug/L	336
Zinc	ug/L	<3
Ammoniacal Nitrogen	mg/L - N	0.09
Total Kjeldahl Nitrogen	mg/L - N	<0.3
Total Suspended Solids (TSS)	mg/L	2
pH	pH	6.87

Orange. Exceeding the CALG (chronic aquatic life guideline, MELCC (2019)); **Red.** Exceeding the AALG (acute aquatic life guideline, MELCC (2019)) or acute toxicity; **Unknown.** The reported limit of detection does not allow a ruling on the level on toxicity of the contaminant (LOD > CALG);

Note that the laboratory did not analyze the hardness of the water with the analysis of metals. For the evaluation of the criteria, the lowest hardness value was used (10 mg/L), which is representative of the values of the region.

3.1.1 Management of Spring Thaw

In the fall of 2018, a 'winterization plan' was developed in order to prevent red water from the spring 2019 thaw from being discharged into the natural environment. The plan is presented in Appendix III and consisted of the construction of three additional ditches around the basin and one temporary dyke, and a system of pumps to divert water away from the area, and out of the natural environment. The implementation of the winterization plan and the meltwater management plan made it possible to avoid the runoff of red water out of the basin.

The plan is described below:

- Snow management before snow melt, including clearing snow from the ditches in order to allow for proper water circulation;
- Pumping system between the Goodwood basin and the Kivivik 1C pit;
- Water level management in the temporary section of the basin;

- Pumping system at the location of the exfiltration downstream of the basin, in case of spill.

Plans of the preventive measures is presented in Appendix III.

3.1.2 Monitoring in spring 2020

Visual monitoring will be conducted in order to ensure that no exfiltration occurs during snow melt. The winterization plan and the meltwater management plan will also be implemented for the thaw in spring 2020.

3.2 Community Complaints

It should be noted that a National Emergency was reported from an anonymous (to TSMC) source about a 'red lake' in the Goodwood area in spring 2019, this was later confirmed to be the Goodwood pit, where TSMC was storing water in order to prevent its discharge into the natural environment.

4 Surface Water Quality Monitoring

TSMC monitors surface water quality since 2015. The location of the water quality monitoring stations is presented in figure 1 of appendix I. Two stations are monitored: EE-GW, which corresponds to the station that is located at the outlet of Fra Lake; ER-GW, the reference station, which is located at the outlet of Migration Lake.

The monitoring plan includes sampling at the 2 stations 4 times annually for the following parameters:

- **Conventional:** alkalinity; DOC, TOC, conductivity, chloride, BOD₅, DOC, hardness, TSS, pH
- **Ions and nutrients:** ammonium nitrate, TKN, cyanide, fluoride, nitrates, nitrites, reactive silica, hydrogen sulfur, sulfates
- **Hydrocarbons:** C₁₀-C₅₀
- **Metals and metalloids:** Al, Sb, Ag, As, Ba, Bo, Cd, Cr, Co, Cu, Sn, Fe, Mn, Mo, Ni, PT, Pb, Se, Th, U, V, Zn, Ca, Cr (VI), Hg, K, Mg, Ra₂₂₆, Na, T

And once annually for the following parameters:

- **Trace metals:** Al, Sb, Ag, As, Ba, Bo, Cd, Cr, Co, Cu, Sn, Fe, Mn, Mo, Ni, PT, Pb, Se, Th, U, V, Zn

4.1 Sampling Schedule

Certificates of analysis for 2019 results are presented in Appendix II-C.

Two types of sampling were conducted in the natural environment (EE and ER): annual sampling of trace metals and a monthly sampling during the ice-free period of conventional parameters, ions, nutrients, hydrocarbons, metals and metalloids

The two stations and all the parameters were sampled on the same dates in 2019:

- June 14
- July 23
- August 21
- September 20

The annual sampling of trace metals was done on August 21.

4.1.1 2019 Sampling Results

In 2019, two of the parameters analyzed at Fra Lake (EE-GW) exceeded the criteria for chronic aquatic life, pH and total phosphorus. The pH was considered too acidic during the inventories from July to September. In comparison, Migration Lake (ER-GW) did not exceed the aquatic life criterion until July. As for total phosphorus, it was not measured during the June inventories. Subsequent sampling from Fra Lake demonstrated that the level of phosphorus exceeded the criteria for chronic aquatic life in July and September. Conversely, no exceedance of total phosphorus was observed at Migration Lake.

It was not possible to determine if the amount of silver exceeded the aquatic life criterion since its detection level was higher than the exceedance criterion (Table 3). On the other hand, since the reference station shows a similar concentration, it could be due to the regional natural concentration of silver and not an exceeding of the criterion due to the activities of the mine.

No other parameter analyzed exceeded the criteria for aquatic life.

Table 3. MELCC Criteria exceedance for aquatic life – 2019 annual monitoring

Date	pH	Total - P (mg/L)	Ag (mg/L)
EE-GW			
2019/06/14			<0.0002
2019/07/23	5.77	0.08	<0.0002
2019/08/21	6.40		<0.0002
2019/09/20	5.89	0.147	<0.0002
ER-GW			
2019/07/23	5.52		<0.0002
2019/08/21			<0.0002
2019/09/20			<0.0002

Orange. Exceeding the CALG (chronic aquatic life guideline, MELCC (2019)); **Red.** Exceeding the AALG (acute aquatic life guideline, MELCC (2019)) or acute toxicity; **Unknown.** The reported limit of detection does not allow a ruling on the level on toxicity of the contaminant (LOD > CALG); NA. Parameter not analyzed

4.2 Surface Water Quality Monitoring Update

There is no update planned for this program.

5 Sediment Quality Monitoring

The monitoring of the sediments quality and the benthos community was carried out in 2019. The sampling stations are presented in Figure I-3.

5.1 Sediment Quality

Sediment monitoring will be conducted once every 5 years at the same stations as for water quality, and for the following parameters:

- Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)
- Phosphorous
- Petroleum hydrocarbons C₁₀-C₅₀
- Total organic carbon
- Sulfur

A visual description of the samples (cohesion, colour, smell) and a grain size analysis (laboratory) was conducted for each sample.

5.1.1 2019 sampling

Due to logistical constraints making boat transport complex on Fra and Migration Lakes, winter sampling was done to monitor sediment quality. The sediment sampling took place on April 6, 2019. This sampling was chosen to depict the environmental conditions for the year 2019. The sampling took place at two points, in the center of Fra Lake (SEE-GW) and in the southeast bay of Migration Lake (SER-GW).

Table 4 provides a description of the sediment samples collected.

Table 4. Description of sediment samples

Sample	Ice (m)	Water (m)	Description
SEE-GW	0.85	3.2	<ul style="list-style-type: none"> ▪ Red-brown ▪ Fine clay silt with organic layer on the surface ▪ Red plume visible during the ascent of the ponar bucket
SER-GW	0.85	1.8	<ul style="list-style-type: none"> ▪ Dark brown ▪ Fine clay silt with a thin organic layer on the surface ▪ No visible plume during the ascent of the ponar bucket

Table 5 presents the samples with exceedance of the regulatory limit values of the Land Protection and Rehabilitation Regulation (LPRR; Beaulieu, 2019). None of the other parameters analyzed were exceeding the regulatory limit values. Certificates of analysis are presented in Appendix II-D.

The only contaminant that has exceeded the limit values is sulfur. It exceeded criterion A in Fra Lake (EE-GW) and criterion B in the reference lake, Migration Lake (ER-GW), with values of 0.12 and 0.20 %g/g respectively. This exceedance can be attributed to environmental factors rather than contamination, especially since the value is higher for the reference site. The presence of bogs at the edge of the lakes could explain this high value.

Table 5 . Exceedance of the regulatory limit values of the Regulation on the protection and rehabilitation of land for the 2019 monitoring

Date	S (%g/g)
SEE-GW	
2019/04/06	0.12
SER-GW	
2019/04/06	0.20

Yellow. Exceeding criterion A (background contents for inorganic parameters and limits of quantification for organic parameters); **Orange.** Exceeding criterion B (regulatory limit values in Annex I to the LPRR); **Red.** Exceeding criterion C (regulatory limit values in Annex II to the LPRR)

5.2 Benthic Community

The sediment monitoring program also includes annual sampling for benthic communities monitoring. The sampling stations are in permanent streams, as close as possible to the sediment sampling stations. Sampling is to be done in August. The descriptors are:

- Total invertebrates' density
- Richness (Number of taxa)
- Simpson diversity index
- Evenness (Pielou's index)
- Density of each taxon
- Relative taxa abundance
- Absence/presence of taxa
- Bray-Curtis coefficient

5.2.1 2019 sampling

The benthic community was monitored on July 31, 2019.

The report on benthic community analysis is presented in Appendix IV.

5.3 Sediment Quality Monitoring Program Update

The next sediment sampling will be carried out in 2024. The same two stations will be sampled in winter, while the lakes are frozen.

Benthic communities will be monitored in the summer of 2020.

6 Mining Effluents Monitoring

From May to December 2017, TSMC completed construction of the water management infrastructure; this includes clean water derivation ditches, runoff collection ditches and an accumulation pond. For the purpose of quality control, TSMC mandated WSP to conduct construction surveillance.

In 2017, TSMC mandated BluMetric to design and build the Goodwood effluent treatment plant. The construction of the treatment plant was completed in fall 2019, with commissioning planned for spring 2020. Three to four weeks will be necessary in spring 2020 to start the treatment plant.

6.1 Metal and Diamond Mining Effluent Regulations Monitoring

Since the treatment plant will only be operational in 2020, there was no effluent monitoring done in 2019. The planned monitoring program is nonetheless described in the following sections.

6.1.1 Effluent Components

Table 6 shows sampling frequency and the parameters used for effluent monitoring. The monitoring program will be implemented as soon as the plant is operational.

Table 6. Effluent Monitoring Parameters

Continuous	Weekly	Monthly	Quarterly
Conductivity, pH	TSS, As, Cu, Fe, Ni, Pb and Zn, pH	Acute Toxicity (<i>O. mykiss</i> and <i>D. magna</i>)	Alkalinity, hardness, Al, Cd, Fe, Hg, Mo, NH ₃ , NO ₃ , dissolved oxygen, temperature

6.1.1.1 Acute Lethality Test

Two monthly trials on six effluent concentrations are planned: 0%, 6.25%, 12.5%, 25%, 50% and 100%.

- *Daphnia magna*, based on the SPE 1/RM/14 method
- *Oncorhynchus mykiss*, based on the SPE 1/RM/13 method

If the mining effluent results indicate a toxic lethality, a physico-analysis sample will be taken immediately. The toxic lethality tests will continue to be conducted twice monthly. If three consecutive samples are not lethally toxic, the monthly sampling frequency will resume (Section 15 of MDMMER).

6.1.2 Environmental Effect Monitoring

The Goodwood project will be subjected to environmental effects monitoring studies (EEM) once the effluent volume output reaches 50 m³/day. There was no effluent output in 2018.

Once the process is implemented, monitoring will comply with the requirements outlined in Schedule 5 of the MDMER. Results will be communicated in the annual report. The following sections presents studies to be conducted.

6.1.2.1 Effluent Monitoring

Effluent characterization will be conducted four times annually, with a minimum of one-month interval between sampling dates. The parameters that will be measured are:

- **Conventional:** hardness, alkalinity, conductivity and temperature
- **Metals:** Al, Cd, Fe, Mo, Se, NH₄, NO₃ et Hg

6.1.2.2 Sublethal Toxicity Test

Sublethal toxicity trials will be conducted on a species of fish, invertebrate, plant and algae, when the effluent is discharged into freshwater, which is the case for project 2a. These trials will be conducted twice per year during the first three years that the project is subject to EEM, and then once annually if the effluent is non-toxic during 6 consecutive trials. The trials will be:

- **Fish:** test of Larval Growth and survival using *Pimephales promelas* (Rapport SPE 1/RM/22) or at the initial stages of the biological cycle of *Oncorhynchus mykiss* (Rapport SPE 1/RM/28).
- **Invertebrate:** test of reproduction and survival on the cladocera *Ceriodaphnia dubia* (Rapport SPE 1/RM/21)
- **Plant:** test for measuring the inhibition of growth using the freshwater macrophyte *Lemna minor* (Rapport SPE 1/RM/37)
- **Algae:** test for measuring the inhibition of growth of the algae *Selenastrum capricornutum* (Rapport SPE 1/RM/25)

6.1.3 Biological Monitoring

Pursuant to article 9, part 2 of the EEM (Appendix 5 of the MDMMER), a study on the fish population will be conducted if the effluent concentration in the exposed zone is superior to 1% at less than 250m downstream of the final discharge point. It has been therefore required to measure effluent concentration 250m downstream of the final discharge point since 2013. In addition, a study on fish tissue will be conducted if a mercury concentration equal or more than 0.10 µg/L is noted during the characterization.

6.2 Monitoring according to Directive 019

Monitoring of the final effluent is required under the *Directive 019 sur l'industrie minière* (MDDEP, 2012), and the requirements are described in section 2.1.1.1.1 of Directive 019, by virtue of article 22 of the *Loi sur la qualité de l'environnement* (LQE), and according to the *Objectifs environnementaux de rejet* (OER) which were calculated by the MELCC specifically for the project 2a. Once the project is subject to the EEM process, TSMC will be subject to two types of monitoring, one regular and one annual.

Regular monitoring of the mining effluent includes continuous automated pH and flow rate measurements, along with sampling and analysis of certain parameters according to the frequencies indicated in Table 7. These frequencies must be maintained until the final cessation of mining activities.

Table 7. Directive 019 Monitoring

Continuous	3 / week	Weekly	Monthly	Annually
pH, flow rate	TSS	As, Cu, Fe, Ni, Pb, Zn	Acute toxicity (<i>O. mykiss</i> and <i>D. magna</i>)	Alcalinity, Cl ⁻ , conductivity, BOD ₅ , COD, flow rate, hardness, F ⁻ , C ₁₀ -C ₅₀ , dissolved solids, total solids, phenolic substances, SO ₄ ²⁻ , turbidity, NH ₃ , TKN, NO ₂ , NO ₃ , TP, Al, Cd, Ca, Cr, Co, Mg, Mn, Hg, Mo, K, Si, Na, S ²⁻ , S ₂ O ₃ ²⁻

The annual monitoring is conducted once a year, during the summer period. It includes the analysis and measurement of several parameters (Table 7). Sampling and yearly monitoring methods should be conducted on the same day and are completed in addition to the regular weekly monitoring for that week.

In order to evaluate the global toxicity of the mining effluents according to Directive 019, this monitoring also includes lethal toxicity tests, which are developed by the MDDEFP, including:

- lethal toxicity in the crustacean *Daphnia magna*. Method MA 500 – D.mag. 1.0. 4th Revision;
- acute lethality in *Onchorynchus mykiss*, method SPE1/RM/13, 2nd edition.

6.3 Environmental Objectives of Rejection (EOR) Monitoring

Monitoring of the contaminants to which EOR were determined is required for each mining effluent in order to ensure that they are respected. This monitoring will be conducted at the same frequency as that planned under Directive 019 (MDDEP, 2012).

The MELCC provided TSMC with EOR for project 2a. This document outlines the concentrations and loads towards which the final effluents at Goodwood must trend.

Additional requested parameters (barium, selenium, and hydrogen sulfide) will be analyzed under the annual monitoring plan, which is once per summer. In addition, dissolved solids will be analyzed four times annually, rather than once as recommended by the Directive 019.

6.4 Summary of Effluent Monitoring

Table 8 presents the overall monitoring that will be conducted in relation to the mining effluent at Goodwood. The monitoring will commence once the flow of 50 m³/day is measured, that is once the water treatment unit is operational.

Table 8. Summary of Effluent Monitoring

Continuous	3 / week	Weekly	Monthly	Quarterly	Annually
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pH, conductivity, flow rate	TSS	As, Cu, Fe, Ni, Pb, Zn	Acute toxicity (<i>O. mykiss</i> and <i>D. magna</i>)	Alkalinity, total hardness, Al, Cd, Fe, Hg, Mo, NH ₃ , NO ₃ , dissolved oxygen, temperature	Cl ⁻ , BOD ₅ , COD, hardness, F ⁻ , C ₁₀ -C ₅₀ , dissolved solids, total solids, phenolic substances, SO ₄ ²⁻ , turbidity, NH ₃ , TKN, NO ₂ , NO ₃ , TP, Al, Cd, Ca, Cr, Co, Mg, Mn, Hg, Mo, K, Si, Na, S ²⁻ , S ₂ O ₃ ²⁻
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7 Groundwater Monitoring

Drilling work was done in fall 2016 to determine the presence of groundwater downstream of the infrastructure at the lowest topographical point. The two wells, Gdw-P01 and GDW-P02, drilled at 65m and 80m respectively, did not detect any groundwater. The location of these wells is shown on Figure I-2.

7.1 Water Table Monitoring

Well water levels must be measured twice annually: in spring and in summer. In 2019, measurements were conducted only in fall, on September 25.

7.2 Groundwater Sampling

Should water be detected in the wells, a sample will be taken and analyzed for the following parameters:

- C10-C50
- pH, ORP
- Dissolved oxygen
- Conductivity
- Nitrites/nitrates
- Total Phosphorus
- Sulfides
- Total cyanides
- Dissolved metals (Al, Ag, Ba, B, As, Cd, Ca, Cr, Co, Cu, Fe, Mg, Mn, Hg, Mo, Ni, Pb, Sb, Se, K, Na, Zn)
- Carbonates/bicarbonates
- Chlorides
- Sulfates
- Fluorides
- Total dissolved solids

Since no water was detected in both wells in 2019, no sampling was conducted.

7.3 Groundwater Monitoring Program Update

No updates are planned. The wells will be monitored in 2020 to verify the presence of a water table and, if required, sampling will be conducted.

8 Air Quality Monitoring

Since 2015, TSMC implemented air quality monitoring for the DSO project. Monitoring was completely operational for the first time in 2018. Certificates of Analysis for 2019 are included in Appendix II. Location of the monitoring stations is shown on Figure I-4 in Appendix I.

In 2017, TSMC started the development of a data management system allowing the comparison of results by month and year for each station.

8.1 2019 Sampling

The sampling periods and results are presented in the following sections. The certificates of analysis are presented in Appendix II-E. The calculation tables for comparison with the standards (24h, 30 days, annual according to the criteria) are presented in Appendix V.

Many problems related to analytical errors or erroneous calculations were encountered by TSMC in 2019. Appendix II-G presents a letter from the AGAT laboratory presenting all the errors originating from the laboratory.

8.1.1 NO₂

The 2019 monitoring of the NO₂ concentration would normally take place every month at the AQS2 and AQS4 stations. However, bad information provided by the AGAT laboratory meant that the samples between March and June could not be analyzed (see Appendix II-G).

Analysis results are available for two sampling periods of NO₂, namely:

- From June 26 to July 27
- From July 27 to August 26

No exceedances of provincial standards (QC and NL) were recorded in 2019. The highest value was measured at AQS2 station for the period from July 27 to August 26, with a value of 1.69 µ/m³ (value measured from 0.9 ppbv converted by considering that 1 ppb NO₂=1.88 µg/m³) for a period of 30 days., well below the provincial standard of 103 µ/m³/year.

8.1.2 Dust and Metals

8.1.2.1 Winter Period

Snow sampling was carried out at the end of winter near the five air quality monitoring stations. Table 9 shows the description of the snow samples.

There is no standard in Quebec for dust fallout. The Newfoundland and Labrador standard is 7.0 g/m²/30 days. The results obtained at the various stations are well below this standard. Appendix V presents the deposition calculations for dust and metals.

Table 9. Description of the Snow Samples and Result of Dust Fallout

Station	Sampling Date	Snow Depth (m)	Description	Dust Fallout (g/m ² /30d)
AQS 1	2019-04-06	1.75	Snow light and fluffy. No compaction. It's in a valley near a stream. No discolouration observed. No air sampler around.	0.29
AQS 2	2019-04-06	1.5	Slight discolouration observed near station and in general area. Snow compact most of the way there.	0.02
AQS 3	2019-03-31	0.24	High in the mountain. Presence air sampler	0.63
AQS 4	2019-03-31	0.75	Only 0.52 m sampled. Close to Foggy Lake Cabin. Presence Air Sampler	0.11
AQS 5	2019-04-06	1.18	Snow compact on surface then soften below. No discolouration on surface. No air sampler around.	0.13

8.1.2.2 Summer Period

For the summer period, the results are only available for the months of June to August. Due to a laboratory error, there are no results from late August to early September. Table 10 shows the sampling dates and results for the dust fallout. Appendix V presents the deposition calculations for dust and metals.

The measured values are well below the standard of 7.0 g/m²/30 days for Newfoundland and Labrador.

Table 10. Results of Dust Fallout – Summer 2019

Station	Start Date	End Date	Dust Fallout (g/m ² /30d)
AQS 1	2019-06-26	2019-07-26	<1.134
AQS 2	2019-06-26	2019-07-27	<1.098
AQS 3	2019-06-26	2019-07-27	1.199
AQS 4	2019-06-27	2019-07-27	1.688
AQS 1	2019-07-26	2019-08-25	1.588
AQS 2	2019-07-27	2019-08-26	2.348
AQS 3	2019-07-27	2019-08-26	0.823
AQS 4	2019-07-27	2019-08-26	1.519

8.1.3 PM2.5 Particles and Total Particulate Matter (TPM)

The certificates of analysis presented in Appendix II show errors in the sampling dates. These have been corrected in the calculations for particles presented in Appendix V and in Table 11, which presents the results for PM2.5 dust particles. TPM concentrations are not shown in this table, only in Appendix V. The TPM concentration is lower than that of PM2.5 particles, suggesting a laboratory error.

The low concentrations of PM2.5 captured at the sampling stations, well below the Quebec standard of 30 µg/m³, suggests an absence of contamination of the ambient air at the sampling sites.

Table 11. Results of PM2.5 Dust Particles

Station	Start Date	Concentration moyenne / 24h (µg/m ³)
		PM2.5
AQS1	2019-06-07	16.217
AQS2	2019-06-26	17.465
AQS2	2019-07-10	15.385
AQS2	2019-07-25	14.138
AQS4	2019-06-25	11.227
AQS4	2019-07-23	12.059
AQS4	2019-07-08	14.970

8.2 Meteorological Station

The meteorological station was installed in August 2019. The Kivivic station was installed on a flat and not too rocky area behind the trailers at KM24 (in Newfoundland and Labrador), at a distance of more than 10X the height of the buildings which is the prescribed distance.

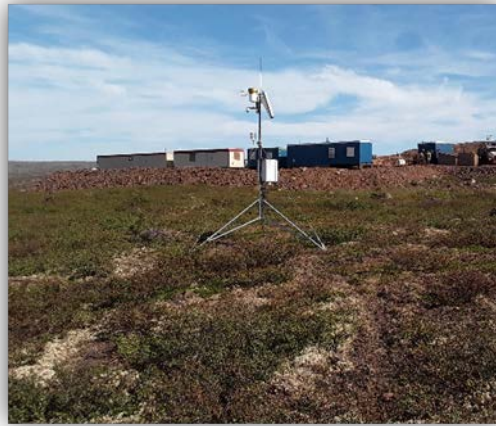


Figure 1. Kivivic Meteo Station

Coordinates to this station are: N55.05213; W67.31022. The location is shown on Figure I-4.

8.3 Air Quality Monitoring Update

The PQ200 Air Monitors employed by TSMC have posed significant technical and logistical issues regarding maintaining the air quality monitoring program both in 2019 and in previous years. The PQ200 monitors are heavy, delicate, and require cumbersome external power solutions, making them challenging to maneuver into positions in rough terrain that encompass most monitoring locations around the Goodwood project. They are better suited to stationary applications, and not the mobile usage they are currently seeing.

As such, TSMC has been in communications with the QC and NL provincial governments and our air monitoring consultant, BBA, to evaluate air monitoring programs at other mine sites with similar climatic conditions in Quebec. TSMC and BBA aim to evaluate the potential for replacing the PQ200s with equally

accurate, but more field expedient and user-friendly air monitoring solutions. Preliminary options proposed by BBA are currently in consideration by the government of Quebec.

The sampling plan proposed by TSMC meets the requirements of the certificate of authorization.

Also, TSMC is committed to obtain valid results in 2020.

9 Waste Rock Geochemical Characteristics Monitoring

The waste rock monitoring program provides for sampling of two composites a month, at a frequency of about 24 samplings per million tons of waste rock for the following parameters:

- Sulfur percentage
- MABA static test
- TCLP lixiviation test
- Metals (Ag, As, Ba, Cd, Co, Cr, Cu, Fe, Sn, Mn, Hg, Mo, Ni, Pb, Se, Zn)
- Parameters outlined in Directive 019 (B, U, Total fluorides, Nitrites and Nitrates)

9.1 2019 Monitoring

A single waste rock sampling was done in 2019, on November 22nd. Four samples were taken from different areas of the stockpile. Certificates of analysis are presented in Appendix II-F.

None of the samples had any detectable sulfur, they all had concentrations below the detection limit. This confirms there are no sulfide minerals in the waste rock.

No acid potential (AP) was found on either sample. Only one had a trace of Neutralization Potential (NP) and the rest none. A net positive value (NP-AP) theoretically means the rock will not produce acid rock drainage (ARD), but this needs to be interpreted in relation to the contents in sulfur or sulfide minerals. Since the sulfur concentration is low or inexistant, we can determine that the waste rock does not have the potential to generate ARD.

Also, the leaching test showed that there were little dissolved metals, which is also a criterion to determine the potential for ARD.

9.2 Waste Rock Monitoring Program Update

No updates are planned. The monitoring program for the waste piles will be carried out in 2020 to ensure that the conditions of the certificate are met.

10 Geotechnical monitoring

As per the monitoring plan for project 2A, TSMC has to provide a hydrological and hydrogeological study which will determine the number of years that will be necessary to fill up the pit. The study is presented in Appendix VI.

As per its certificate of operations for the project 2A, TSMC must verify the physical stability of the infrastructure at Goodwood on a regular basis. (*La stabilité physique des ouvrages, digues du bassin d'accumulation, bermes et haldes sera également l'objet d'un suivi régulier.*). This is done at all times during operations at Goodwood, and if personnel on site observe any problems related to the physical stability of the infrastructure at Goodwood, this is reported to managers.

In 2019, a high level of scrutiny was applied to water management infrastructure at the site: basin and ditches. Reports on incomplete snow removal in certain ditches were responded to immediately. Furthermore, reports on the slopes of the waste pile were also addressed by conducting an investigation into the slope of the waste pile.

The major infrastructure, the dikes of the Goodwood basin and the waste piles will be inspected by external experts yearly. Their observation for 2019 and recommendations are presented in the report in Appendix VI.

11 Caribou Monitoring

Data received from the Ungava program allow us to monitor caribou locations (*Rangifer tarandus*).

TSMC has not been able to receive caribou position for 2019 before the report submission date.

11.1 Caribou Ungava Project Contribution

Since 2014, TSMC is a partner in the *Caribou Ungava* program and participates to this program for an amount of 100,000\$ annually.

The research program follows populations and is committed to inform TSMC about caribou locations should they come within TSMC's buffer zone.

It aims to quantify factors determining population dynamics and use of the migratory caribou land in a context of climate and anthropic changes.

The Caribou Ungava program's objectives are to determine effects of anthropic activities on land use and survival of caribous, analyze caribou-predator interactions, analysis of the caribou population dynamic in order to ensure the continuation of socio-economic, cultural and subsistence hunting activities. Finally, the impact of climate change and demographic modifications on the caribou habitat is also studied.

As per the Certificate of Authorization for the Project 2A, this partnership is to last 5 years (2014-2019), and TSMC has completed this requirement.

11.2 CARMA Project Contribution

Since 2013, TSMC is a partner of the *CircumArctic Rangifer Monitoring and Assessment* (CARMA) network. This network includes scientists, administrators and communities concerned with the survival of arctic caribou herds.

As per the Certificate of Authorization for the Project 2A, this partnership is to last 5 years, that is, until 2019 and TSMC has completed this requirement.

12 Avifauna Survey

In the environmental impact study, TSMC committed to conducting a quinquennial monitoring of avifauna. This plan aims to determine whether the mining activities have an effect on nesting populations.

Baseline surveys were conducted by Groupe Hémisphères in 2008-2009. A first monitoring was done in 2017. The next avifauna monitoring survey is scheduled for 2022.

13 Wildlife Habitats Monitoring

In the environmental impact study, TSMC committed to monitoring of wildlife habitat. This monitoring aims to verify if the expected loss to habitat corresponds to that on the ground.

This evaluation will be done when the construction of the infrastructure is further along, in 2020. At that time, the site's construction activities will be nearly complete.

14 Closure Plan and Rehabilitation

14.1 Strategic Rehabilitation Plan

This strategic plan defines the foundations required for restoration of mining sites operated by TSMC for the duration of its mining activities, as well as for the closure of the project. The progressive restoration program is implemented to reduce exposition of bare ground, reduce dust generation, restore functional ecosystems and preserve quality of the pit and wastepile water.

This strategic plan supports TSMC's Environment and Permitting team in assessing restoration priorities, assembling required teams, defining the most appropriate restoration approaches and methods, and defining a realistic progressive restoration schedule.

It also describes restoration works already undertaken by TSMC in collaboration with Laval and McGill universities, T2 Environnement and Viridis Terra Innovations, as well as Earth Alive Clean Technologies inc. In 2017, this collaboration allowed TSMC to adapt the rehabilitation and closure plan to Nordic conditions.

TSMC is committed to restore their sites in close collaboration with local communities who will be consulted prior to producing the closure plan. TSMC will not ask to be released from its obligations until local communities are satisfied by the restoration efforts.

The strategic plan was presented to local communities in early 2018 (the document is already available on the file sharing server used by TSMC and the local communities) and submitted to government authorities.

In 2021, an updated version of TSMC's closure and rehabilitation plan will be provided. Specifications concerning the sterile rocks berm that will secure the pit as well as the stability analysis for the pit in post-restoration will be presented in the next revision of the restoration plan.

14.2 Research Project – Restoration of Habitats Affected by Mining Industry

14.2.1 Project Title

Isolation, identification and selection of plant root symbiotes to improve habitat restoration in Quebec alpine and arctic tundra affected by mining development.

14.2.2 Description

The project started in 2016 with collaboration between TSMC, T2 Environnement and Viridis Terra Innovations. Final report is expected in spring 2020.

The scientific objectives pursued in the project are:

- Decrypt the root and rhizosphere metagenome of key species in nordic mine sites.
- Isolate and identify morphologically and molecularly the ectomycorrhiza, ericoid and endophytic fungi associated with key cultural species of the forested tundra (*Picea mariana*, *Betula glandulosa* et *Vaccinium uliginosum*); and

- Select the best ectomycorrhiza fungi, ericoid and endophytic isolates *in vitro* and *in vivo* for their resistance to stress generated by mining waste with morphometric, physiological and biochemical parameters.

The fundamental objectives of the research will allow to generate new scientific knowledge for developing new phytotechnologies specific to arctic and subarctic areas. The applied objectives will allow development of relevant, transferable and economically viable know-how to approach present and future complex environmental issues afflicting the mining development in arctic areas.

14.2.3 Results

The survival rates of test species, planted in representative areas, as a function of various relevant parameters and methods provide valuable information regarding the most applicable phytotechnologies for eventual remediation of the DSO4 area. Though much of the trial plots and overall restoration work have been conducted with regards to the DSO3 site, the data and learnings from these trials are expected to be highly useful and transferable to restoration efforts for the Goodwood Project.

Thus far, trial plots have been planted at Timmins 4 and Timmins 6 waste piles, Elross Creek and a purposefully chosen, steeply sloped area near Timmins 1 pit that is optimally suited to slope stability studies. The survival rates of species used in these trials as a function of different site preparation methods and soil amendments are presented in Appendix VII.

Soil in Goodwood Area

The physiochemical parameters and mineralogy of soil in the Goodwood area was also evaluated in order to ascertain how soil characteristics interact with test species, and what factors would need to be considered in the context of eventual remediation.

Results tables are presented in Appendix VI.

14.2.3.1 Deciphering root and rhizospheric metagenome of key species in northern mining sites

Native plants of the Schefferville iron mine have been harvested in disturbed and undisturbed alpine and tundra areas in August 2016 and 2017. Bulk soil microbe communities, rhizosphere and roots were analyzed with high throughput amplicon sequencing of the total DNA extract from representative plant species growing at site.

Following this, statistical data analysis specifically targeting micro-organisms associated with plants growing at the sites was conducted. Rhizosphere and endophytic bacterial communities of plants growing on disturbed and undisturbed areas were found to be significantly different.

Among the dominating bacterial and fungal taxa, it was observed that some are only present in roots and rhizospheres of plants growing on disturbed sites. These include species involved in iron oxide reduction, metals sequestration and resistance to heavy metals such as *Geobacter*, *Polaromonas* and Cyanobacteria. These microorganisms can allow plants to have better tolerance and prosper in challenging environments and could eventually be used as an inoculum to increase efficiency in restoration of the mine site

14.2.3.2 Isolate and identify morphologically and molecularly isolate and identify fungi associated with key cultural species of forest tundra

Over 400 fungal isolates have been successfully identified, and sequencing was submitted to the Genbank databank (<http://www.ncbi.nlm.nih.gov>). Preliminary statistical analysis allowed to demonstrate a contrasted pattern of cultivable root symbiotes isolated in natural and disturbed areas. It was also noted that plants don't recruit the same microorganisms according to the state of their environment.

14.2.3.3 Select the best fungus and endophyte isolates for resistance to stress from mining discharges

Candidate fungi have been selected *in vitro* for their growth and production of metabolites in presence of residues from the mine, as well as different concentrations of hematite (Fe_2O_3). Selected isolates will be used for inoculum production. Another experience on the performance of *Betula glandulosa* and *Alnus crispa* planted on overburden amended with biochar and sphagnum peat moss has been completed recently.

Significant differences have been found between *A. crispa* et *B. glandulosa* for each determined variable, respectively for root, foliar, cauline and total biomasses. However, the biochar and peat moss factors did not have any significant effects on biomass production of both species.

Additionally, results showed that *A. crispa* grew better than *B. glandulosa* in overburden. In another experience, it was demonstrated that performance (survival, shoot emergence rate, number of shoots, biomass production) of *Salix planifolia* cuttings planted vertically or horizontally on two types of substrate (overburden and waste rock) was better in overburden than in waste rock at the end of the experience (7 weeks). These results suggest that asexual propagation of *S. planifolia* shows potential for revegetation of overburden in iron mines.

14.2.4 Coordination, communication and dissemination of results and information generated by the project to stakeholders

A communication plan for dissemination of results and information is in place (5 meetings per year on average) to promote concertation and partnership between researchers and potential users.

Records of these meetings are available in the project's Dropbox, managed by research professional Marie-Eve Beaulieu at Laval University. At least 5 peer reviewed scientific publications are planned with the results of this project.

Some of the results have already been presented at international conferences:

- ICOM9 à Prague, 30 Juillet 30-4 août, 2017. Title: Isolation and morpho-molecular identification of root plant symbionts of Quebec's arctic and alpine tundra; and
- 7th European Bioremediation Conference (EBC-VII) and 11th International Society for Environmental Biotechnology conference (ISEB 2018), Chania, 25 June 2018 to 28 June 2018. Title: Isolation and morpho-molecular identification of root symbionts for the ecological restoration of Schefferville iron ore mining site in northern Quebec, Canada

Publication in Quebec Science (40) July-August 2019, titled: Pour que le rouge passe au vert

Apart from annual reports, results from the present research will also be relayed through conferences and information sessions among which a workshop planned in the week of April 8th 2019 in Montreal at TSMC's head office.

14.3 National Research Council Canada

In 2019, TSMC funded a research project led by the National Research Council of Canada (NRCC), titled: Effects of biochar input to surface deposits on plant growth in a discontinuous permafrost environment.

The waste rock from TSMC's mining operations generates dust during dry season and excessive sediment load in surface water, in spring and autumn.

Because of their mineralogy, dominated by iron oxides and silicate, the waste rock piles and the access roads built with waste rock are the main causes of reddish fine particles in surface water and air. Those

fine particles are generated mainly during ore transportation, wind erosion, spring runoff, heavy rain, cryogenic processes and slope erosion.

These events or processes affect the waste rock piles that are the result of TSMC's mining activities and those left by IOC. Although it is not possible to remove the tailings piles, it is possible to control their impacts and thus reduce TSMC's environmental footprint.

As part of a sustainable development strategy advocated by TSMC, the approach proposed by NRC is based on the principle of sustainable development "3RV" - reduction, reuse, recycling and recovery, to control or mitigate the impact of mine tailings and generated red particles. The methods proposed below utilize in-situ materials to solve environmental problems at site.

Note that in 20 or 30 years, when TSMC's mining operations are reduced or completed in the region, TSMC's operations will have to be closed and rehabilitated. In this northern region, where climatic conditions are unique, to achieve results in 20 years, we must now implement rehabilitation measures.

Among the set of environmentally and economically profitable solutions to reduce fines in air and surface water, NRC proposes an approach comprising passive and active methods. Revegetalization is a passive method for slope stabilization of waste rock piles that controls sediment load with shrubs and trees combined with vegetation cover strips. Hydro-seeding is an active method to be considered with revegetalization. To limit dust from ore hauling, active methods such as hydro-seeding combined with spraying of a biodegradable additive on the road surface, will stabilize the fines. However, simply covering the surface of the hauling roads made of waste rock material with natural granular material from local gravel borrow pit, will limit the impact of reddish particles in air and in the aquatic environment.

Following the February 12 2019 meeting held at the CANMet - NRCan Ottawa office in the presence of Dr. Mariana Trindade (TSMC), Dr. Suzanne Beauchemin and Sean Langley (NRCan) and Didier Barré (NRC), TSMC has requested NRC to assist TSMC in developing a restoration solution for the DSO3 and DSO4 mining areas to limit slope erosion generated by runoff, cryogenic processes and wind erosion. The proposed approach is based on vegetalization and valorization of top-soil and overburden material stockpiled, involving BIOCHAR as a source of nutrient - generated from the pyrolysis of wood, cardboard - to soil for helping growing plants at the TSMC site. Also, BIOCHAR has the capability to capture CO2 released during permafrost alteration associated with mining activities.

TSMC recognizes the need to finalize the topsoil and overburden stockpile and Howse Zone for development of the BIOCHAR-SOIL couple, as well as the need to identify BIOCHAR-Pyrolysis industry players, located in the Quebec-Atlantic region.

To initiate and develop the proposed solutions, the NRC approach will be extent over 2 years.

Step 1 – fiscal year 2019-2020

- a) Characterization of topsoil, overburden, TPH residual contamination or undefined stockpiles located in DSO3-DSO4 area, and topsoil *in situ* at the Howse area– by NRC;
- b) Development of a BIOCHAR sector – by NRC/TSMC.

Following the characterization of stockpiles and surficial deposits performed by NRC and the valorization of organic residues performed by TSMC, the intention is to mix overburden, topsoil and composting residues for their reuse as a surficial cover to waste rock piles for their vegetalization.

15 Communities

Please refer to Appendix VIII for the complete document. The appendices referred to in the following sections are presented in the document.

15.1 Citizens' Information Program

For the year 2019, TSMC engaged with the local communities on a regular basis in order to provide updates on mining and processing activities and measures taken to protect the environment:

- Radio announcements broadcast on local Naskapi and Innu community radio stations providing updates on mining activities, concentrator stabilization progress and environmental mitigation measures. (Appendix VIII-A)
- Newsletter distributed to all Post Office boxes in Schefferville, Matimekush-Lac John and Kawawachikamach on the progress of TSMC's Iron Ore Project, environmental mitigation measures, access to harvesting lands, socio-economic benefits to the communities, as well as TSMC's 24-hr toll free emergency telephone number available to them. This number was not used by community members to raise any environmental or other issues (Appendix VIII-B)
- Bi-weekly blasting notices were distributed in writing to the offices of the Naskapi Nation of Kawawachikamach (NNK), Nation Innu Matimekush-Lac John (NIMLJ), and the Town of Schefferville advising the population of mining and blasting activities at Goodwood, along with TSMC contact information. (Appendix VIII-C)
- Community Health, Safety & Environment Committee Meetings were held in February and December 2019 with representatives from the NNK, NIMLJ, Innu TakuaiKAN Uashat mak Mani-utenam (ITUM), Innu Nation, NunatuKavut Community Council. Extensive and detailed presentations on the mining Project, Environmental and Health & Safety matters were provided.
- Project 2A Environmental and Social Monitoring Committee meetings held in March and October 2019 in which Naskapi and Inuit representatives participated. (see Appendix VIII-D for meeting minutes and presentations content)
- Other meetings, communications and events between Quebec Aboriginal Groups and TSMC as detailed by the Communications Log. (Appendix VIII-E)
- Press release on water quality at the TSMC mine site. (Appendix VIII-B)
- Site visit in March 2019 by members of the Kativik Environmental Advisory Committee, Kativik Regional Government (KRG) and the NNK. (Appendix VIII-F)
- Multiple meetings with community representatives on subject of water quality and visits of the Goodwood Area in Spring and Summer 2019 with local community representatives.

Citizens continuously have the opportunity to communicate directly with TSMC through its representatives in Environment and Community Affairs by telephone, email, and social media applications, and through the intermediary of representatives of the Community Health, Safety and Environment Committee, and anytime by visiting the TSMC Iron Ore Mine Site.

Community environment representatives play a key role in receiving feedback and complaints pertaining to the Project, from community members which are transmitted to TSMC. The representatives have an important role to play in keeping apprised of mining activities and matters relating to the environment and disseminating to community members.

15.2 Evaluation program of the perceptions of the Project by land users

Lands users concerned in Project 2a are primarily the citizens of Matimekush-Lac John and Kawawachikamach, residing in close proximity to the Project.

Following further clarification from the Administrator, an evaluation of perceptions of Project 2a (the Survey) will be carried out in 2020 by a third party responsible for data collection from users of the land.

At the time of finalization of this report, the Survey was in TSMC's procurement process, whereby a Request for Proposals had been issued for firms specializing in such studies. The elaboration of a Feedback and Complaint Process Plan is included in the Scope of Work, along with the Survey.

15.3 Community Health, Safety and Environment Committee

A Community Health, Safety and Environment Committee was established in 2013 and meets in Schefferville multiple times per year. It is comprised of environmental representatives from the NNK, NIMLJ, ITUM, Innu Nation, Nunatukavut Community Council, and TSMC.

An Environmental and Social Monitoring Committee was established in 2015, comprised of KRG, Makivik and TSMC representatives. The Committee met twice in 2019. Meeting minutes/presentation material are attached (Appendix VIII-G).

15.3.1 Project 2A Closure and Rehabilitation Plan

The Closure and Rehabilitation Plan (the Plan) was discussed at the Environmental and Social Monitoring Committee (the Committee) meeting of 28 March, 2019.

The following summarizes questions and comments received:

- Will the document be renewed every 5 years? Yes
- In terms of restoration works, there are many possible methods, including plantings, microbial applications. In 2019, the focus will be on what has worked well, and moving into the more northerly Kivivic & Goodwood areas. TSMC is focusing on testing of reddish water and soil characterization, then rendering it appropriate for revegetation. A soil activator will not be pursued in 2020.
- TSMC will involve the communities as much as possible to transfer knowledge so that communities can eventually take the lead in restoration works while phasing out consultants. Bi-directional transfer of knowledge is always sought.
- TSMC and its consultant, T2 Environment, are also looking at the possibility of a sapling plantation and a greenhouse, for which local knowledge will be sought.
- Taking into account community concerns, the possibility of in-pit filling is being considered.
- As per suggestion made by Makivik Corp., TSMC will look into the possibility of filling in collection ponds with the use of inert material.

16 2019 Operations and Conclusion

In 2019, TSMC continued the operations at the Goodwood pit, as well as preparation for the work to be done at the accumulation basin.

TSMC will start 2020 with a Spring plan to capture all of the meltwater from the spring thaw and redirect it to an existing pit. Following this, operations at Goodwood are expected to start in June 2020, depending on date and length of spring thaw.

At the same time, preparations are ongoing for the commissioning of the water treatment unit as well as the repairs to the Goodwood basin. They should be done during summer 2020.

17 References

- TSMC [Tata Steel Minerals Canada Ltd.]. (2018) *Rapport annuel 2017 – Projet 2a (Goodwood) – Québec*. Rapport annuel présenté au ministère de l'Environnement et de la Lutte contre les changements climatiques, direction générale de l'évaluation environnementale et stratégique.
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- Beaulieu, M. (2019) *Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés*. Québec, ministère de l'Environnement et de la Lutte contre les changements climatiques, 219 p. + annexes
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APPENDICES

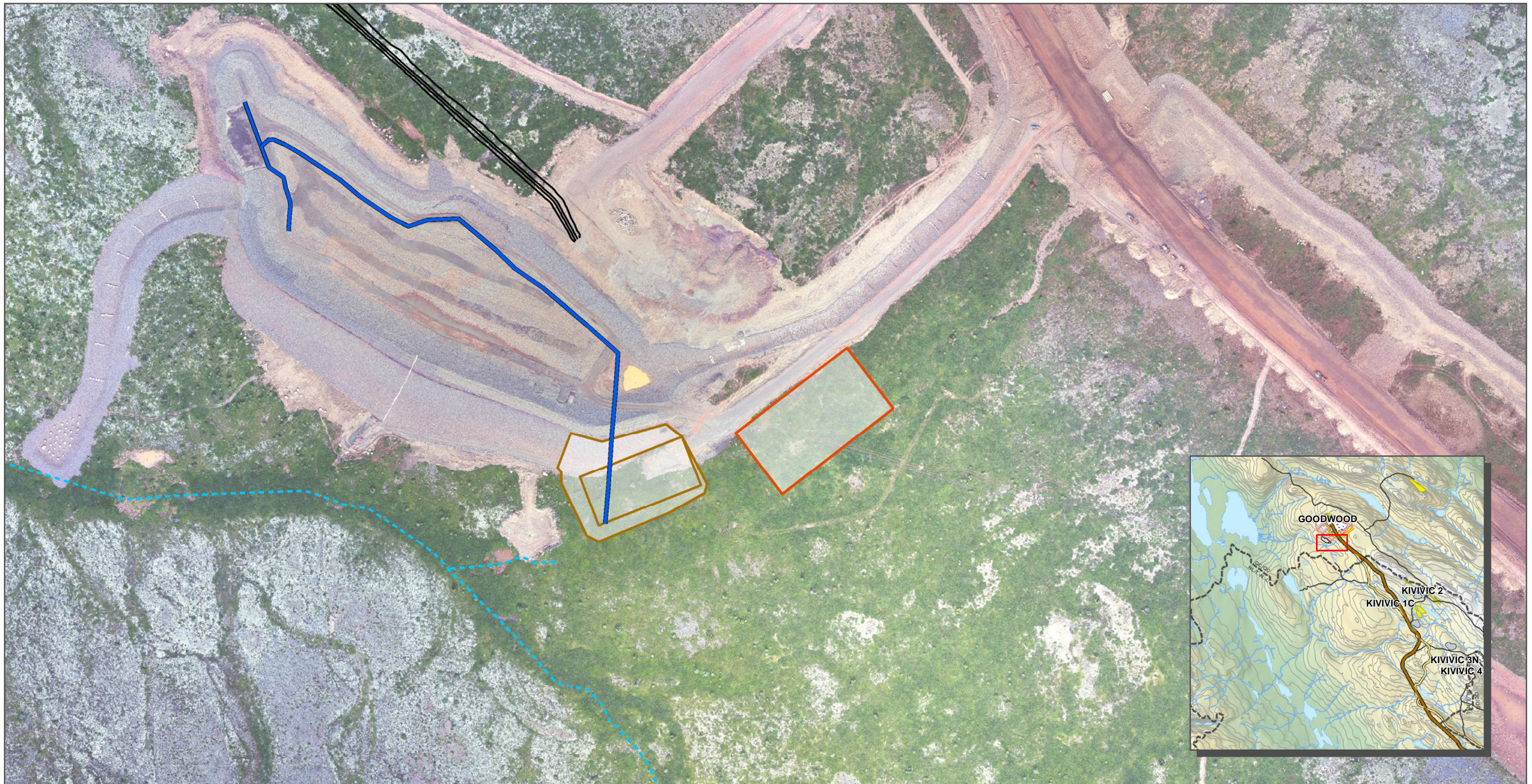
Appendix I. Figures

Figure I- 1. Planned Infrastructure Modifications

Figure I- 2. Water Quality Monitoring Stations

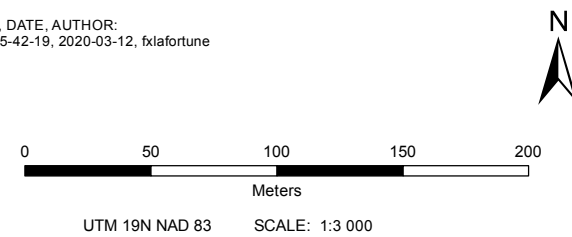
Figure I- 3. Sediment and Benthos Monitoring Stations

Figure I- 4. Air Quality Monitoring Stations



- Planned Footprint of Treatment Plant / Empreinte prévue de l'usine de traitement
- New Footprint of Treatment Plant / Nouvelle empreinte de l'usine de traitement
- New Ditch F1 / Nouveau fossé F1
- Accumulation Pond Drain / Drain du bassin d'accumulation
- Intermittent Watercourse / Cours d'eau intermittent

FILE, PROJECT, DATE, AUTHOR:
GH-1148 , PR185-42-19, 2020-03-12, fxlafortune

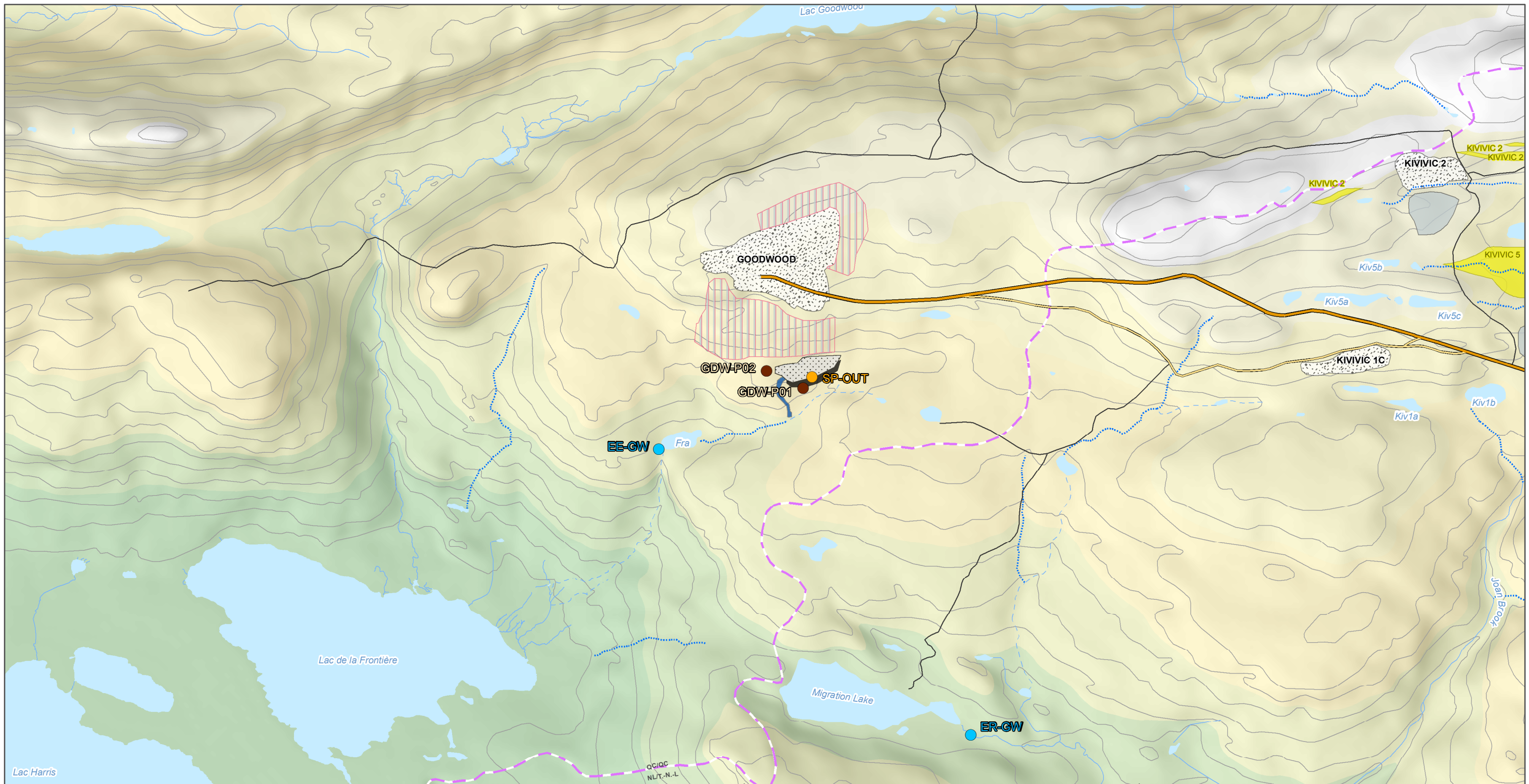


SOURCES:
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Government of Newfoundland-and-Labrador and Government of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology and wetlands update, 2010
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2019 ANNUAL REPORT - PROJECT 2A (GOODWOOD) QUEBEC /
RAPPORT ANNUEL 2019 – PROJET 2A (GOODWOOD) QUÉBEC

Modifications prévues aux infrastructures / Planned Infrastructure Modifications

Groupe Hémisphères
1001, route de l'Église, Bureau 302, Québec (QC) Canada, G1V 3V7
2120, rue Sherbrooke est, Bureau 204, Montréal (QC) Canada, H2K 1C3



Water Monitoring Stations

- Exfiltration / Exfiltration
- Groundwater / Eau souterraine
- Surface Water / Eau de surface
- - - Provincial border / Frontière provinciale
- Waterbody / Plan d'eau
- Permanent Watercourse / Cours d'eau permanent
- - - Intermittent Watercourse / Cours d'eau intermittent
- ⋯ Storm Runoff / Chenal torrentiel
- Contour interval / Courbe de niveau

- Haul road / Main access road / Route de halage / Route d'accès principale
- DSO4 bypass road / Route de contournement
- Other Access Road / Autre route d'accès

Pit / Deposit / Waste Dump

- Deposit / Gisement

TSMC existing infrastructure / Infrastructure existante

- Pit / Fosse
- Sedimentation pond / Bassin de sédimentation
- Spillway / Evacuateur de crue
- Dike / Digue
- Dump / Halde

TSMC projected infrastructure / Infrastructure projetée

- Dump / Halde

FILE, PROJECT, DATE, AUTHOR:
GH-1149 , PR185-42-19, 2020-03-12, fxlafortune

UTM 19N NAD 83 SCALE: 1:25 000

SOURCES:
 Government of Canada, NTDB, 1:50,000, 1979
 Government of Newfoundland-and-Labrador and Government of Quebec, Boundary used for claims
 New Millennium Capital Corp., Mining sites and roads
 Groupe Hémisphères, Hydrology and wetlands update, 2010

Gouvernement du Canada, BNDT, 1/50 000, 1979
 Gouvernement de Terre-Neuve-et-Labrador et gouvernement du Québec, frontière utilisée pour les titres miniers
 New Millennium Capital Corp., gisements et routes
 Groupe Hémisphères, mise à jour de l'hydrologie et des milieux humides, 2010

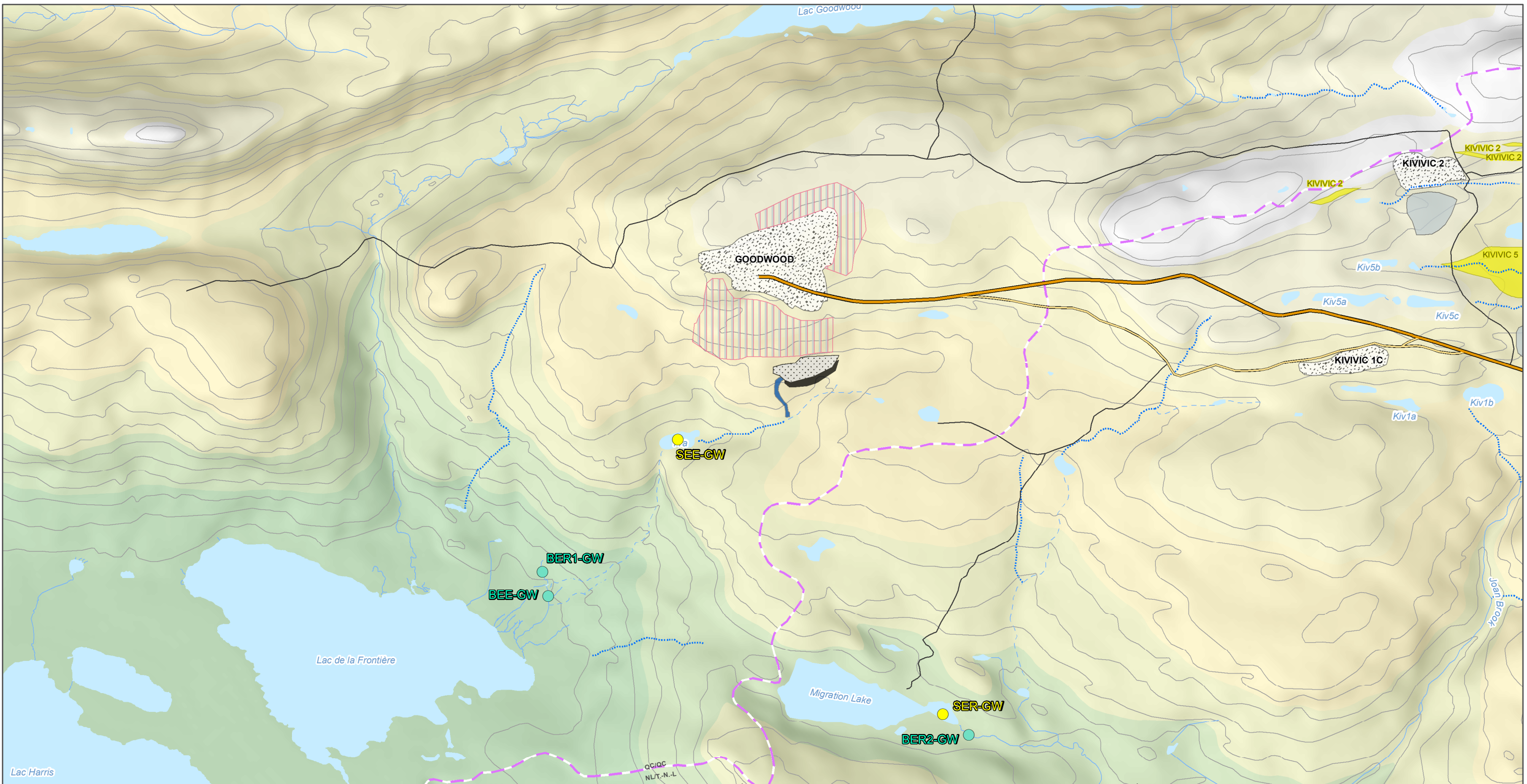
2019 ANNUAL REPORT - PROJECT 2A (GOODWOOD) QUEBEC /
RAPPORT ANNUEL 2019 – PROJET 2A (GOODWOOD) QUÉBEC

**Stations de suivi de la qualité de l'eau - DSO4 /
Water Quality Monitoring Stations - DSO4**

1001, route de l'Église,
Bureau 302, Québec (QC)
Canada, G1V 3V7

2120, rue Sherbrooke est,
Bureau 204, Montréal (QC)
Canada, H2K 1C3

Figure
I - 2



Sediment Monitoring Stations

- Benthos
- Sediment / Sédiment
- - - Provincial border / Frontière provinciale
- Waterbody / Plan d'eau
- Permanent Watercourse / Cours d'eau permanent
- - - Intermittent Watercourse / Cours d'eau intermittent
- ⋯ Storm Runoff / Chenal torrentiel
- Contour interval / Courbe de niveau

- Haul road / Main access road / Route de halage / Route d'accès principale
- DSO4 bypass road / Route de contournement
- Other Access Road / Autre route d'accès

Pit / Deposit / Waste Dump

- Deposit / Gisement

TSMC existing infrastructure / Infrastructure existante

- Pit / Fosse
- Sedimentation pond / Bassin de sédimentation
- Spillway / Evacuateur de crue
- Dike / Digue
- Dump / Halde

TSMC projected infrastructure / Infrastructure projetée

- Dump / Halde

FILE, PROJECT, DATE, AUTHOR:
GH-1150, PR185-42-19, 2020-03-11, fxlafortune

UTM 19N NAD 83 SCALE: 1:25 000

SOURCES:
 Government of Canada, NTDB, 1:50,000, 1979
 Government of Newfoundland-and-Labrador and Government of Quebec, Boundary used for claims
 New Millennium Capital Corp., Mining sites and roads
 Groupe Hémisphères, Hydrology and wetlands update, 2010

Gouvernement du Canada, BNDT, 1/50 000, 1979
 Gouvernement de Terre-Neuve-et-Labrador et gouvernement du Québec, frontière utilisée pour les titres miniers
 New Millennium Capital Corp., gisements et routes
 Groupe Hémisphères, mise à jour de l'hydrologie et des milieux humides, 2010

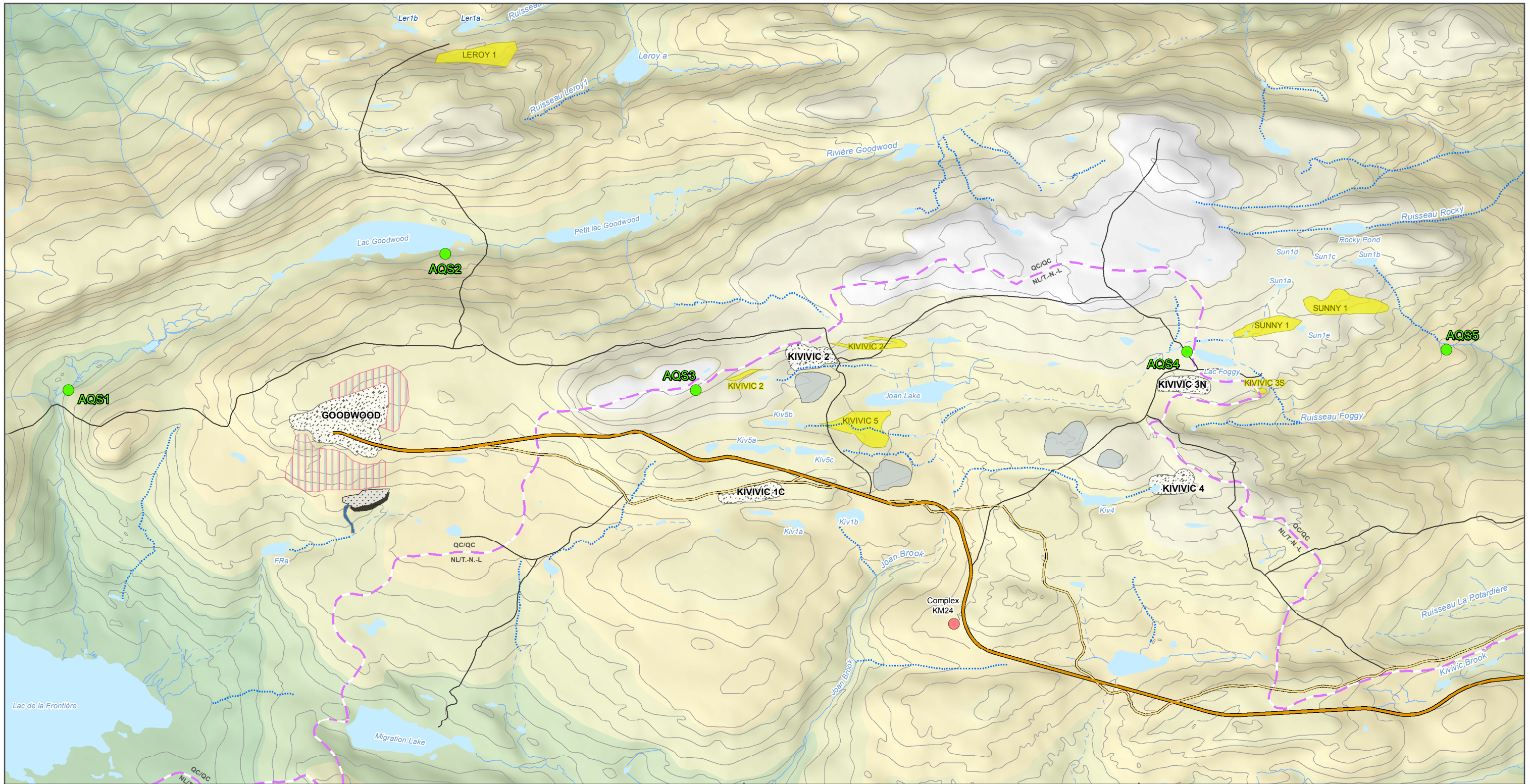
2019 ANNUAL REPORT - PROJECT 2A (GOODWOOD) QUEBEC /
RAPPORT ANNUEL 2019 - PROJET 2A (GOODWOOD) QUÉBEC

**Stations de suivi des sédiments
et du benthos - DSO4 /
Sediment and Benthos
Monitoring Stations - DSO4**

1001, route de l'Église,
Bureau 302, Québec (QC)
Canada, G1V 3V7

2120, rue Sherbrooke est,
Bureau 204, Montréal (QC)
Canada, H2K 1C3

**Figure
I - 3**



Air Monitoring Stations

- Air Quality Station / Station de la qualité de l'air
- Weather Station / Station météorologique
- Provincial border / Frontière provinciale
- Waterbody / Plan d'eau
- Permanent Watercourse / Cours d'eau permanent
- Intermittent Watercourse / Cours d'eau intermittent
- Storm Runoff / Chenal torrentiel
- Contour interval / Courbe de niveau

- Haul road / Main access road / Route de halage / Route d'accès principale
- DSO4 bypass road / Route de contournement
- Other Access Road / Autre route d'accès
- TSMC facilities / Installations
- Pit / Deposit / Waste Dump**
- Deposit / Gisement

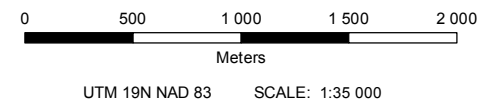
TSMC existing infrastructure / Infrastructure existante

- Pit / Fosse
- Sedimentation pond / Bassin de sédimentation
- Spillway / Evacuateur de crue
- Dike / Digue
- Dump / Halde

TSMC projected infrastructure / Infrastructure projetée

- Dump / Halde

FILE, PROJECT, DATE, AUTHOR:
GH-1151, PR185-42-19, 2020-03-11, fxlafortune



SOURCES:
Government of Canada, NTDB, 1:50 000, 1979
Government of Newfoundland-and-Labrador and Government of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology and wetlands update, 2010

Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouvernement de Terre-Neuve-et-Labrador et gouvernement du Québec, frontière utilisée pour les titres miniers
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise à jour de l'hydrologie et des milieux humides, 2010

2019 ANNUAL REPORT - PROJECT 2A (GOODWOOD) QUEBEC /
RAPPORT ANNUEL 2019 - PROJET 2A (GOODWOOD) QUÉBEC

**Stations de suivi de la qualité de l'air - DSO4 /
Air Quality Monitoring Stations - DSO4**

Groupe Hémisphères
1001, route de l'Église,
Bureau 302, Québec (QC)
Canada, G1V 3V7

2120, rue Sherbrooke est,
Bureau 204, Montréal (QC)
Canada, H2K 1C3

Appendix II. Analysis Certificates

A. Blasting Report

Date/Time MicL at 12:00:53 May 30, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 8.82 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/K4.MMB

Serial Number UM12241 V 10-87 Micromate DIN
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name __TEMP.EVT

Post Event Notes
 GD-753-15

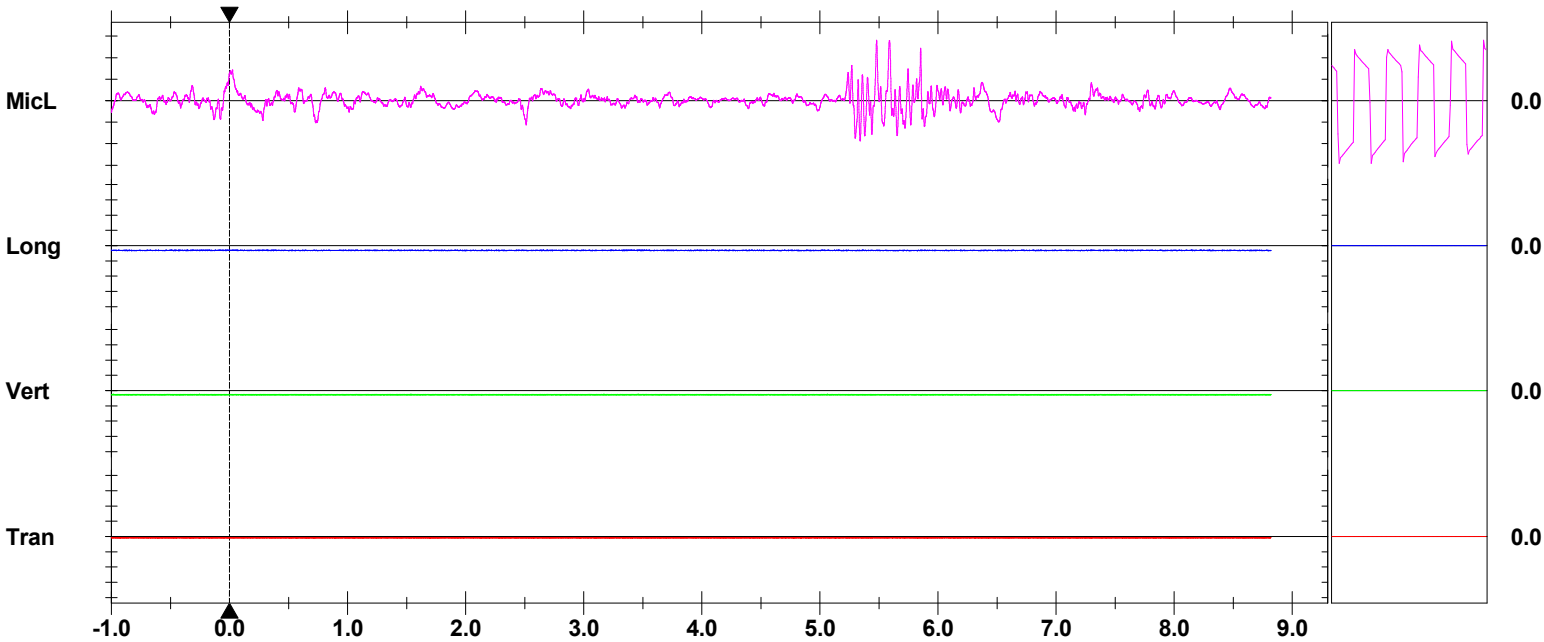
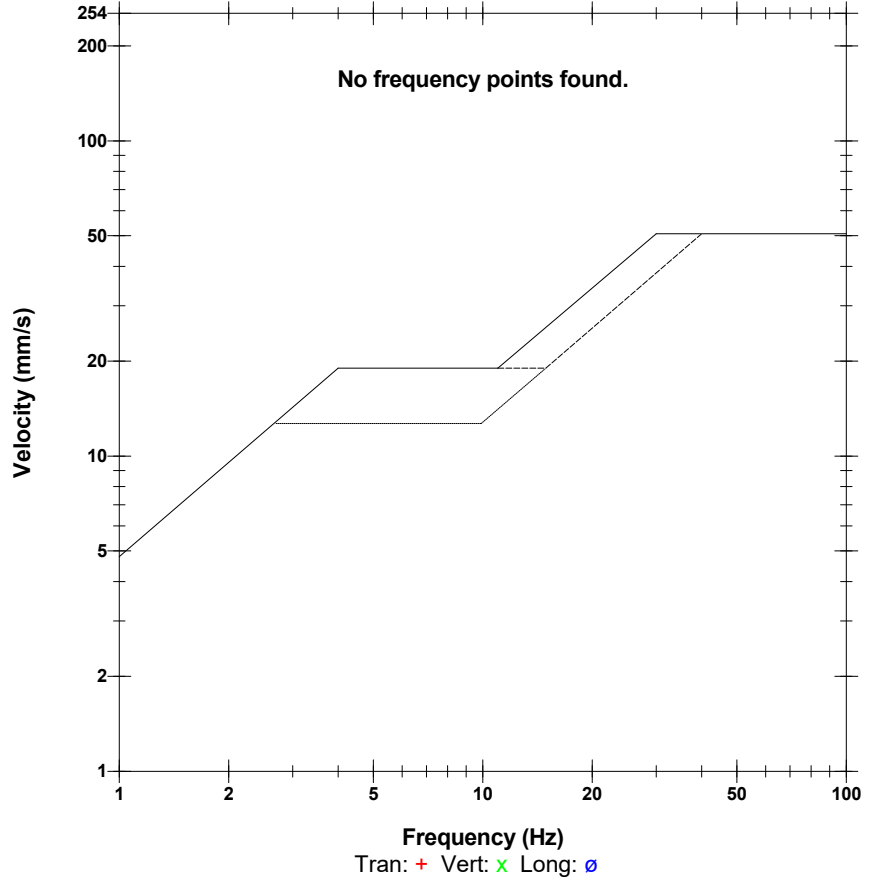
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 116.9 dB(L) at 5.480 sec
ZC Freq 13.0 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1617 mv)

	Tran	Vert	Long	
PPV	0.205	0.575	0.678	mm/s
ZC Freq	N/A	N/A	N/A	Hz
Time (Rel. to Trig)	7.958	-0.419	7.640	sec
Peak Acceleration	0.013	0.013	0.013	g
Peak Displacement	0.000	0.000	0.000	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.898 mm/s at 7.640 sec
N/A: Not Applicable

USBM RI8507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 5.000 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 11:58:48 June 3, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 20.783 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/K4.MMB

Serial Number UM12241 V 10-87 Micromate DIN
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name __TEMP.EVT

Post Event Notes
 GD-753-16

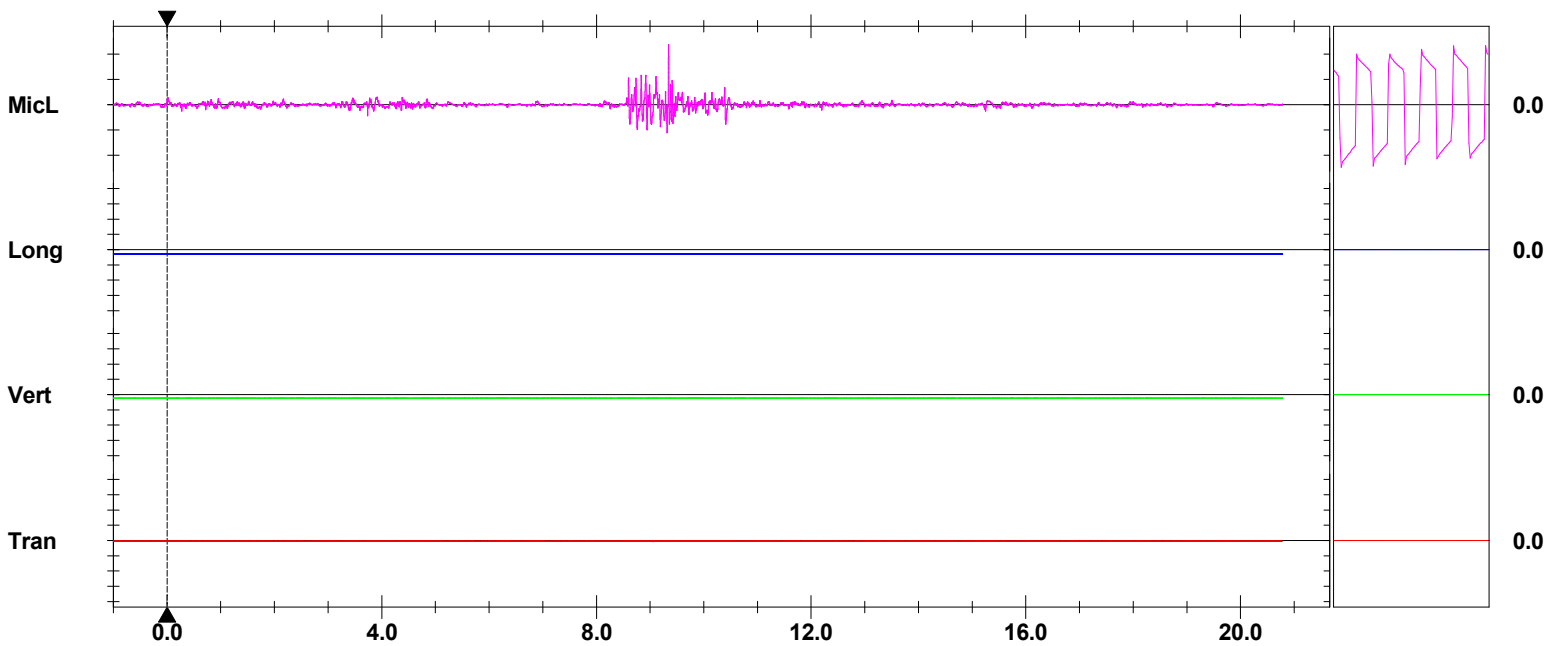
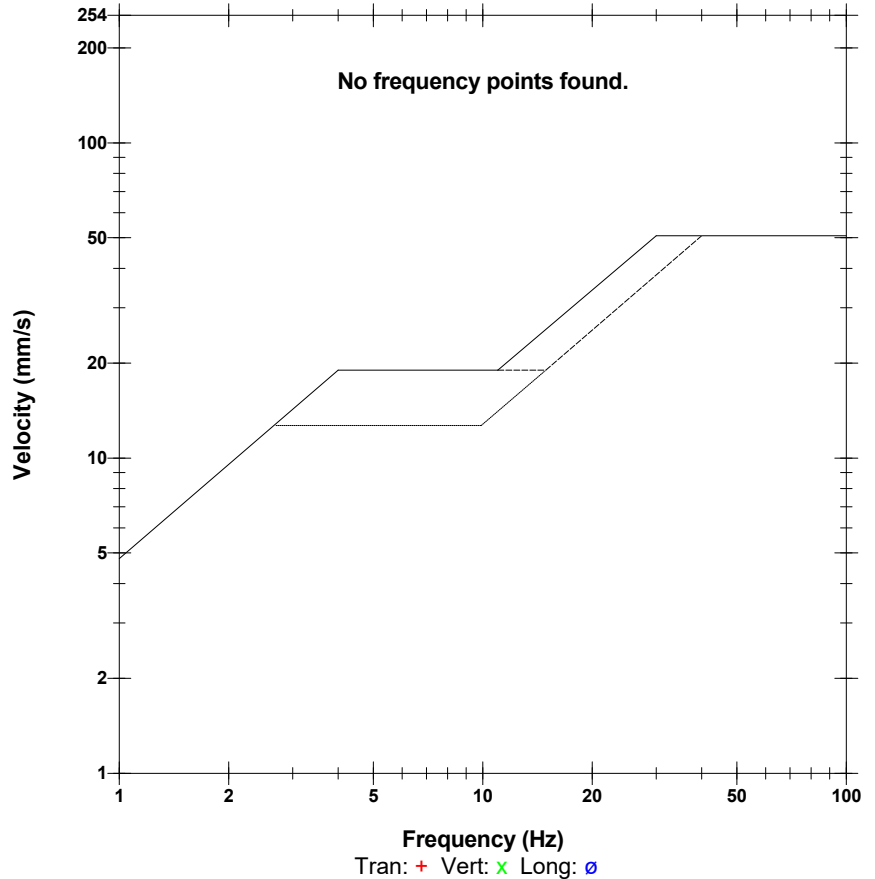
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 135.6 dB(L) at 9.344 sec
ZC Freq 29 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1579 mv)

	Tran	Vert	Long	
PPV	0.150	0.520	0.623	mm/s
ZC Freq	N/A	N/A	N/A	Hz
Time (Rel. to Trig)	9.054	0.965	17.008	sec
Peak Acceleration	0.013	0.013	0.015	g
Peak Displacement	0.000	0.000	0.000	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.808 mm/s at 15.828 sec
 N/A: Not Applicable

USBM R18507 And OSMRE



Time Scale: 1.00 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 50.00 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 12:01:05 June 15, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 9.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/K4.MMB

Serial Number UM12241 V 10-87 Micromate ISEE
Battery Level 3.7 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name UM12241_20190615120105.IDFW

Post Event Notes
 GD-753-17

Notes

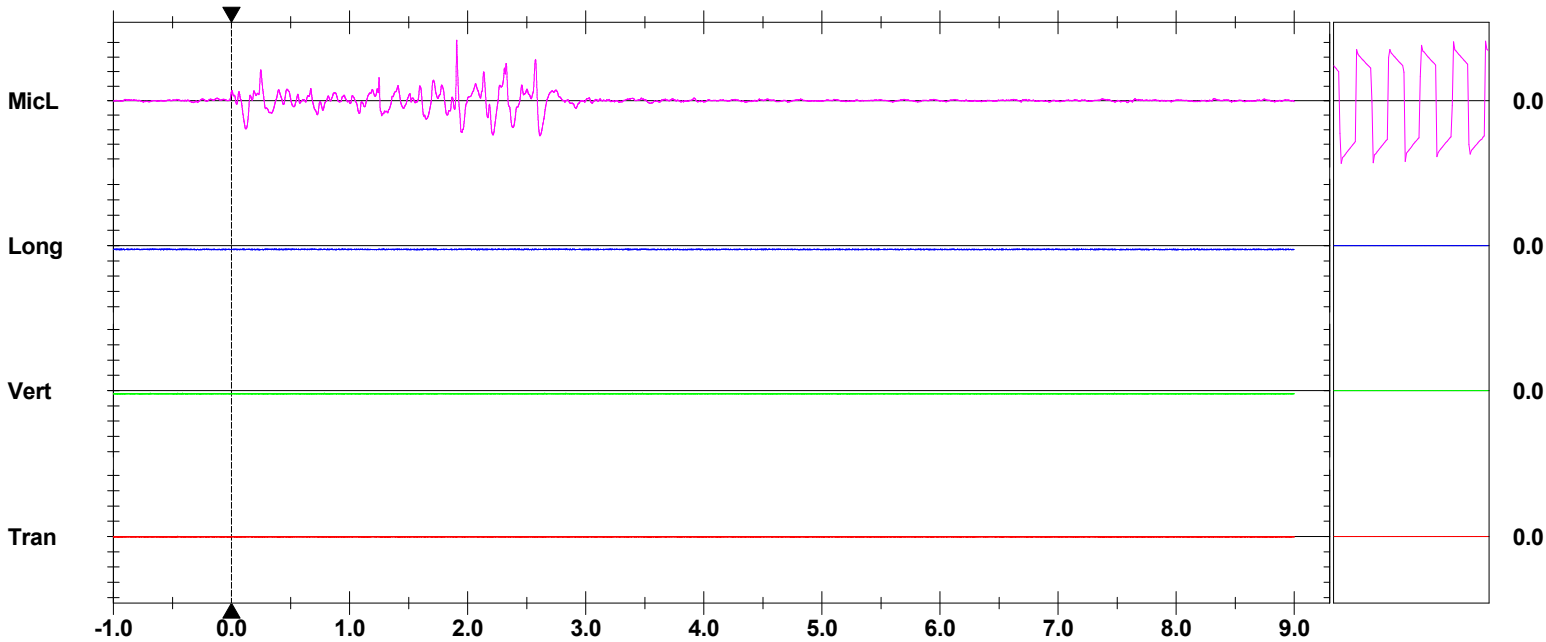
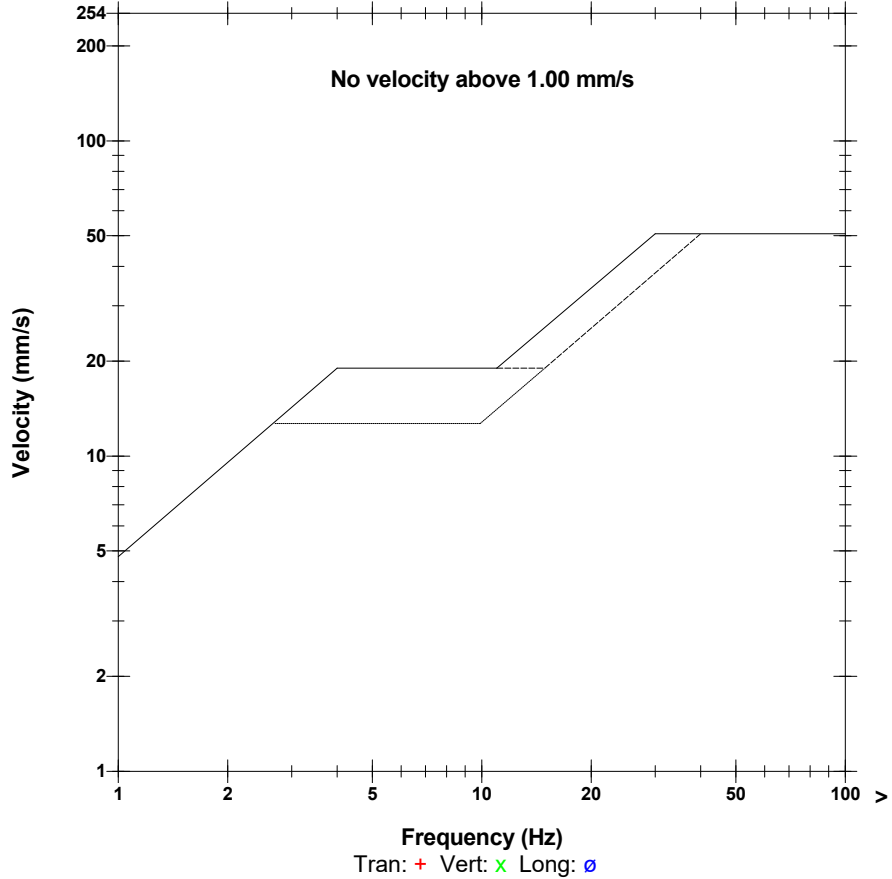
Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 126.4 dB(L) at 1.908 sec
ZC Freq 18.6 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1479 mv)

	Tran	Vert	Long	
PPV	0.102	0.465	0.567	mm/s
ZC Freq	47	N/A	N/A	Hz
Time (Rel. to Trig)	-0.403	7.315	7.315	sec
Peak Acceleration	0.015	0.016	0.015	g
Peak Displacement	0.002	0.000	0.000	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.740 mm/s at 7.315 sec
 N/A: Not Applicable

USBM R18507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
 Trigger =

Sensor Check

Date/Time MicL at 06:30:39 July 10, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 9.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/TATA.MMB

Serial Number UM12242 V 10-87 Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by Instantel
File Name UM12242_20190710063039.IDFW

Post Event Notes

GD-763-01
 Seismograph set up off waste dump road

Notes

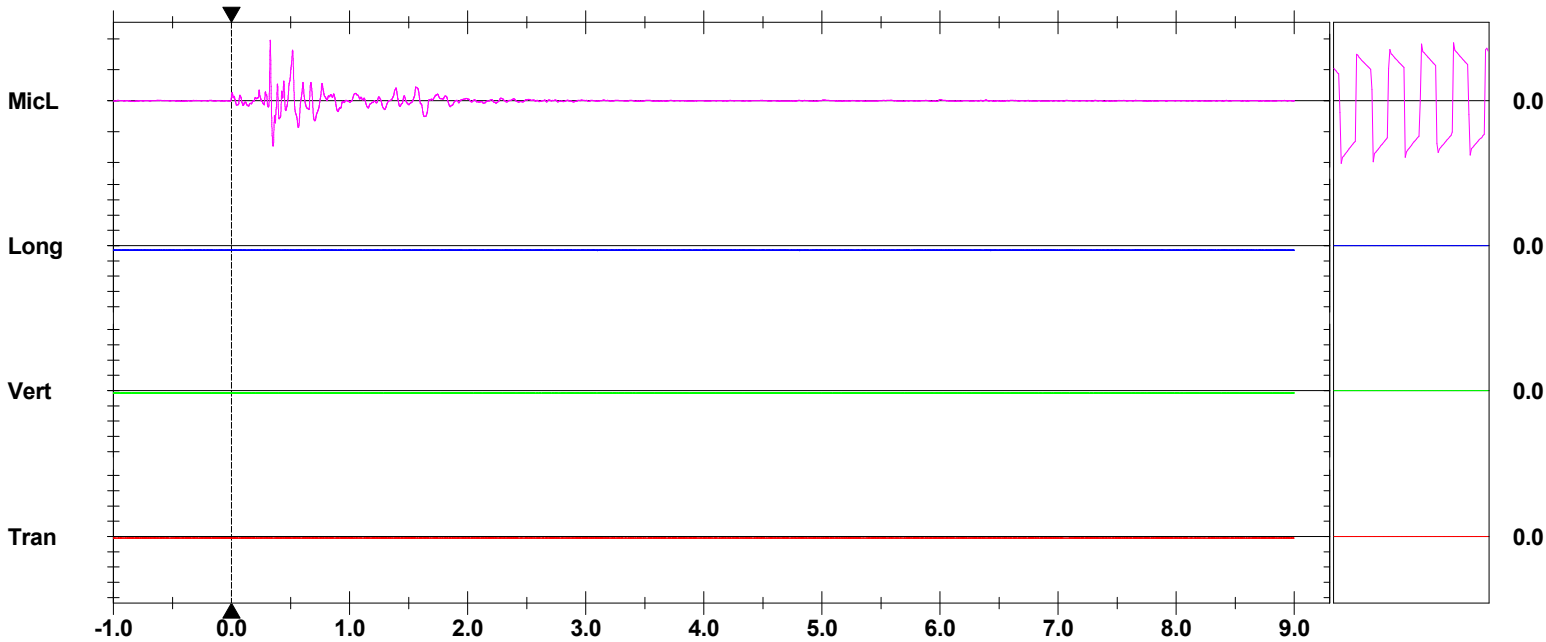
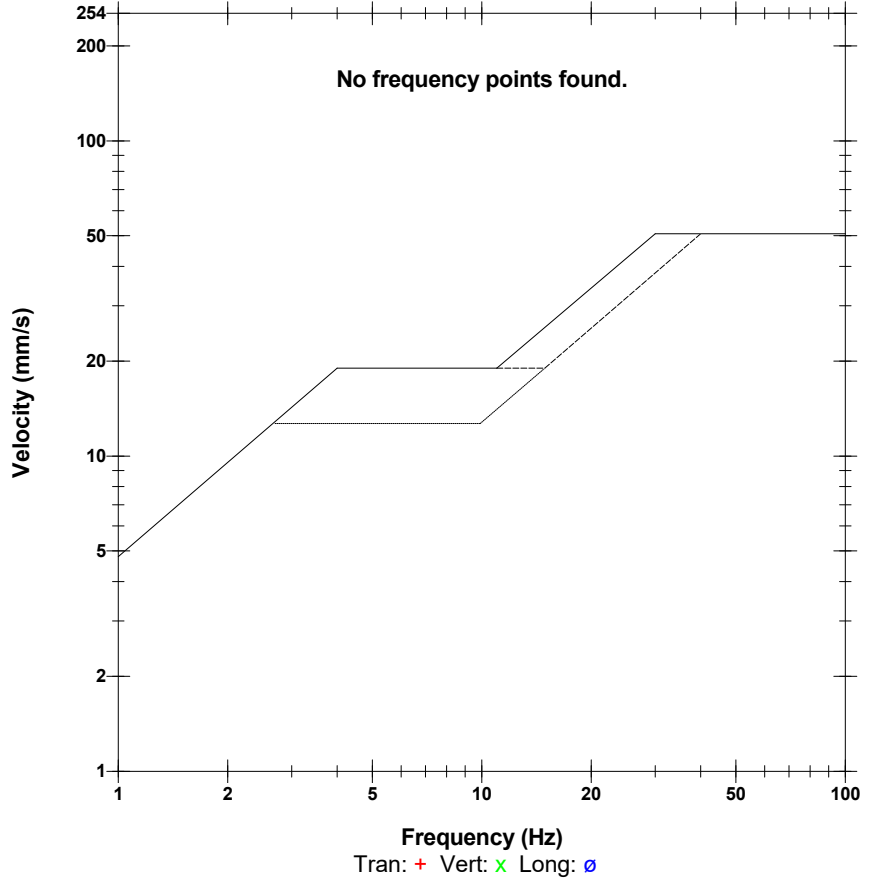
Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 133.8 dB(L) at 0.329 sec
ZC Freq 27 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1554 mv)

	Tran	Vert	Long	
PPV	0.244	0.363	0.654	mm/s
ZC Freq	N/A	N/A	N/A	Hz
Time (Rel. to Trig)	0.901	-0.138	3.101	sec
Peak Acceleration	0.013	0.015	0.015	g
Peak Displacement	0.000	0.000	0.000	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.776 mm/s at 4.814 sec
 N/A: Not Applicable

USBM R18507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 50.00 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 12:04:44 July 19, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 6.325 pa.(L)
Range Geo: 254.0 mm/s
Record Time 9.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/K4.MMB

Serial Number UM12241 V 10-87 Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name UM12241_20190719120444.IDFW

Post Event Notes

GD-763-02
 (This blast also has a very low value of the air blast overpressure)

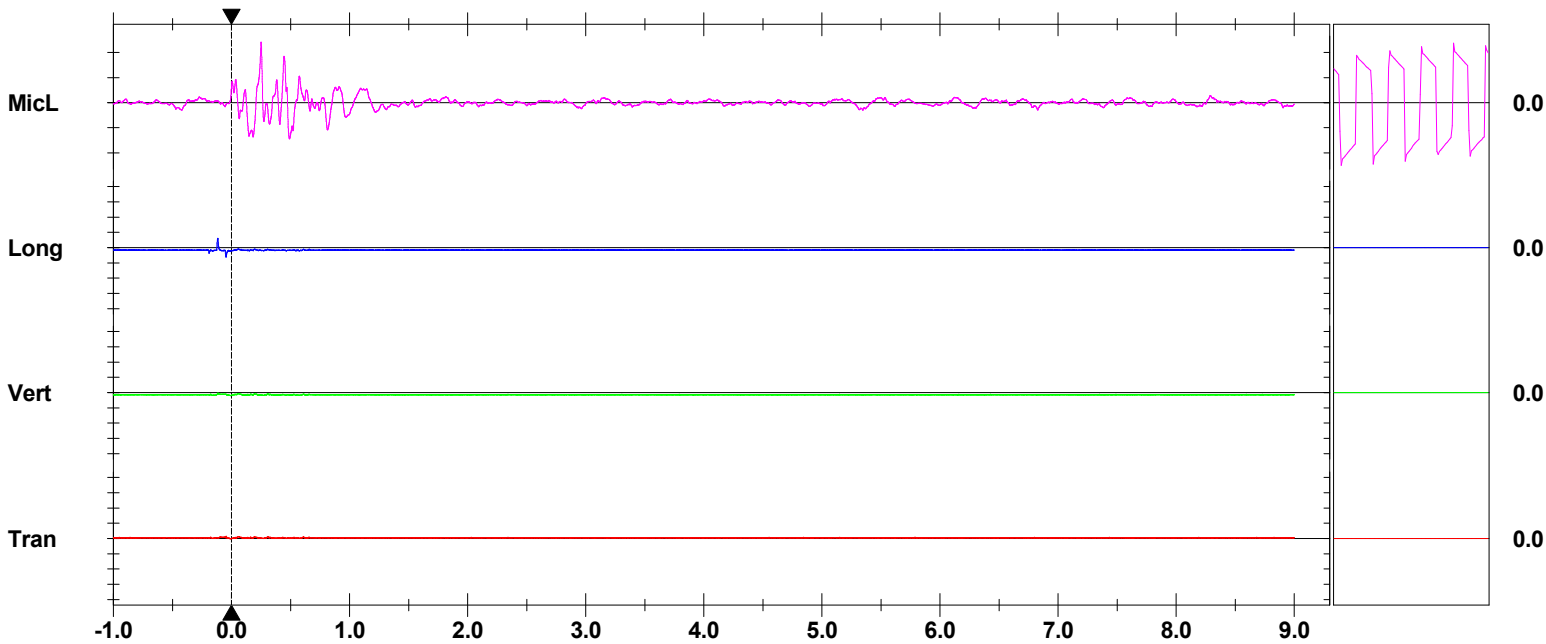
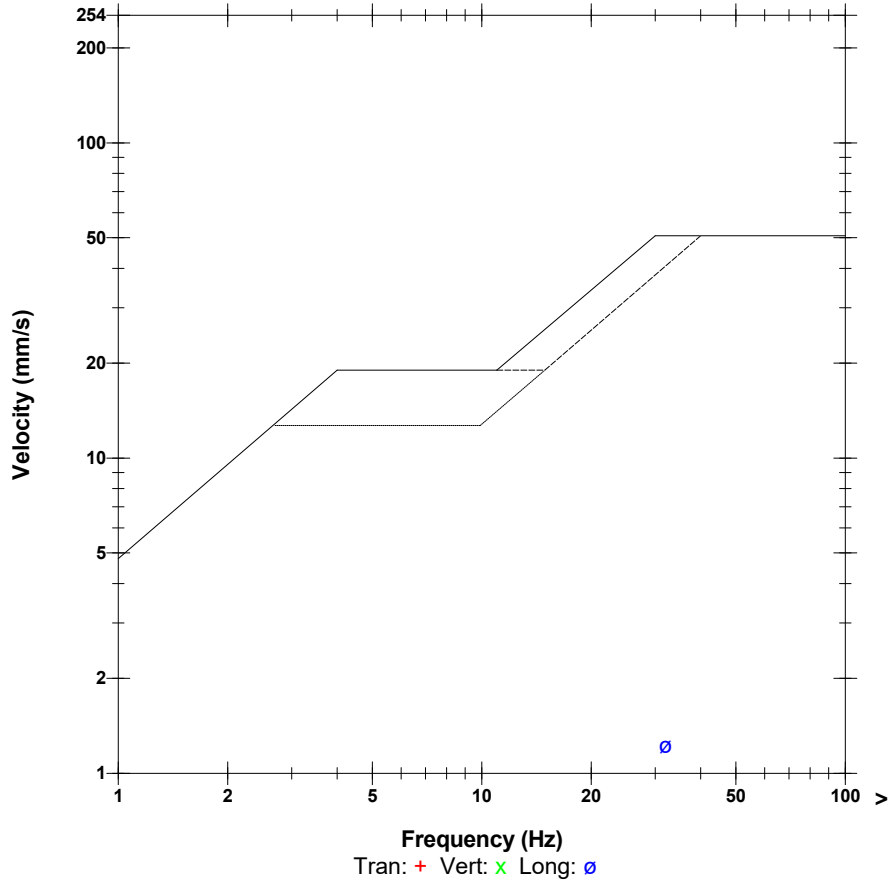
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 24.14 pa.(L) at 0.250 sec
ZC Freq 8.8 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1313 mv)

	Tran	Vert	Long	
PPV	0.284	0.402	1.277	mm/s
ZC Freq	3.6	N/A	N/A	Hz
Time (Rel. to Trig)	-0.045	-0.007	-0.045	sec
Peak Acceleration	0.016	0.015	0.035	g
Peak Displacement	0.040	0.000	0.145	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 1.323 mm/s at -0.045 sec
N/A: Not Applicable

USBM RI8507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger =

Sensor Check

Date/Time Vert at 14:50:56 July 21, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 6.325 pa.(L)
Range Geo: 254.0 mm/s
Record Time 2103.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/K4.MMB

Serial Number UM12241 V 10-87 Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name UM12241_20190721145056.IDFW

Notes

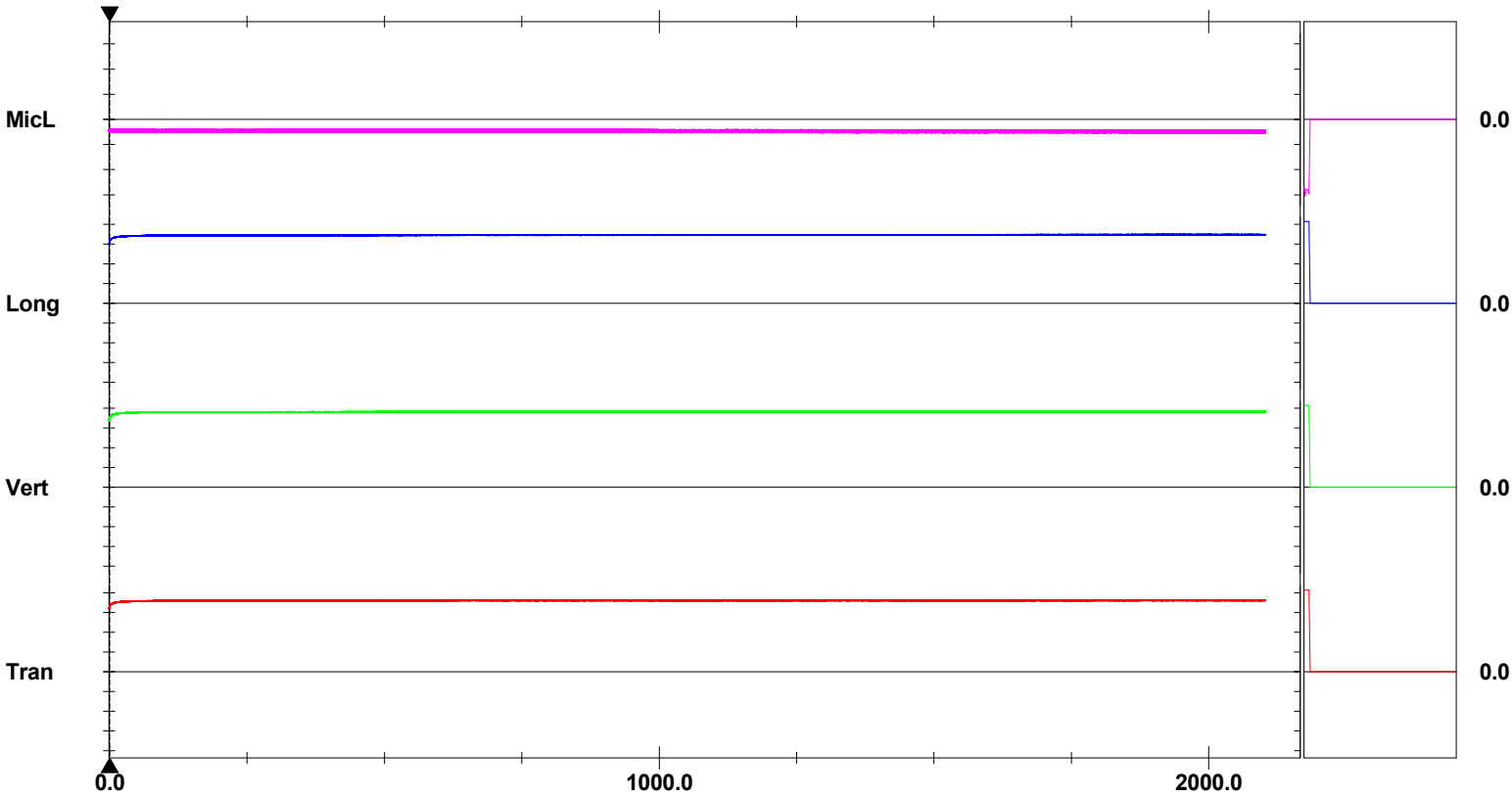
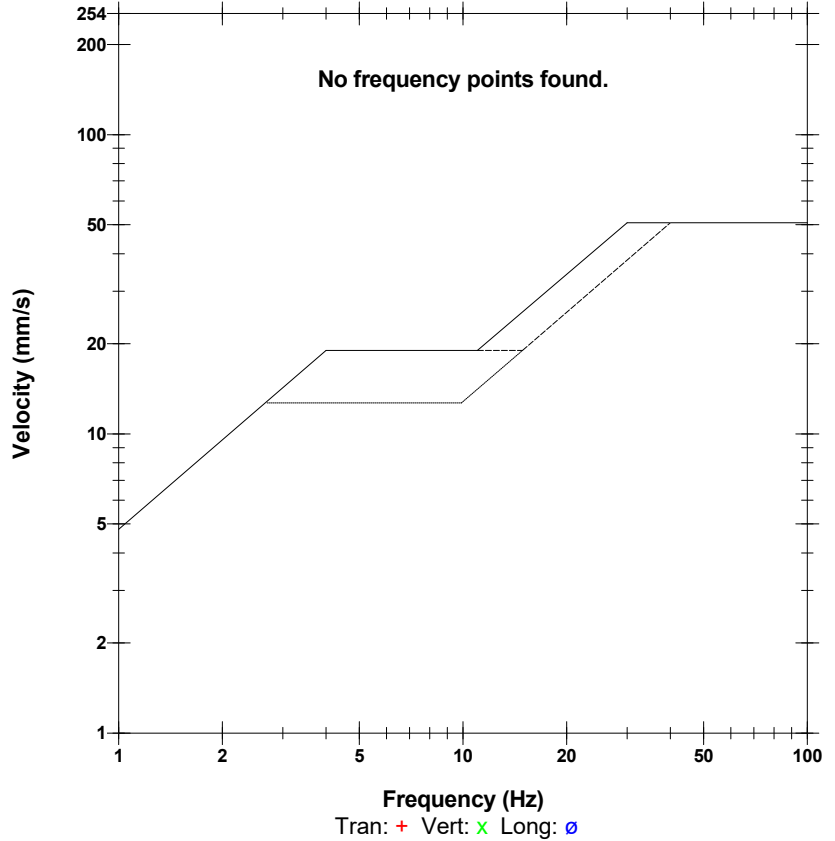
Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 0.559 pa.(L) at 1483.628 sec
ZC Freq N/A
Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	7.267	7.701	6.991	mm/s
ZC Freq	N/A	N/A	N/A	Hz
Time (Rel. to Trig)	480.518	1610.778	1916.660	sec
Peak Acceleration	0.013	0.012	0.013	g
Peak Displacement	0.000	0.000	0.000	mm
Sensor Check	Check	Check	Check	
Frequency	1024.0	1024.0	1024.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 12.65 mm/s at 2067.291 sec
N/A: Not Applicable

USBM RI8507 And OSMRE



Time Scale: 250.00 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 17:19:35 July 26, 2019
Trigger Source Geo: 12.70 mm/s, Mic: 68.95 pa.(L)
Range Geo: 254.0 mm/s
Record Time 3.0 sec at 1024 sps
Operator/Setup: Operator/factory.MMB

Serial Number UM12240 V 10-87 Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name __TEMP.EVT

Post Event Notes
 T3-695-07

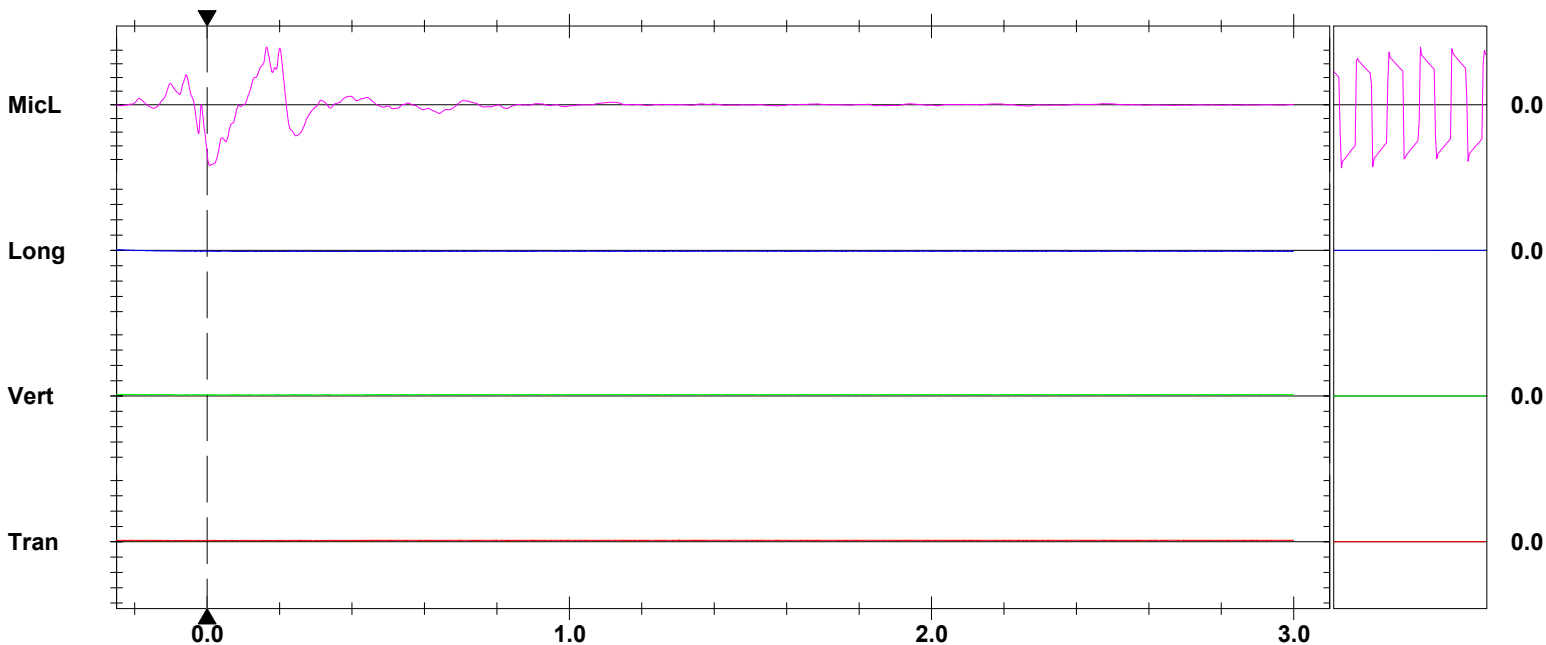
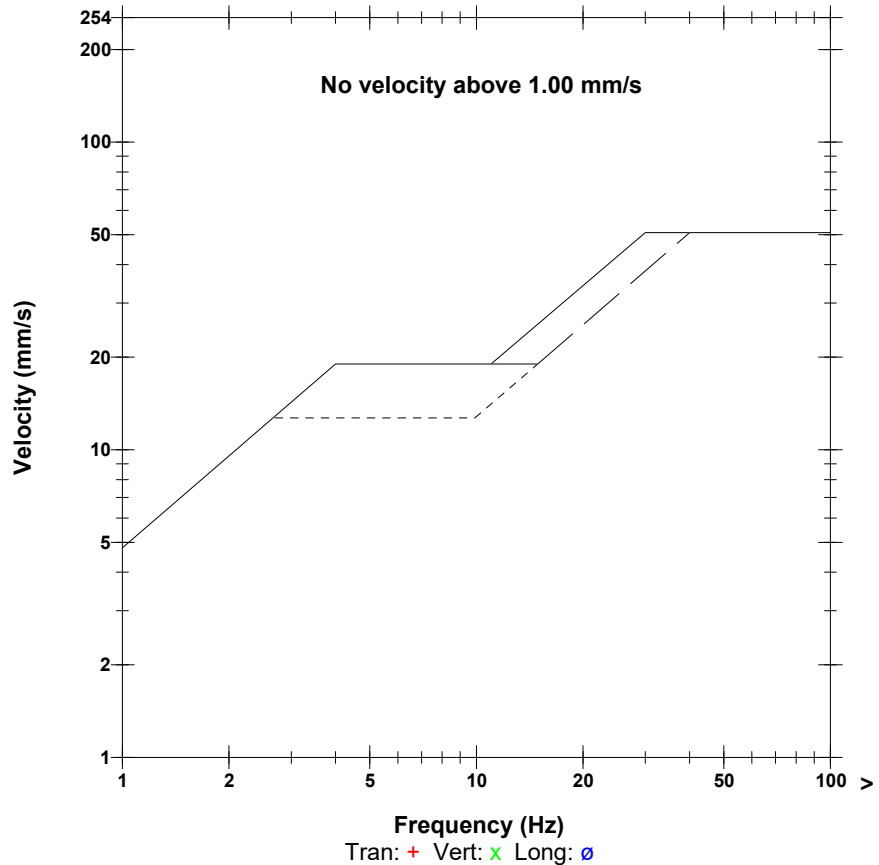
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 88.94 pa.(L) at 0.007 sec
ZC Freq 4.3 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1435 mv)

	Tran	Vert	Long	
PPV	0.229	0.229	0.158	mm/s
ZC Freq	N/A	N/A	N/A	Hz
Time (Rel. to Trig)	1.408	-0.233	0.138	sec
Peak Acceleration	0.007	0.007	0.007	g
Peak Displacement	0.000	0.000	0.001	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.322 mm/s at 1.757 sec
N/A: Not Applicable

USBM RI8507 And OSMRE



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 20.00 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 12:11:48 August 14, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 9.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/K4.MMB

Serial Number UM12241 V 10-87 Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name UM12241_20190814121148.IDFW

Post Event Notes
 GD-743-15

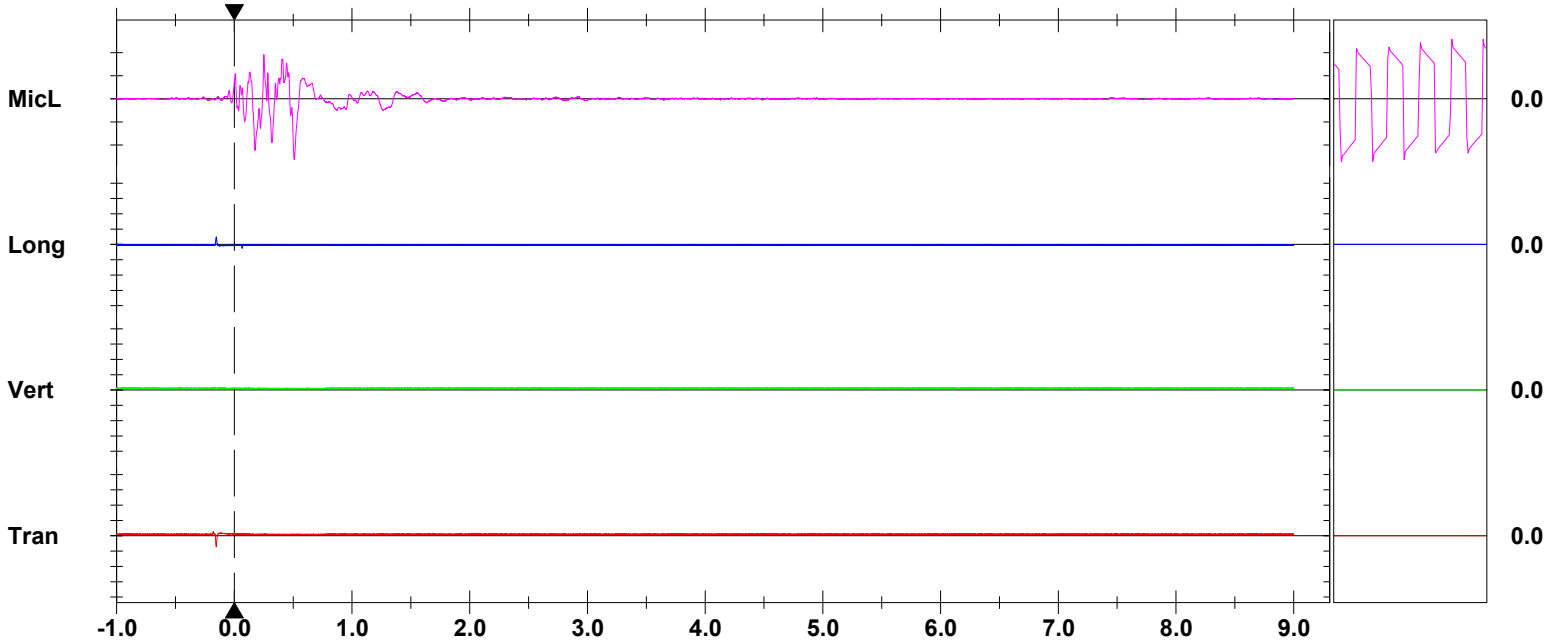
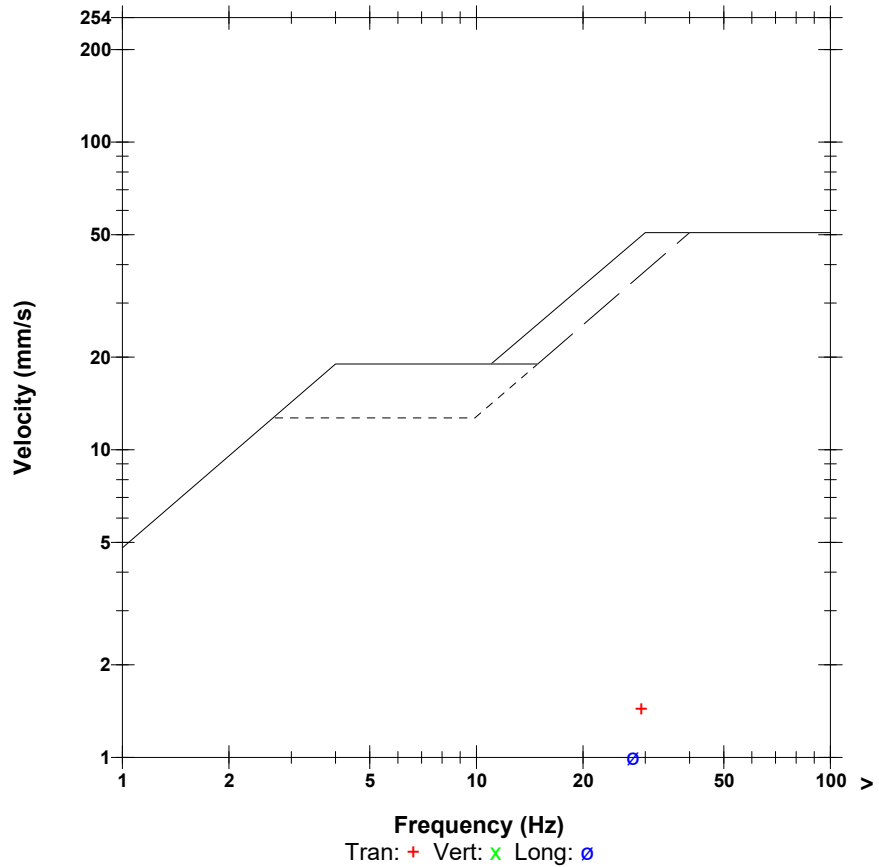
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 122.4 dB(L) at 0.509 sec
ZC Freq 6.4 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1413 mv)

	Tran	Vert	Long	
PPV	1.434	0.323	1.001	mm/s
ZC Freq	29	N/A	28	Hz
Time (Rel. to Trig)	-0.154	-0.157	-0.152	sec
Peak Acceleration	0.036	0.015	0.028	g
Peak Displacement	0.085	0.000	0.038	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 1.752 mm/s at -0.152 sec
N/A: Not Applicable

USBM RI8507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 13:23:33 August 21, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 9.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/K4.MMB

Serial Number UM12241 V 10-87 Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name UM12241_20190821132333.IDFW

Post Event Notes
 GD-763-04

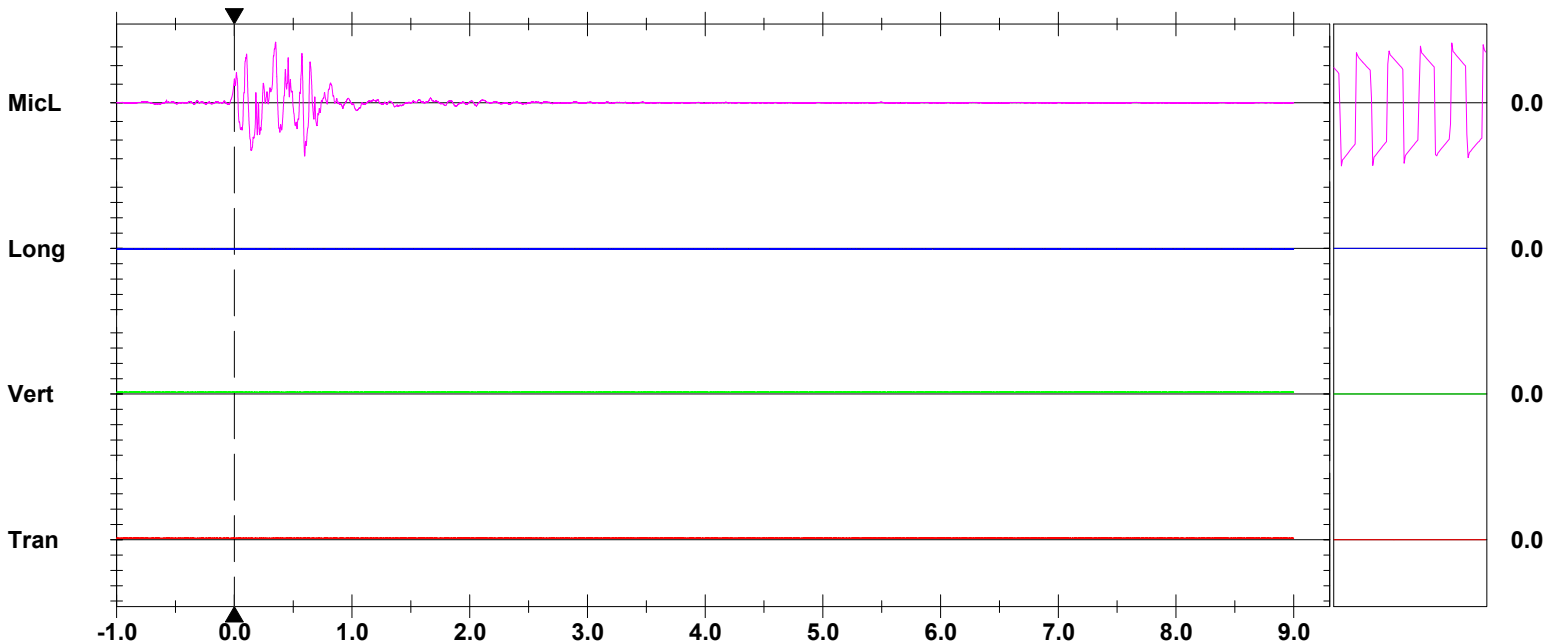
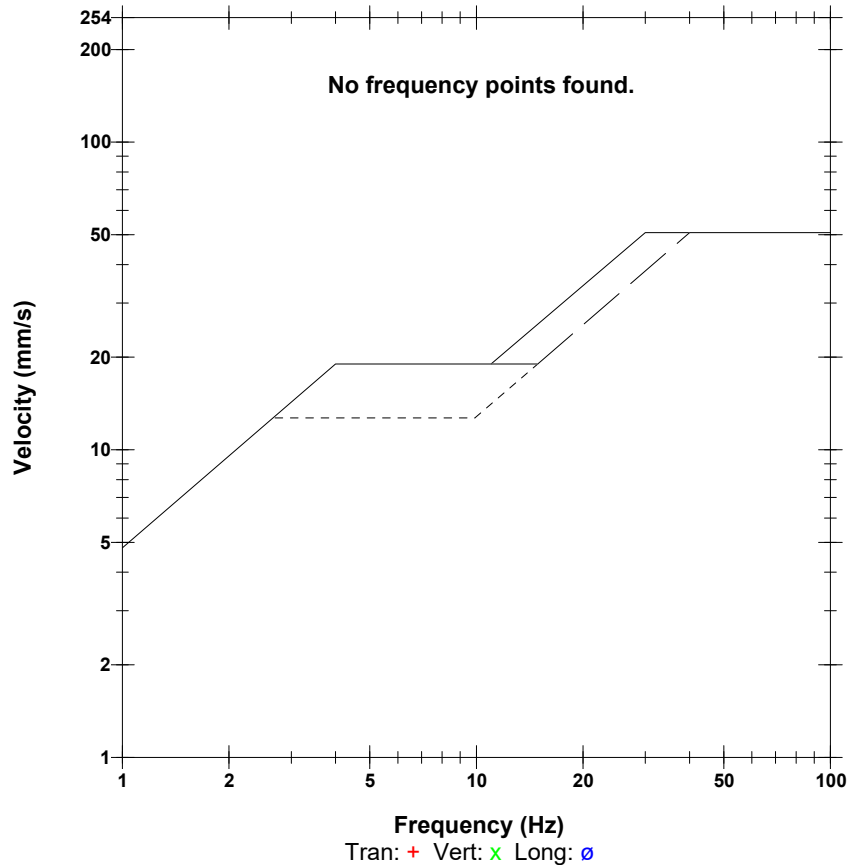
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 118.2 dB(L) at 0.351 sec
ZC Freq 6.4 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1395 mv)

	Tran	Vert	Long	
PPV	0.252	0.276	0.134	mm/s
ZC Freq	N/A	N/A	N/A	Hz
Time (Rel. to Trig)	3.471	0.951	-0.485	sec
Peak Acceleration	0.015	0.015	0.013	g
Peak Displacement	0.000	0.000	0.000	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.373 mm/s at 2.427 sec
N/A: Not Applicable

USBM RI8507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 5.000 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 12:12:10 September 25, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 9.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/GD.MMB

Serial Number UM12244 V 10-87 Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name UM12244_20190925121210.IDFW

Post Event Notes
 GD-743-17B

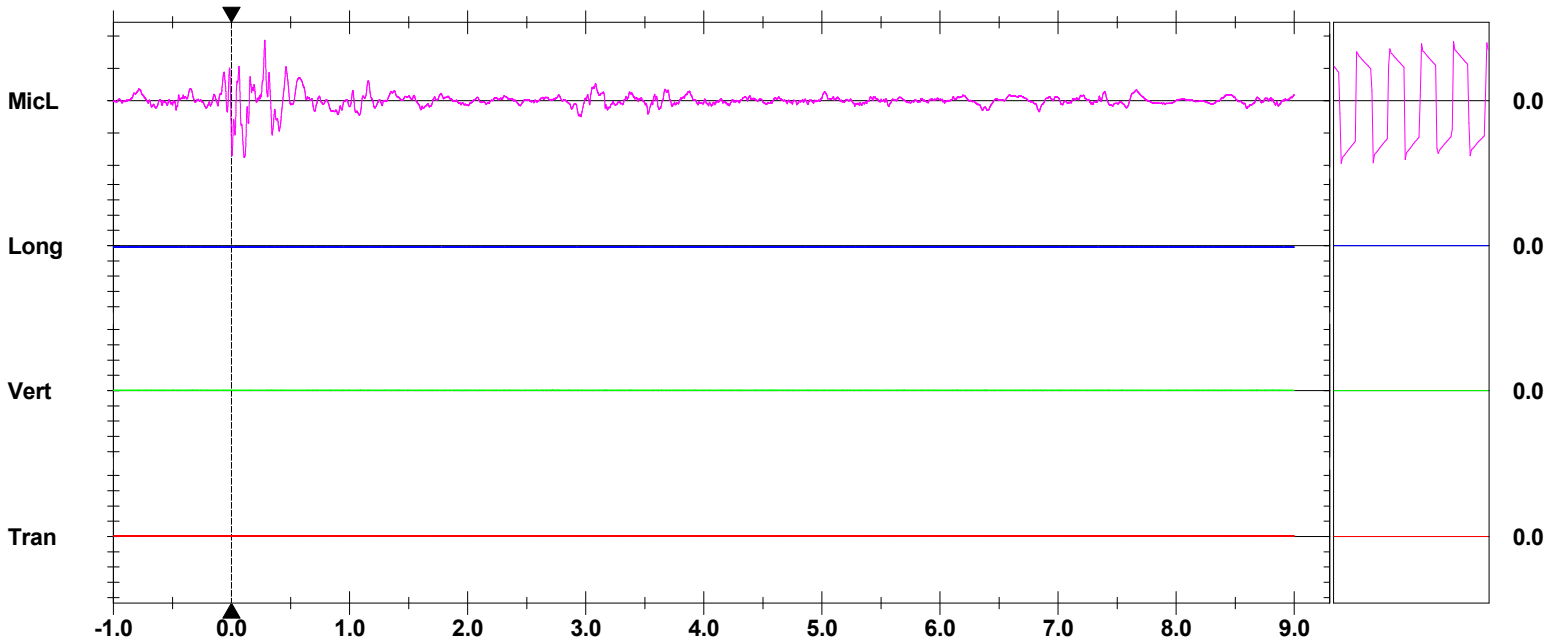
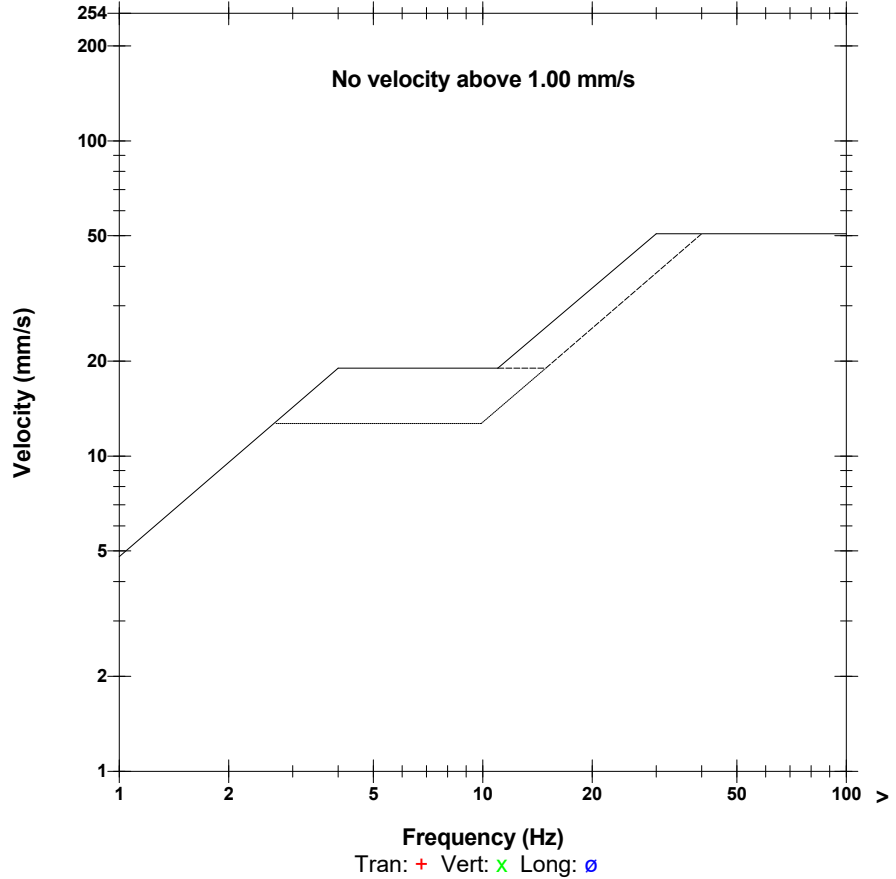
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 113.4 dB(L) at 0.283 sec
ZC Freq 4.4 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1448 mv)

	Tran	Vert	Long	
PPV	0.110	0.087	0.244	mm/s
ZC Freq	N/A	11.9	N/A	Hz
Time (Rel. to Trig)	2.910	2.767	-0.085	sec
Peak Acceleration	0.015	0.013	0.013	g
Peak Displacement	0.000	0.002	0.000	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.251 mm/s at -0.085 sec
 N/A: Not Applicable

USBM R18507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 5.000 pa.(L)/div
Trigger =

Sensor Check

Date/Time MicL at 11:25:07 September 29, 2019
Trigger Source Geo: 7.000 mm/s, Mic: 110.0 dB(L)
Range Geo: 254.0 mm/s
Record Time 9.0 sec (Auto=3Sec) at 2048 sps
Operator/Setup: Operator/GD.MMB

Serial Number UM12244 V 10-87 Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration June 30, 2017 by InstanTel
File Name UM12244_20190929112507.IDFW

Post Event Notes
 GD-738-02

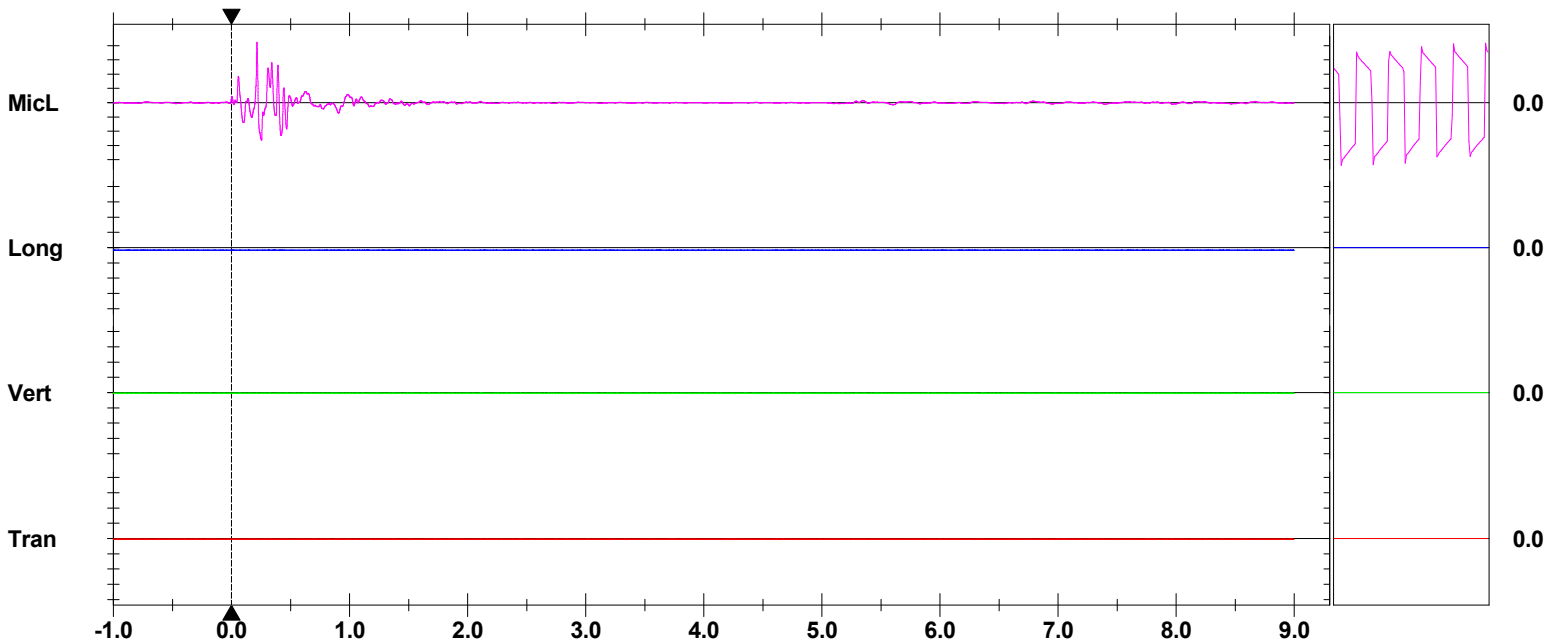
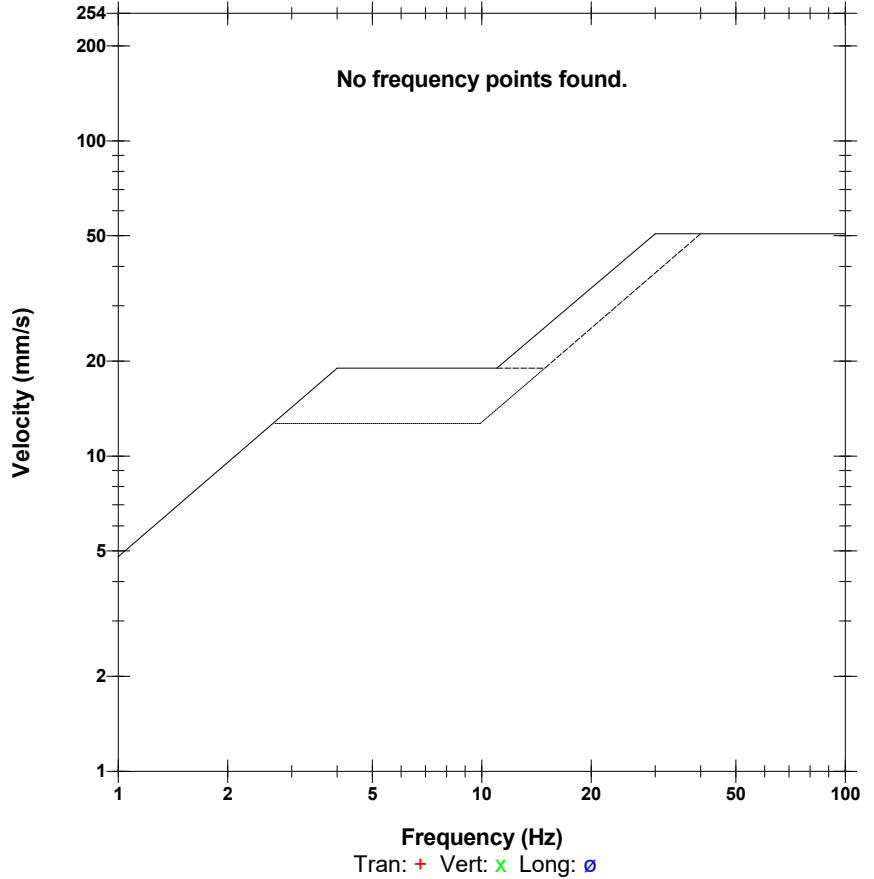
Notes
 Location:
 Client:
 User Name:
 General:

Microphone Linear Weighting
PSPL 132.6 dB(L) at 0.216 sec
ZC Freq 19.0 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1586 mv)

	Tran	Vert	Long	
PPV	0.134	0.142	0.378	mm/s
ZC Freq	N/A	N/A	N/A	Hz
Time (Rel. to Trig)	-0.168	-0.384	0.112	sec
Peak Acceleration	0.013	0.013	0.015	g
Peak Displacement	0.000	0.000	0.000	mm
Sensor Check	Passed	Passed	Passed	
Frequency	0.0	0.0	0.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 0.410 mm/s at 3.000 sec
 N/A: Not Applicable

USBM R18507 And OSMRE



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 20.00 pa.(L)/div
Trigger =

Sensor Check

B. Exfiltration water Quality - Goodwood Basin



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Goodwood

AGAT WORK ORDER: 19M469470

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-07-04

VERSION*: 1

PAGES (INCLUDING COVER): 6

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M469470

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JF DION

ATTENTION TO: Mariana Trindade

SAMPLING SITE: GOODWOOD (QUEBEC)

Inorganic Analyses - Surface Water

DATE RECEIVED: 2019-05-21

DATE REPORTED: 2019-07-04

SAMPLE DESCRIPTION: GW-EXF-1

SAMPLE TYPE: SW

DATE SAMPLED: 2019-05-20

Parameter	Unit	G / S	RDL	211377
Ammonia Nitrogen	mg/L - N		0.02	0.09
Total Kjeldahl Nitrogen	mg/L - N		0.3	<0.3
Total Suspended Solids	mg/L		2	2
pH	pH		NA	6.87

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

211377 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M469470

PROJECT: Goodwood

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JF DION

ATTENTION TO: Mariana Trindade

SAMPLING SITE: GOODWOOD (QUEBEC)

Total Extractable Metals

DATE RECEIVED: 2019-05-21

DATE REPORTED: 2019-07-04

SAMPLE DESCRIPTION: GW-EXF-1
SAMPLE TYPE: SW
DATE SAMPLED: 2019-05-20
G / S RDL 211377

Parameter	Unit	G / S	RDL	211377
Aluminum	µg/L		5	56
Antimony	µg/L		1	<1
Silver	µg/L		0.2	<0.2
Arsenic	µg/L		0.3	<0.3
Barium	µg/L		2	<2
Boron	µg/L		40	<40
Cadmium	µg/L		0.2	<0.2
Chromium	µg/L		1	<1
Cobalt	µg/L		0.5	<0.5
Copper	µg/L		1	<1
Manganese	µg/L		1	38
Mercury	µg/L		0.01	<0.01
Molybdenum	µg/L		1	<1
Nickel	µg/L		1	<1
Lead	µg/L		0.5	<0.5
Selenium	µg/L		1	<1
Sodium	µg/L		200	336
Zinc	µg/L		3	<3

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

211377 A higher RDL indicates that a dilution has been performed to reduce the concentration of analytes or to reduce matrix interference.

Certified By: _____



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Quality Assurance

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: Goodwood
 SAMPLED BY: JF DION

 AGAT WORK ORDER: 19M469470
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: GOODWOOD (QUEBEC)

Water Analysis

RPT Date: 2019-07-04			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Extractable Metals															
Aluminum	245842		176	172	2.3%	< 5	89%	80%	120%	90%	80%	120%	NA	80%	120%
Antimony	245842		<1	<1	NA	< 1	113%	80%	120%	92%	80%	120%	107%	80%	120%
Silver	245842		<0.2	<0.2	NA	< 0.2	NA	80%	120%	103%	80%	120%	104%	80%	120%
Arsenic	245842		<0.3	<0.3	NA	< 0.3	109%	80%	120%	110%	80%	120%	117%	80%	120%
Barium	245842		5	5	NA	< 2	109%	80%	120%	95%	80%	120%	NA	80%	120%
Boron	245842		<40	<40	NA	< 40	112%	80%	120%	117%	80%	120%	103%	80%	120%
Cadmium	245842		<0.2	<0.2	NA	< 0.1	103%	80%	120%	102%	80%	120%	NA	80%	120%
Chromium	245842		6	6	0.0%	< 1	111%	80%	120%	107%	80%	120%	NA	80%	120%
Cobalt	245842		0.8	0.8	NA	< 0.5	114%	80%	120%	109%	80%	120%	102%	80%	120%
Copper	245842		NA	NA	0.0%	< 1	108%	80%	120%	98%	80%	120%	NA	80%	120%
Manganese	245842		4	4	NA	< 1	104%	80%	120%	99%	80%	120%	94%	80%	120%
Mercury	211668		<0.01	<0.01	NA	< 0.01	102%	80%	120%	99%	80%	120%	110%	80%	120%
Molybdenum	245842		<1	<1	NA	< 1	106%	80%	120%	119%	80%	120%	105%	80%	120%
Nickel	245842		3	3	NA	< 1	107%	80%	120%	104%	80%	120%	103%	80%	120%
Lead	245842		0.5	0.5	NA	< 0.5	110%	80%	120%	109%	80%	120%	98%	80%	120%
Selenium	245842		<1	<1	NA	< 1	117%	80%	120%	120%	80%	120%	NA	80%	120%
Sodium	245842		1640	1630	0.6%	< 200	103%	80%	120%	101%	80%	120%	NA	80%	120%
Zinc	245842		11	11	NA	< 3	106%	80%	120%	96%	80%	120%	NA	80%	120%

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spiked blank or CRM indicates that it is not required by the procedure.

The percent recovery of the CRM may be outside of the acceptability criteria of 80-120%, if conform to the criteria provided on the Certificate of Analysis of the reference material.

Inorganic Analyses - Surface Water

Ammonia Nitrogen	204118		1.72	1.75	1.7%	< 0.02	116%	80%	120%	89%	80%	120%	NA	80%	120%
Total Kjeldahl Nitrogen	209556		0.9	0.9	NA	< 0.3	106%	80%	120%	100%	80%	120%	87%	80%	120%
Total Suspended Solids	210192		7	7	NA	< 2	90%	80%	120%	NA			107%	80%	120%
pH	211498		7.80	7.83	0.4%		100%	80%	120%	100%	80%	120%	NA		

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spiked blank or CRM indicates that it is not required by the procedure.

The percent recovery of the CRM may be outside of the acceptability criteria of 80-120%, if conform to the criteria provided on the Certificate of Analysis of the reference material.

Certified By: _____



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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M469470

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY: JF DION

SAMPLING SITE: GOODWOOD (QUEBEC)

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Ammonia Nitrogen	2019-05-28	2019-05-28	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
Total Kjeldahl Nitrogen	2019-05-29	2019-05-29	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Suspended Solids	2019-05-27	2019-05-28	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
pH	2019-05-22	2019-05-22	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRY
Aluminum	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Barium	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-06-10	2019-06-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Chromium	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Cobalt	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Copper	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Manganese	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Mercury	2019-05-24	2019-05-24	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Molybdenum	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Lead	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Sodium	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Zinc	2019-06-10	2019-06-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS

C. Water Quality



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Goodwood

AGAT WORK ORDER: 19M488236

MICROBIOLOGY ANALYSIS REVIEWED BY: Linda Maille, Superviseur Microbiology

TRACE ORGANICS REVIEWED BY: Robert Roch, Chimiste

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-09-03

VERSION*: 1

PAGES (INCLUDING COVER): 15

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JFD

ATTENTION TO: Mariana Trindade

SAMPLING SITE: QUEBEC

Microbiology - Surface Water

DATE RECEIVED: 2019-07-04

DATE REPORTED: 2019-09-03

Parameter	Unit	DSO4-ER-GW-		DSO4-EE-GW-	
		G / S	RDL	G / S	RDL
SAMPLE DESCRIPTION: Q1-2019 Q1-2019					
SAMPLE TYPE: SW SW					
DATE SAMPLED: 2019-06-14 2019-06-14					
Total Coliforms	CFU/100ml		2	2	30
Atypical Bacteria	CFU/100ml		2	62	2
Fecal Coliforms	CFU/100ml		2	<2	<2
Temperature upon receipt	°C		N/A	10.0	10.0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
324641-324688 The results are preliminary and subject to change if they are not certified.

Certified By:



Linda Maille

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Certificate of Analysis

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

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FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: QUEBEC

Petroleum Hydrocarbons in Water

DATE RECEIVED: 2019-07-04

DATE REPORTED: 2019-09-03

Parameter	Unit	G / S	DSO4-ER-GW-		DSO4-EE-GW-	
			RDL	324641	RDL	324688
Petroleum Hydrocarbons C10-C50	µg/L	100	<100	<100		
Surrogate	Unit	Acceptable Limits				
Nonane	%	40-140	107	102		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

324641-324688 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



Robert Roch

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Certificate of Analysis

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JFD

ATTENTION TO: Mariana Trindade

SAMPLING SITE: QUEBEC

Inorganic Analyses

DATE RECEIVED: 2019-07-04

DATE REPORTED: 2019-09-03

Parameter	Unit	DSO4-ER-GW-		DSO4-EE-GW-	
		SAMPLE DESCRIPTION: Q1-2019		Q1-2019	
		SAMPLE TYPE: SW		SW	
		DATE SAMPLED: 2019-06-14		2019-06-14	
		G / S	RDL	324641	324688
Alkalinity	mg/L - CaCO3		1.5	<1.5	<1.5
Ammonia Nitrogen	mg/L - N		0.02	0.32	0.09
Total Kjeldahl Nitrogen	mg/L - N		0.3	<0.3	<0.3
Dissolved Organic Carbon	mg/L		0.30	3.40	1.72
Total Organic Carbon	mg/L		0.30	3.98	2.26
Chloride	mg/L		0.5	<0.5	<0.5
Hexavalent Chromium	mg/L		0.008	<0.008	<0.008
Conductivity (25 Celsius)	µmhos/cm		2	4	2
Total Cyanide	mg/L - CN		0.005	<0.005	<0.005
BOD5	mg/L - O2		2	<2	<2
COD	mg/L - O2		5	<5	<5
Fluoride	mg/L		0.10	<0.10	<0.10
Total Suspended Solids	mg/L		2	<2	<2
Nitrate	mg/L - N		0.02	<0.02	<0.02
Nitrite	mg/L - N		0.02	<0.02	<0.02
Dissolved Oxygen	mg/L - O2		3	8	8
pH	pH		NA	7.51	6.99
Total Phenols	mg/L		0.002	0.002	0.004
Total Phosphorus	mg/L - P		0.02	<0.02	<0.02
Reactive Silica	mg/L		0.05	1.60	1.60
Dissolved Solids	mg/L		10	<10	12
Sulfate	mg/L		0.5	0.5	1.0
Total Sulfide	mg/L S-2		0.02	<0.02	<0.02
Nitrite-Nitrate (Montreal) (mg/L -N)	mg/L - N		0.04	<0.04	<0.04

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

324641-324688 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
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TEL (514)337-1000
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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JFD

ATTENTION TO: Mariana Trindade

SAMPLING SITE: QUEBEC

Subcontracting

DATE RECEIVED: 2019-07-04

DATE REPORTED: 2019-09-03

		DSO4-ER-GW-		DSO4-EE-GW-	
SAMPLE DESCRIPTION:		Q1-2019		Q1-2019	
SAMPLE TYPE:		SW		SW	
DATE SAMPLED:		2019-06-14		2019-06-14	
Parameter	Unit	G / S	RDL	324641	324688
Radium-226	Bq/L	0.005	<0.005	<0.005	<0.005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
324641-324688 Subcontract analysis

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

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TEL (514)337-1000
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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JFD

ATTENTION TO: Mariana Trindade

SAMPLING SITE: QUEBEC

Total Extractable Metals

DATE RECEIVED: 2019-07-04

DATE REPORTED: 2019-09-03

Parameter	Unit	DSO4-ER-GW-		DSO4-EE-GW-	
		SAMPLE DESCRIPTION: Q1-2019		Q1-2019	
		SAMPLE TYPE: SW		SW	
		DATE SAMPLED: 2019-06-14		2019-06-14	
		G / S	RDL	324641	324688
Aluminum	µg/L		5	70	18
Antimony	µg/L		1	<1	<1
Silver	µg/L		0.2	<0.2	<0.2
Arsenic	µg/L		0.3	<0.3	<0.3
Barium	µg/L		2	<2	<2
Boron	µg/L		40	<40	<40
Cadmium	µg/L		0.2	<0.2	<0.2
Chromium	µg/L		1	<1	<1
Cobalt	µg/L		0.5	<0.5	<0.5
Copper	µg/L		1	<1	<1
Tin	µg/L		5	<5	<5
Iron	µg/L		60	<60	<60
Manganese	µg/L		1	29	30
Mercury	µg/L		0.01	0.01	<0.01
Molybdenum	µg/L		1	<1	<1
Nickel	µg/L		1	<1	<1
Lead	µg/L		0.5	<0.5	<0.5
Potassium	µg/L		100	120	<100
Selenium	µg/L		1	<1	<1
Sodium	µg/L		200	223	<200
Thallium	µg/L		1	<1	<1
Titanium	µg/L		3	<3	<3
Uranium	µg/L		0.5	<0.5	<0.5
Vanadium	µg/L		1	<1	<1
Zinc	µg/L		3	<3	<3
Hardness	µg/L - CaCO3		1000	1230	<1000

Certified By: _____



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AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

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CANADA H4S 1V9
TEL (514)337-1000
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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: QUEBEC

Total Extractable Metals

DATE RECEIVED: 2019-07-04

DATE REPORTED: 2019-09-03

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

324641-324688 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: Goodwood
 SAMPLED BY: JFD

AGAT WORK ORDER: 19M488236
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: QUEBEC

Trace Organics Analysis

RPT Date: 2019-09-03			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE		MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons in Water															
Petroleum Hydrocarbons C10-C50	MR		3530	3500	0.9%	< 100	NA	70%	130%	94%	70%	130%	NA	70%	130%

Comments: NA : Non applicable
 If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
 NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.
 NA in the spiked blank or CRM indicates that it is not required by the procedure.

Certified By: _____



Robert Roch

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Quality Assurance

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: Goodwood
 SAMPLED BY: JFD

 AGAT WORK ORDER: 19M488236
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: QUEBEC

Water Analysis															
RPT Date: 2019-09-03			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Total Extractable Metals

Aluminum	323737		<5	<5	NA	< 5	99%	80%	120%	103%	80%	120%	106%	80%	120%
Antimony	323737		<1	<1	NA	< 1	109%	80%	120%	99%	80%	120%	120%	80%	120%
Silver	323737		<0.2	<0.2	NA	< 0.2	NA	80%	120%	102%	80%	120%	100%	80%	120%
Arsenic	323737		<0.3	<0.3	NA	< 0.3	99%	80%	120%	106%	80%	120%	111%	80%	120%
Barium	323737		107	101	5.8%	< 2	92%	80%	120%	95%	80%	120%	NA	80%	120%
Boron	323737		257	262	1.9%	< 40	106%	80%	120%	102%	80%	120%	NA	80%	120%
Cadmium	323737		<0.2	<0.2	NA	< 0.2	103%	80%	120%	99%	80%	120%	NA	80%	120%
Chromium	323737		<1	<1	NA	< 1	102%	80%	120%	102%	80%	120%	99%	80%	120%
Cobalt	323737		<0.5	<0.5	NA	< 0.5	103%	80%	120%	104%	80%	120%	91%	80%	120%
Copper	323737		2	2	NA	< 1	102%	80%	120%	102%	80%	120%	103%	80%	120%
Tin	323737		<5	<5	NA	< 5	NA	80%	120%	103%	80%	120%	109%	80%	120%
Iron	323737		747	706	5.6%	< 60	98%	80%	120%	99%	80%	120%	NA	80%	120%
Manganese	323737		22	21	4.7%	< 1	101%	80%	120%	97%	80%	120%	NA	80%	120%
Mercury	1		NA	NA	NA	< 0.01	106%	80%	120%	102%	80%	120%	NA	80%	120%
Molybdenum	323737		<1	<1	NA	< 1	100%	80%	120%	103%	80%	120%	NA	80%	120%
Nickel	323737		4	3	NA	< 1	104%	80%	120%	101%	80%	120%	104%	80%	120%
Lead	323737		<0.5	<0.5	NA	< 0.5	101%	80%	120%	104%	80%	120%	NA	80%	120%
Potassium	323737		13500	13600	0.7%	< 100	98%	80%	120%	95%	80%	120%	NA	80%	120%
Selenium	323737		<1	<1	NA	< 1	99%	80%	120%	105%	80%	120%	116%	80%	120%
Sodium	323737		268000	266000	0.7%	< 200	102%	80%	120%	105%	80%	120%	NA	80%	120%
Thallium	323737		<1	<1	NA	< 1	100%	80%	120%	104%	80%	120%	99%	80%	120%
Titanium	323737		<3	<3	NA	< 3	NA	80%	120%	98%	80%	120%	106%	80%	120%
Uranium	323737		<0.5	<0.5	NA	< 0.5	99%	80%	120%	105%	80%	120%	106%	80%	120%
Vanadium	323737		<1	<1	NA	< 1	104%	80%	120%	101%	80%	120%	99%	80%	120%
Zinc	323737		3	<3	NA	< 3	102%	80%	120%	103%	80%	120%	115%	80%	120%

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percent of recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spiked blank or CRM indicates that it is not required by the procedure.

The percent recovery of the CRM may be outside of the acceptability criteria of 80-120%, if conform to the criteria provided on the Certificate of Analysis of the reference material.

Inorganic Analyses

Alkalinity	308458		103	102	1.0%	< 1.5	95%	80%	120%	92%	80%	120%	NA	80%	120%
Ammonia Nitrogen	316867		0.38	0.42	10.0%	< 0.02	109%	80%	120%	116%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	3		NA	NA	0.0%	< 0.30	110%	80%	120%	108%	80%	120%	NA	80%	120%
Total Organic Carbon	324491		3.71	3.72	0.3%	< 0.30	110%	80%	120%	108%	80%	120%	117%	80%	120%
Chloride	327076		<0.5	<0.5	NA	< 0.5	95%	80%	120%	84%	80%	120%	111%	80%	120%
Hexavalent Chromium	312129		< 0.008	< 0.008	NA	< 0.008	97%	80%	120%	102%	80%	120%	NA	80%	120%
Conductivity (25 Celsius)	319250		9	9	NA	< 2	103%	80%	120%	102%	80%	120%	102%	80%	120%
Total Cyanide	324688	324688	<0.005	<0.005	NA	< 0.005	77%	80%	120%	101%	80%	120%	83%	80%	120%
BOD5	1		NA	NA	0.0%	< 2	85%	80%	120%	92%	80%	120%	88%	80%	120%
COD	342049		<5	<5	NA	< 5	109%	80%	120%	97%	80%	120%	NA	80%	120%

Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY: JFD

AGAT WORK ORDER: 19M488236
ATTENTION TO: Mariana Trindade
SAMPLING SITE: QUEBEC

Water Analysis (Continued)

RPT Date: 2019-09-03			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Fluoride	327076		<0.10	<0.10	NA	< 0.10	100%	80%	120%	105%	80%	120%	NA	80%	120%
Total Suspended Solids	326040		13	13	0.0%	< 2	98%	80%	120%	NA	80%	120%	96%	80%	120%
Nitrate	327076		NA	NA	0.0%	< 0.02	96%	80%	120%	96%	80%	120%	96%	80%	120%
Nitrite	327076		<0.02	<0.02	NA	< 0.02	NA	80%	120%	91%	80%	120%	105%	80%	120%
pH	325688		7.00	7.03	0.4%		99%	80%	120%	99%	80%	120%	NA		
Total Phenols	324641	324641	0.002	<0.002	NA	< 0.002	100%	80%	120%	90%	80%	120%	80%	80%	120%
Reactive Silica	307536		4.81	4.80	0.2%	< 0.05	113%	80%	120%	120%	80%	120%	107%	70%	130%
Dissolved Solids	324641	324641	<10	14	NA	< 10	102%	80%	120%	NA	80%	120%	106%	80%	120%
Sulfate	327076		NA	NA	0.0%	< 0.5	98%	80%	120%	95%	80%	120%	NA	80%	120%
Total Sulfide	325688		0.13	0.13	0.0%	< 0.02	92%	80%	120%	92%	80%	120%	113%	80%	120%

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Inorganic Analyses

BOD5	1		NA	NA	0.0%	< 2	80%	80%	120%	88%	80%	120%	102%	80%	120%
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Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: QUEBEC

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Total Coliforms	2019-07-06	2019-07-06	MIC-102-7017	MA.700-Col 1.0	N/A
Atypical Bacteria	2019-07-06	2019-07-06	MIC-102-7017	MA.700-Col1.0	N/A
Fecal Coliforms	2019-07-06	2019-07-06	MIC-102-7013	MA.700-Fec.Ec 1.0	N/A
Temperature upon receipt	2019-07-05	2019-07-05	N/A		N/A
Trace Organics Analysis					
Petroleum Hydrocarbons C10-C50	2019-07-05	2019-07-05	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID
Nonane	2019-07-05	2019-07-05	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: QUEBEC

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Alkalinity	2019-07-05	2019-07-05	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION
Ammonia Nitrogen	2019-07-17	2019-07-17	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
Total Kjeldahl Nitrogen		2019-07-30	INOR-101-6048F	MA.300-NTPPT 2.0	COLORIMETRY
Dissolved Organic Carbon	2019-07-05	2019-07-05	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Total Organic Carbon	2019-07-05	2019-07-05	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
Chloride	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Hexavalent Chromium	2019-07-05	2019-07-05	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Conductivity (25 Celsius)	2019-07-16	2019-07-16	INOR-101-6016F	MA.115-Cond. 1.1	CONDUCTIVIMETER
Total Cyanide	2019-07-19	2019-07-19	INOR-101-6061F	MA. 300 - CN 1.2	COLORIMETRY
BOD5	2019-07-31	2019-08-07	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRIC
COD	2019-07-31	2019-07-31	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Fluoride	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-07-05	2019-07-06	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Nitrate	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Dissolved Oxygen	2019-08-07	2019-08-07	INOR-101-6006F, unaccredited by MDDELCC	MA. 315 - DBO 1.1	ELECTROMETRIC
pH	2019-07-05	2019-07-05	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRIC
Total Phenols	2019-07-13	2019-07-13	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMETRY
Total Phosphorus		2019-07-26	INOR-101-6048F	MA.300-NTPPT 2.0	COLORIMETRY
Reactive Silica	2019-08-05	2019-08-05	INOR-101-6071F, unaccredited by MDDELCC	AQ2 EPA-122A Rev 5	COLORIMETRY
Dissolved Solids	2019-07-19	2019-07-20	INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Sulfate	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Sulfide	2019-07-12	2019-07-12	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Radium-226			Subcontracted	Subcontracted	N/A
Aluminum	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-07-05	2019-07-08	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Tin	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Iron	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Mercury	2019-07-10	2019-07-10	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Molybdenum	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-07-05	2019-07-08	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Sodium	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M488236

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: QUEBEC

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Titanium	2019-07-05	2019-07-08	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-07-05	2019-07-08	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-07-05	2019-07-08	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Hardness	2019-07-08	2019-07-08	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS

Chaîne de traçabilité Environnement

Eau potable RQEP (réseau) - Veuillez utiliser le formulaire du MDDELCC

Information pour le rapport

Compagnie : **TSMC**
 Adresse : _____
 Téléphone : _____ Téléc. : _____
 Projet : **Goodwood**
 Lieu de prélèvement : **Quebec**
 Prélevé par : **JFD**

Rapport envoyé à

1. Nom: **TSMC mailing list**
 Courriel: _____
 2. Nom: _____
 Courriel: _____

Critères à respecter

PRTC ABC RESC
 CCME
 Eau consommation
 Eau résurg. Surface
 Eau résurg. Salée
 CMM Sanitaire Pluvial
 Autre.

Délais d'analyse requis (jours ouvrables)

Environnemental: Régulier: 5 à 7 jours Urgent: Même jour 1 jour 2 jours 3 jours
Haute Résolution: Régulier: 10 à 15 jours Urgent: < 10 jours
 Date Requête: _____

Facturé à

Même adresse: Oui Non
 Compagnie : **TSMC**
 Contact : _____
 Courriel : _____
 Adresse : _____
 Bon de commande : **3000000242** Soumission : _____

Commentaires: **VOIR LE PAGE POUR PARAMETRES A ANALYSER Appendix "Quebec"**

Matrice (légende)

EP Eau potable EB Eau brute EPI Eau de piscine
 S Sol B Boue SE Sédiment ES Eau de surface AF Affluent
 SL Solide EU Eau usée EF Effluent ST Eau souterraine A Air

IDENTIFICATION DE L'ÉCHANTILLON	PRÉLÈVEMENT		MATRICE	NB DE CONTENANTS
	DATE (AA/MM/JJ)	HEURE		
DS04-ER-GW-Q1-2014	19/06/14	8:05	ES	16
DS04-EF-GW-Q1-2014	"	9:53	ES	16

Format de rapport

Portrait (échantillon/page) Paysage (échantillons/page)

Hydrocarbures pétroliers C13-C50		COURT DÉLAI DE CONSERVATION	
<input type="checkbox"/> P-AP	<input type="checkbox"/> ETEX <input type="checkbox"/> HAM <input type="checkbox"/> HAC-HAM <input type="checkbox"/> T-IM	<input type="checkbox"/> CHLORURES	<input type="checkbox"/> COD
<input type="checkbox"/> Chlorobenzènes	<input type="checkbox"/> Phthalates <input type="checkbox"/> COSV	<input type="checkbox"/> Bromates	<input type="checkbox"/> o-PDA <input type="checkbox"/> NO ₂
<input type="checkbox"/> EPC: Congénères	<input type="checkbox"/> Aroclor <input type="checkbox"/> CENC	<input type="checkbox"/> Fluorures	<input type="checkbox"/> NO ₃
<input type="checkbox"/> Éthylène glycol	<input type="checkbox"/> Formaldéhyde	<input type="checkbox"/> Sulfates	<input type="checkbox"/> Turbidité
<input type="checkbox"/> Huiles et graisses: Minérales	<input type="checkbox"/> Totales	<input type="checkbox"/> Sulfures	<input type="checkbox"/> Couleur
<input type="checkbox"/> Pesticides: OC	<input type="checkbox"/> OP	<input type="checkbox"/> Disposables	<input type="checkbox"/> DBO ₅ Carbonée
<input type="checkbox"/> Herbicides	<input type="checkbox"/> Glyphosate	<input type="checkbox"/> Oxydables	<input type="checkbox"/> Coliformes: Totaux
<input type="checkbox"/> Diquat/ Paraquat	<input type="checkbox"/> Indiole phénolique (4AAP)	<input type="checkbox"/> COT	<input type="checkbox"/> Fécules
<input type="checkbox"/> Phénols (GC-MS)	<input type="checkbox"/> Hg	<input type="checkbox"/> NO ₂ + HO ₃	<input type="checkbox"/> E. coli
<input type="checkbox"/> Métaux - Sol	<input type="checkbox"/> Hg	<input type="checkbox"/> NO ₃	<input type="checkbox"/> Microbiologie (autre):
<input type="checkbox"/> Métaux - ST	<input type="checkbox"/> CrVI	<input type="checkbox"/> MES	<input type="checkbox"/> H-R/MS: Dioxines/Furanes
<input type="checkbox"/> Métaux: Filtré sur terrain	<input type="checkbox"/> Filtré au lab	<input type="checkbox"/> Sulfure total - Sol	<input type="checkbox"/> CMM 2003-47: Sanitaire
<input type="checkbox"/> Métaux (spécifier):	<input type="checkbox"/> P total	<input type="checkbox"/> F-H	<input type="checkbox"/> NP
<input type="checkbox"/> Dureté totale	<input type="checkbox"/> Conductivité	<input type="checkbox"/> Absorbance UV	<input type="checkbox"/> REIMR art
<input type="checkbox"/> Alcalinité	<input type="checkbox"/> Bromures	<input type="checkbox"/> DBO ₅ Carbonée	
<input type="checkbox"/> Chlorures	<input type="checkbox"/> Sulfates	<input type="checkbox"/> COU	
<input type="checkbox"/> Cyanures: Totaux	<input type="checkbox"/> Disposables	<input type="checkbox"/> DBO ₅ Carbonée	
<input type="checkbox"/> CCO	<input type="checkbox"/> COT	<input type="checkbox"/> Coliformes: Totaux	
<input type="checkbox"/> N-H ₃ + NH ₄	<input type="checkbox"/> NTK	<input type="checkbox"/> Fécules	
<input type="checkbox"/> Solides: Totaux	<input type="checkbox"/> Dissous	<input type="checkbox"/> Microbiologie (autre):	
<input type="checkbox"/> Sulfures: Eau	<input type="checkbox"/> Sulfure total - Sol	<input type="checkbox"/> H-R/MS: Dioxines/Furanes	
<input type="checkbox"/> F-H	<input type="checkbox"/> NO ₂	<input type="checkbox"/> CMM 2003-47: Sanitaire	
<input type="checkbox"/> Absorbance UV	<input type="checkbox"/> NO ₃	<input type="checkbox"/> NP	
<input type="checkbox"/> DBO ₅ Carbonée	<input type="checkbox"/> Turbidité	<input type="checkbox"/> REIMR art	
<input type="checkbox"/> Coliformes: Totaux	<input type="checkbox"/> E. coli		
<input type="checkbox"/> Microbiologie (autre):			
<input type="checkbox"/> H-R/MS: Dioxines/Furanes	<input type="checkbox"/> HA ²		
<input type="checkbox"/> CMM 2003-47: Sanitaire	<input type="checkbox"/> Pluvial		
<input type="checkbox"/> NP	<input type="checkbox"/> NPE		
<input type="checkbox"/> REIMR art			

Échantillon remis par (nom en lettres moulées et signature): **Jean-François Dion**

Date (AA/MM/JJ): **19/06/14** Heure: **14:00**

Échantillon reçu par (nom en lettres moulées et signature): **Ali**

Date (AA/MM/JJ): **19/07/14** Heure: **15H**

Page **1** de **2**

Échantillon remis par (nom en lettres moulées et signature): _____

Date (AA/MM/JJ): _____ Heure: _____

Échantillon reçu par (nom en lettres moulées et signature): _____

Date (AA/MM/JJ): _____ Heure: _____

N°: **070287**

Quebec EEM p

METALS	CONVENTIONALS
Aluminum (Al)	Conductivity
Arsenic (As)	Nitrates (N-NO3-)
Barium (Ba)	Nitrites (N-NO2-)
Cadmium (Cd)	Nitrogen ammonia (N-NH3)
Calcium (Ca)	pH
Chromium (Cr)	Alkalinity Total (as CaCO3) pH 4.5
Copper (Cu)	Bicarbonates (HCO3 as CaCO3)
Total Hardness (CaCO3)	Carbonate (CO3 as CaCO3)
Iron (Fe)	Sulfates (SO4)
Magnesium (Mg)	Total dissolved solids
Manganese (Mn)	Total suspended solids (TSS)
Molybdenum (Mo)	Dissolved oxygen
Mercury (Hg)	Hydrogen Sulphide
Nickel (Ni)	
Lead (Pb)	
Selenium (Se)	
Zinc (Zn)	
Radium 226	

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*Handwritten blue text: Métaux
Totaux*

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Good Wood

AGAT WORK ORDER: 19M496706

TRACE ORGANICS REVIEWED BY: Manal Seif, Report Writer

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-09-04

VERSION*: 1

PAGES (INCLUDING COVER): 13

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M496706

PROJECT: Good Wood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: Adam Calvert

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

Petroleum Hydrocarbons in Water

DATE RECEIVED: 2019-07-24

DATE REPORTED: 2019-09-04

Parameter	Unit	SAMPLE DESCRIPTION:		DS04-ER-GW-	DS04-EE-GW-
		G / S	RDL	Q2-2019	Q2-2019
Petroleum Hydrocarbons C10-C50	µg/L	100	<100	<100	<100
Surrogate	Unit	Acceptable Limits			
Nonane	%	40-140	73	91	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

375876-375943 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M496706

PROJECT: Good Wood

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ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: Adam Calvert

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-07-24

DATE REPORTED: 2019-09-04

Parameter	Unit	SAMPLE DESCRIPTION:		DS04-ER-GW-	DS04-EE-GW-
		Q2-2019		Q2-2019	Q2-2019
		SAMPLE TYPE:		SW	SW
		DATE SAMPLED:		2019-07-23	2019-07-23
		G / S	RDL	375876	375943
Mercury	µg/L		0.1	<0.1	<0.1
Aluminum	µg/L		10	11	25
Antimony	µg/L		1	<1	<1
Silver	µg/L		0.2	<0.2	<0.2
Arsenic	µg/L		1	<1	<1
Barium	µg/L		5	<5	<5
Boron	µg/L		40	<40	<40
Cadmium	µg/L		0.5	<0.5	<0.5
Calcium	µg/L		100	<100	256
Chromium	µg/L		1	<1	<1
Cobalt	µg/L		0.5	<0.5	<0.5
Copper	µg/L		1	<1	<1
Hardness	µg/L - CaCO3		1000	<1000	1310
Tin	mg/L		0.5	<0.5	<0.5
Iron	µg/L		70	<70	<70
Manganese	µg/L		1	9	19
Molybdenum	µg/L		1	<1	<1
Nickel	µg/L		1	<1	<1
Lead	µg/L		1	<1	<1
Potassium	µg/L		100	<100	110
Thallium	µg/L		1	<1	<1
Titanium	µg/L		3	<3	<3
Uranium	µg/L		0.5	<0.5	<0.5
Vanadium	µg/L		1	<1	<1
Zinc	µg/L		3	<3	10
Radium-226	Bq/L		0.005	<0.005	<0.005
Magnesium	µg/L		100	<100	164

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M496706

PROJECT: Good Wood

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TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: Adam Calvert

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-07-24

DATE REPORTED: 2019-09-04

Parameter	Unit	DS04-ER-GW-		DS04-EE-GW-	
		G / S	RDL	G / S	RDL
SAMPLE DESCRIPTION:		Q2-2019		Q2-2019	
SAMPLE TYPE:		SW		SW	
DATE SAMPLED:		2019-07-23		2019-07-23	
Selenium	µg/L	1	<1	<1	<1
Sodium	µg/L	200	263	291	291

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M496706

PROJECT: Good Wood

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ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: Adam Calvert

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

Tata Steel - QC Packages - Conventionals

DATE RECEIVED: 2019-07-24

DATE REPORTED: 2019-09-04

Parameter	Unit	DS04-ER-GW-		DS04-EE-GW-	
		SAMPLE DESCRIPTION: Q2-2019		Q2-2019	
		SAMPLE TYPE: SW		SW	
		G / S	RDL	375876	375943
BOD5	mg/L - O2		2	<2	<2
COD	mg/L - O2		5	<5	<5
Dissolved Organic Carbon	mg/L		0.30	1.33	1.45
Dissolved Oxygen	mg/L - O2		3	9	10
Fluoride	mg/L		0.10	<0.10	<0.10
Chromium VI	mg/L		0.008	<0.008	<0.008
Ammonia Nitrogen	mg/L - N		0.02	0.08	0.05
Reactive Silica	mg/L		0.05	<0.05	0.60
Total Kjeldahl Nitrogen	mg/L - N		0.3	<0.3	34.2
Total Cyanide	mg/L - CN		0.005	<0.005	<0.005
Total Organic Carbon	mg/L		0.30	1.43	1.61
Alkalinity	mg/L - CaCO3		1.5	<1.5	<1.5
Chloride	mg/L		0.5	<0.5	0.6
Nitrate	mg/L - N		0.02	<0.02	0.02
Nitrite	mg/L - N		0.02	<0.02	<0.02
Sulfate	mg/L		0.5	1.4	<0.5
Total Suspended Solids	mg/L		2	<2	<2
Dissolved Solids	mg/L		10	10	<10
Total Sulfide	mg/L S-2		0.02	0.02	0.08
Total Phenols	mg/L		0.002	0.007	0.008
Total Phosphorus	mg/L - P		0.02	<0.02	0.08
pH	pH		NA	5.52	5.77
Conductivity (25 Celsius)	µmhos/cm		2	2	4

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: Good Wood
 SAMPLED BY: Adam Calvert

AGAT WORK ORDER: 19M496706
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE:

Trace Organics Analysis

RPT Date: 2019-09-04			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE		MATRIX SPIKE				
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
Petroleum Hydrocarbons in Water																
Petroleum Hydrocarbons C10-C50	MR		3170	3390	6.7%	< 100	NA	70%	130%	85%	70%	130%	NA	70%	130%	

Comments: NA : Non applicable
 If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
 NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.
 NA in the spike blank or CRM indicates that it is not required by the procedure.

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Good Wood
SAMPLED BY: Adam Calvert

AGAT WORK ORDER: 19M496706
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis															
RPT Date: 2019-09-04			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Tata Steel - QC Packages - Conventionals															
BOD5	1		NA	NA	0.0%	< 2	80%	80%	120%	88%	80%	120%	102%	80%	120%
COD	361043		<5	<5	NA	< 5	88%	80%	120%	80%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	1		NA	NA	0.0%	< 0.30	106%	80%	120%	102%	80%	120%	NA	80%	120%
Fluoride	375682		7.86	8.10	3.0%	< 0.10	87%	80%	120%	106%	80%	120%	NA	80%	120%
Chromium VI	377984		< 0.008	< 0.008	NA	< 0.008	100%	80%	120%	97%	80%	120%	NA	80%	120%
Ammonia Nitrogen	369806		0.36	0.38	5.4%	< 0.02	117%	80%	120%	101%	80%	120%	NA	80%	120%
Reactive Silica	372785		< 0.05	< 0.05	NA	< 0.05	102%	90%	110%	105%	70%	130%	112%	70%	130%
Total Kjeldahl Nitrogen	313616		0.9	0.8	NA	< 0.3	117%	80%	120%	86%	80%	120%	NA	80%	120%
Total Cyanide	377347		0.016	0.014	NA	< 0.005	82%	80%	120%	89%	80%	120%	99%	80%	120%
Total Organic Carbon	375876	375876	1.43	1.39	NA	< 0.30	106%	80%	120%	102%	80%	120%	92%	80%	120%
Alkalinity	375876	375876	<1.5	<1.5	NA	< 1.5	94%	80%	120%	93%	80%	120%	96%	80%	120%
Chloride	375682		NA	NA	0.0%	< 0.5	96%	80%	120%	86%	80%	120%	NA	80%	120%
Nitrate	375682		0.22	0.26	16.7%	< 0.02	99%	80%	120%	101%	80%	120%	100%	80%	120%
Nitrite	375682		0.25	0.24	4.1%	< 0.02	NA	80%	120%	94%	80%	120%	94%	80%	120%
Sulfate	375682		NA	NA	0.0%	< 0.5	108%	80%	120%	102%	80%	120%	NA	80%	120%
Total Suspended Solids	378282		6	7	NA	< 2	98%	80%	120%	NA			102%	80%	120%
Dissolved Solids	375876	375876	10	<10	NA	< 10	104%	80%	120%	NA			106%	80%	120%
Total Sulfide	375773		< 0.02	< 0.02	NA	< 0.02	86%	80%	120%	93%	80%	120%	NA	80%	120%
Total Phenols	375876	375876	0.007	0.003	NA	< 0.002	85%	80%	120%	90%	80%	120%	NA	80%	120%
Total Phosphorus	380988		0.34	0.32	6.1%	< 0.02	102%	80%	120%	89%	80%	120%	NA	80%	120%
pH	375876	375876	5.52	5.58	1.1%		99%	80%	120%	99%	80%	120%	NA		
Conductivity (25 Celsius)	377263		25	25	0.0%	< 2	106%	80%	120%	104%	80%	120%	99%	80%	120%
Tata Steel - QC Package - Metals															
Mercury	375876	375876	<0.1	<0.1	NA	< 0.1	97%	80%	120%	95%	80%	120%	98%	80%	120%
Aluminum	377742		14	14	NA	< 10	100%	80%	120%	95%	80%	120%	NA	80%	120%
Antimony	377742		<1	<1	NA	< 1	109%	80%	120%	100%	80%	120%	120%	80%	120%
Silver	377742		<0.2	<0.2	NA	< 0.2	NA	80%	120%	101%	80%	120%	102%	80%	120%
Arsenic	377742		<1	<1	NA	< 1	97%	80%	120%	101%	80%	120%	113%	80%	120%
Barium	377742		16	17	NA	< 5	87%	80%	120%	92%	80%	120%	NA	80%	120%
Boron	377742		<40	<40	NA	< 40	100%	80%	120%	87%	80%	120%	NA	80%	120%
Cadmium	377742		<0.5	<0.5	NA	< 0.5	97%	80%	120%	99%	80%	120%	NA	80%	120%
Calcium	377742		26000	23900	8.4%	< 100	93%	80%	120%	103%	80%	120%	NA	80%	120%
Chromium	377742		<1	<1	NA	< 1	99%	80%	120%	102%	80%	120%	NA	80%	120%
Cobalt	377742		<0.5	<0.5	NA	< 0.5	101%	80%	120%	102%	80%	120%	105%	80%	120%
Copper	377742		2	2	NA	< 1	100%	80%	120%	99%	80%	120%	115%	80%	120%
Tin	377742		<0.5	<0.5	NA	< 0.5	NA	80%	120%	106%	80%	120%	107%	80%	120%
Iron	377742		<70	<70	NA	< 70	98%	80%	120%	105%	80%	120%	NA	80%	120%
Manganese	377742		2	2	NA	< 1	99%	80%	120%	98%	80%	120%	NA	80%	120%
Molybdenum	377742		<1	<1	NA	< 1	99%	80%	120%	116%	80%	120%	111%	80%	120%
Nickel	377742		2	2	NA	< 1	99%	80%	120%	102%	80%	120%	NA	80%	120%
Lead	377742		<1	<1	NA	< 1	98%	80%	120%	100%	80%	120%	106%	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Good Wood
SAMPLED BY: Adam Calvert

AGAT WORK ORDER: 19M496706
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis (Continued)

RPT Date: 2019-09-04			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Potassium	377742		1380	1410	2.2%	< 100	101%	80%	120%	95%	80%	120%	NA	80%	120%
Thallium	377742		<1	<1	NA	< 1	96%	80%	120%	99%	80%	120%	105%	80%	120%
Titanium	377742		<3	<3	NA	< 3	NA	80%	120%	100%	80%	120%	NA	80%	120%
Uranium	377742		<0.5	<0.5	NA	< 0.5	97%	80%	120%	102%	80%	120%	108%	80%	120%
Vanadium	377742		<1	<1	NA	< 1	102%	80%	120%	100%	80%	120%	NA	80%	120%
Zinc	377742		69	72	4.3%	< 3	99%	80%	120%	100%	80%	120%	NA	80%	120%
Magnesium	377742		6070	6400	5.3%	< 100	96%	80%	120%	97%	80%	120%	NA	80%	120%
Selenium	377742		<1	<1	NA	< 1	95%	80%	120%	93%	80%	120%	108%	80%	120%
Sodium	377742		22220	23390	5.1%	< 200	101%	80%	120%	91%	80%	120%	NA	80%	120%
Tata Steel - QC Packages - Conventionals															
BOD5	1		NA	NA	0.0%	< 2	85%	80%	120%	96%	80%	120%	88%	80%	120%

Certified By: _____



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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M496706

PROJECT: Good Wood

ATTENTION TO: Mariana Trindade

SAMPLED BY: Adam Calvert

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis					
Petroleum Hydrocarbons C10-C50	2019-07-31	2019-07-31	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID
Nonane	2019-07-31	2019-07-31	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M496706

PROJECT: Good Wood

ATTENTION TO: Mariana Trindade

SAMPLED BY: Adam Calvert

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Mercury	2019-07-29	2019-07-29	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Aluminum	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-07-25	2019-07-26	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-07-25	2019-07-26	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Hardness			MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Tin	2019-07-25	2019-07-26	MET-101-6107F	MA. 200 - Mét 1.2	ICP/OES
Iron	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-07-25	2019-07-26	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Titanium	2019-07-25	2019-07-26	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-07-25	2019-07-26	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Radium-226			Subcontracted	Subcontracted	N/A
Magnesium	2019-07-25	2019-07-26	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Selenium	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Sodium	2019-07-25	2019-07-26	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
BOD5	2019-07-31	2019-08-07	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRIC
COD	2019-08-05	2019-08-05	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Dissolved Organic Carbon	2019-07-30	2019-07-30	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Dissolved Oxygen		2019-08-28	INOR-101-6006F, unaccredited by MDDELCC	MA. 315 - DBO 1.1	ELECTROMETRIC
Fluoride	2019-07-25	2019-07-25	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Chromium VI	2019-07-25	2019-07-25	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Ammonia Nitrogen	2019-07-31	2019-07-31	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
Reactive Silica	2019-08-06	2019-08-06	INOR-101-6071F, unaccredited by MDDELCC	AQ2 EPA-122A Rev 5	COLORIMETRY
Total Kjeldahl Nitrogen	2019-08-09	2019-08-12	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Cyanide	2019-07-30	2019-07-30	INOR-101-6061F	MA. 300 - CN 1.2	COLORIMETRY
Total Organic Carbon	2019-07-30	2019-07-30	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
Alkalinity	2019-07-30	2019-07-30	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M496706

PROJECT: Good Wood

ATTENTION TO: Mariana Trindade

SAMPLED BY: Adam Calvert

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Chloride	2019-07-25	2019-07-25	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrate	2019-07-25	2019-07-25	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-07-25	2019-07-25	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Sulfate	2019-07-25	2019-07-25	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-07-29	2019-07-30	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Dissolved Solids	2019-07-26	2019-07-27	INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Total Sulfide	2019-07-25	2019-07-25	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Total Phenols	2019-07-29	2019-07-29	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMETRY
Total Phosphorus	2019-08-09	2019-08-09	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
pH	2019-07-24	2019-07-24	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRIC
Conductivity (25 Celsius)	2019-07-29	2019-07-29	INOR-101-6016F	MA.115-Cond. 1.1	CONDUCTIVIMETER



Laboratory Use Only
AGAT Work Order 149496 706
No. of Coolers: _____
Arrival Temperature: 11.9 | 10.7 | 14.7
Custody Seal Intact?: Yes No N/A

Chain of Custody - Environmental Chemistry

Client Information

Company: Tata Steel Minerals Canada
Address: 1000 Rue Sherbrooke Ouest
Montreal, QC H3A 3G4
Phone: 514-764-6700 Fax: _____
Project No: Goodwood
Sample Location: Quebec
Sampled By: Adam Calvert

Report Sent To

1. Name: Mariana Trindade
Email: mariana.trindade@tatasteelcanada.com
2. Name: Team Email List
Email: provided to AGAT

Guideline Criteria

PRTC ABC RESC
 CCME Other: _____
 Eau consommation
 Eau résurg. Surface
 Eau résurg. Salée
CMM Sanitary Storm

Turn Around Time Required (Business Days)

Environmental: Regular: 5 to 7 days
Rush: < 12 hours
 24 hours
 48 hours
 72 hours

Ultra Trace: Regular: 10 to 15 days
Rush: < 10 days
Date Required: _____

Invoice To Same Address: Yes No

Company: _____
Contact: _____
Email: _____
Address: _____
PO No: 3000000296 Quote No: _____

Comments: _____

Matrix (legend)

S Soil	B Sludge	EP Drinking Water (MDD/DEC Form)
SE Sediment	ES Surface Water	AF Affluent
SL Solid	EU Wastewater	EF Effluent
ST Groundwater	A Air	

Report Format

Portrait (sample/page) Landscape (multi sample/page)

SAMPLES RECEIVED AFTER 4 PM WILL BE RECORDED AS RECEIVED ON NEXT BUSINESS DAY

SAMPLE IDENTIFICATION	SAMPLE DATE		MATRIX	No. OF CONTAINERS
	DATE (DD/MM/YY)	TIME		
DS04-ER-GW-Q2-2019	23/07/19	5:37am	ES	14
DS04-EE-GW-Q2-2019	23/07/19	7:08am	ES	14

<input type="checkbox"/> THM	<input type="checkbox"/> VOC: THH-MAH	<input type="checkbox"/> MAH	<input type="checkbox"/> VOC	<input type="checkbox"/> BTEX	<input type="checkbox"/> PAH	<input type="checkbox"/> Petroleum Hydrocarbons C10-C50	<input type="checkbox"/> Phthalates	<input type="checkbox"/> Chlorobenzenes	<input type="checkbox"/> PCB: Congeners	<input type="checkbox"/> Aroclor	<input type="checkbox"/> Etylene glycol	<input type="checkbox"/> Glycols (Scan)	<input type="checkbox"/> Formaldehyde	<input type="checkbox"/> Mineral Oil & Grease	<input type="checkbox"/> Total Oil & Grease	<input type="checkbox"/> Pesticides (specify):	<input type="checkbox"/> Phenols (GC-MS)	<input type="checkbox"/> Phenolic Compounds (4AAP)	<input type="checkbox"/> 6 Metals (Cd, Cr, Cu, Ni, Pb, Zn)	<input type="checkbox"/> 13 Metals TC - Soil	<input type="checkbox"/> 17 Metals TC - Water	<input type="checkbox"/> Metals (specify):	<input type="checkbox"/> Mercury	<input type="checkbox"/> Selenium - Soil	<input type="checkbox"/> Total Hardness	<input type="checkbox"/> Alkalinity	<input type="checkbox"/> Bicarbonate	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Chloride	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Sulphate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Cyanide : Total	<input type="checkbox"/> Available	<input type="checkbox"/> Oxidizable	<input type="checkbox"/> COD	<input type="checkbox"/> P total	<input type="checkbox"/> TOC	<input type="checkbox"/> NH3	<input type="checkbox"/> TKN	<input type="checkbox"/> NO2 + NO3	<input type="checkbox"/> Solides : Total	<input type="checkbox"/> Dissolved	<input type="checkbox"/> TSS	<input type="checkbox"/> VSS	<input type="checkbox"/> Sulphide - Water	<input type="checkbox"/> Total Sulphur - Soil	SHORT HOLD TIME									
											Dissolved Metals filtered by Laboratory:										<input type="checkbox"/> pH	<input type="checkbox"/> NO2	<input type="checkbox"/> NO3	<input type="checkbox"/> o-PO4	<input type="checkbox"/> Absorbance	<input type="checkbox"/> Colour	<input type="checkbox"/> Turbidity	<input type="checkbox"/> BOD5	<input type="checkbox"/> CBOD5	<input type="checkbox"/> Hexavalent Chromium	<input type="checkbox"/> Coliforms : Total	<input type="checkbox"/> Fecal	<input type="checkbox"/> E.coli	Microbiology (other):																							
															<input type="checkbox"/> HR/MS : PCDD/PCDF	<input type="checkbox"/> PAH	<input type="checkbox"/> PCB	<input type="checkbox"/> CMM 2008-47 : Sanitary	<input type="checkbox"/> Storm	<input type="checkbox"/> RMD	<input type="checkbox"/> REIMR art.																																				

Samples Released by (Print and Sign): Adam Calvert / Adam Calvert
Date (DD/MM/YY): 23/07/19 Time: 13:00

Samples Received by (Print and Sign): _____
Date (DD/MM/YY): _____ Time: _____

Date (DD/MM/YY): 19/07/24 Time: 14:35
Page 1 of 1
No.: _____

Quebec parameters:		
DSO4 2a (Sunny and Goodwood) environmental monitoring and G		
METALS	CONVENTIONAL	MICROBIOLOGICAL TESTS
Mercury (Hg)	BOD5	Total coliforms
Total phosphorous	COD	Fecal coliforms
Aluminium (Al)	Conductivity	
Antimony (Sb)	Dissolved organic carbon	
Silver (Ag)	Dissolved oxygen	
Arsenic (As)	Fluoride (F)	
Barium (Ba)	Hexavalent Chromium (Cr 6+)	
Boron (B)	Nitrogen ammonia (N-NH3)	
Cadmium (Cd)	pH	
Calcium (Ca)	Reactive silica (SiO2)	
Chromium (Cr)	TKN Total Kjeldahl Nitrogen	
Cobalt (Co)	Total Cyanide (CN)	
Copper (Cu)	Total Organic Carbon	
Total Hardness (CaCO3)	Alkalinity Total [as CaCO3] pH 4.5	
Tin (Sn)	Chloride (Cl)	
Iron (Fe)	Nitrites (N-NO2-)	
Magnesium (Mg)	Nitrates (N-NO3-)	
Manganese (Mn)	Sulfates (SO4)	
Molybdenum (Mo)	Total suspended solids (TSS)	
Nickel (Ni)	Total dissolved solids	
Lead (Pb)	Hydrogen Sulphide	
Potassium (K)	Phenols-4AAP	
Selenium (Se)		
Sodium (Na)		
Thallium (Tl)		
Titanium (Ti)		
Uranium (U)		
Vanadium (V)		
Zinc (Zn)		
Radium 226 (Ra)		



TPH

Interlab à envoyer à
AGAZ Dartmouth avec

Critères Atlantique PIRI



Métaux

Totaux

+ TKN et NH3

Sur tous.



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Goodwood

AGAT WORK ORDER: 19M508397

MICROBIOLOGY ANALYSIS REVIEWED BY: Linda Maille, Superviseur Microbiology

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-09-25

VERSION*: 1

PAGES (INCLUDING COVER): 11

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M508397

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Microbiological

DATE RECEIVED: 2019-08-22

DATE REPORTED: 2019-09-25

Parameter	Unit	SAMPLE DESCRIPTION:		DSO4-ER-GW	DSO4-EE-GW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-08-21	2019-08-21
		G / S	RDL	462306	462323
Fecal Coliforms	CFU/100ml		2	<2	29
Total Coliforms	CFU/100ml		2	<2	<2
Temperature upon receipt	°C		NA	8.4	8.4

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
462306-462323 Analysis performed passed the regulatory conservation time of 48 hours.

Certified By:



Linda Houllé

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Certificate of Analysis

AGAT WORK ORDER: 19M508397

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-08-22

DATE REPORTED: 2019-09-25

Parameter	Unit	SAMPLE DESCRIPTION:		DSO4-ER-GW	DSO4-EE-GW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-08-21	2019-08-21
		G / S	RDL	462306	462323
Mercury	µg/L		0.1	<0.1	<0.1
Total Phosphorus			20	<20	<20
Aluminum	µg/L		10	<10	13
Antimony	µg/L		1	<1	<1
Silver	µg/L		0.2	<0.2	<0.2
Arsenic	µg/L		1	<1	<1
Barium	µg/L		5	<5	<5
Boron	µg/L		40	<40	<40
Cadmium	µg/L		0.5	<0.5	<0.5
Calcium	µg/L		100	<100	373
Chromium	µg/L		1	<1	<1
Cobalt	µg/L		0.5	<0.5	<0.5
Copper	µg/L		1	<1	<1
Total hardness	µg/L - CaCO3		1000	<1000	1830
Tin	mg/L		0.5	<0.5	<0.5
Iron	µg/L		70	<70	<70
Manganese	µg/L		1	8	44
Molybdenum	µg/L		1	<1	<1
Nickel	µg/L		1	<1	<1
Lead	µg/L		1	<1	<1
Potassium	µg/L		100	<100	108
Thallium	µg/L		1	<1	<1
Titanium	µg/L		3	<3	<3
Uranium	µg/L		0.5	<0.5	<0.5
Vanadium	µg/L		1	<1	<1
Zinc	µg/L		3	17	<3
Radium-226	Bq/L		0.005	0.009	<0.005

Certified By: _____



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AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19M508397

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-08-22

DATE REPORTED: 2019-09-25

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M508397

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Packages - Conventionals

DATE RECEIVED: 2019-08-22

DATE REPORTED: 2019-09-25

Parameter	Unit	SAMPLE DESCRIPTION:		DSO4-ER-GW	DSO4-EE-GW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-08-21	2019-08-21
		G / S	RDL	462306	462323
BOD5	mg/L - O2		2	<2	<2
BOD5 (day 0)				8/28/2019	8/28/2019
COD	mg/L - O2		5	<5	<5
Dissolved Organic Carbon	mg/L		0.30	0.79	1.11
Dissolved Oxygen	mg/L		3	8	6
Fluoride	mg/L		0.10	<0.10	<0.10
chromium VI	mg/L		0.008	<0.008	<0.008
Ammonia Nitrogen	mg/L - N		0.02	0.60	0.98
pH	pH		NA	7.78	6.40
Reactive silica	mg/L		0.05	<0.05	<0.05
Total Kjeldahl Nitrogen	mg/L - N		0.3	8.5	7.1
Total Cyanide	mg/L - CN		0.005	<0.005	<0.005
Alkalinity	mg/L - CaCO3		1.5	<1.5	<1.5
Chloride	mg/L		0.5	<0.5	1.1
Nitrate	mg/L - N		0.02	0.02	0.03
Nitrite	mg/L - N		0.02	<0.02	<0.02
Sulfate	mg/L		0.5	<0.5	<0.5
Total Suspended Solids	mg/L		2	<2	<2
Dissolved Solids	mg/L		10	16	24
Total Sulfide	mg/L S-2		0.02	<0.02	<0.02
Total Phenols (colorimetry)	mg/L		0.002	0.003	0.003
Total Phosphorus	mg/L - P		0.02	<0.02	<0.02
Total Organic Carbon	mg/L		0.30	0.93	1.39

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY:

AGAT WORK ORDER: 19M508397
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis															
RPT Date: 2019-09-25			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Tata Steel - QC Package - Metals															
Mercury	464740		<0.1	<0.1	NA	< 0.1	105%	80%	120%	110%	80%	120%	109%	80%	120%
Total Phosphorus	461065		< 20	< 20	NA	< 20	96%	80%	120%	99%	80%	120%	92%	80%	120%
Aluminum	462306	462306	<10	14	NA	< 10	100%	80%	120%	107%	80%	120%	109%	80%	120%
Antimony	462306	462306	<1	<1	NA	< 1	109%	80%	120%	94%	80%	120%	119%	80%	120%
Silver	462306	462306	<0.2	<0.2	NA	< 0.2	NA	80%	120%	98%	80%	120%	83%	80%	120%
Arsenic	462306	462306	<1	<1	NA	< 1	101%	80%	120%	94%	80%	120%	109%	80%	120%
Barium	462306	462306	<5	<5	NA	< 5	90%	80%	120%	91%	80%	120%	NA	80%	120%
Boron	462306	462306	<40	<40	NA	< 40	99%	80%	120%	101%	80%	120%	112%	80%	120%
Cadmium	462306	462306	<0.5	<0.5	NA	< 0.5	98%	80%	120%	94%	80%	120%	NA	80%	120%
Calcium	462306	462306	<100	130	NA	< 100	100%	80%	120%	96%	80%	120%	NA	80%	120%
Chromium	462306	462306	<1	<1	NA	< 1	100%	80%	120%	95%	80%	120%	113%	80%	120%
Cobalt	462306	462306	<0.5	<0.5	NA	< 0.5	96%	80%	120%	97%	80%	120%	106%	80%	120%
Copper	462306	462306	<1	<1	NA	< 1	103%	80%	120%	118%	80%	120%	118%	80%	120%
Tin	462306	462306	<0.5	<0.5	NA	< 0.5	NA	80%	120%	101%	80%	120%	108%	80%	120%
Iron	462306	462306	<70	<70	NA	< 70	106%	80%	120%	106%	80%	120%	NA	80%	120%
Manganese	462306	462306	8	8	0.0%	< 1	98%	80%	120%	100%	80%	120%	113%	80%	120%
Molybdenum	462306	462306	<1	<1	NA	< 1	99%	80%	120%	98%	80%	120%	110%	80%	120%
Nickel	462306	462306	<1	<1	NA	< 1	102%	80%	120%	112%	80%	120%	109%	80%	120%
Lead	462306	462306	<1	<1	NA	< 1	105%	80%	120%	101%	80%	120%	NA	80%	120%
Potassium	462306	462306	<100	<100	NA	< 100	97%	80%	120%	100%	80%	120%	115%	80%	120%
Thallium	462306	462306	<1	<1	NA	< 1	100%	80%	120%	98%	80%	120%	116%	80%	120%
Titanium	462306	462306	<3	<3	NA	< 3	NA	80%	120%	101%	80%	120%	115%	80%	120%
Uranium	462306	462306	<0.5	<0.5	NA	< 0.5	103%	80%	120%	101%	80%	120%	120%	80%	120%
Vanadium	462306	462306	<1	<1	NA	< 1	98%	80%	120%	96%	80%	120%	119%	80%	120%
Zinc	462306	462306	17	<3	NA	< 3	103%	80%	120%	97%	80%	120%	NA	80%	120%
Tata Steel - QC Packages - Conventional															
BOD5	467223		11400	11200	1.8%	< 2	102%	80%	120%	95%	80%	120%	NA	80%	120%
COD	462306	462306	< 5	< 5	NA	< 5	93%	80%	120%	92%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	1		NA	NA	0.0%	< 0.30	94%	80%	120%	96%	80%	120%	NA	80%	120%
Fluoride	460716		<0.10	<0.10	NA	< 0.10	88%	80%	120%	97%	80%	120%	104%	80%	120%
chromium VI	459070		0.067	0.069	2.9%	< 0.008	103%	80%	120%	98%	80%	120%	NA	80%	120%
Ammonia Nitrogen	459233		0.85	0.79	7.3%	< 0.02	117%	80%	120%	110%	80%	120%	NA	80%	120%
pH	461408		5.96	5.99	0.5%		101%	80%	120%	101%	80%	120%	NA		
Reactive silica	462306	462306	< 0.05	< 0.05	NA	< 0.05	88%	80%	120%	100%	70%	130%	92%	70%	130%
Total Kjeldahl Nitrogen	413457		57.3	58.1	1.4%	< 0.3	84%	80%	120%	93%	80%	120%	NA	80%	120%
Total Cyanide	462306	462306	<0.005	<0.005	NA	< 0.005	92%	80%	120%	91%	80%	120%	106%	80%	120%
Alkalinity	460844		17.1	17.9	4.6%	< 1.5	95%	80%	120%	106%	80%	120%	97%	80%	120%
Chloride	460716		3.4	3.4	0.0%	< 0.5	101%	80%	120%	94%	80%	120%	101%	80%	120%
Nitrate	460716		0.07	0.06	NA	< 0.02	98%	80%	120%	106%	80%	120%	106%	80%	120%
Nitrite	460716		<0.02	<0.02	NA	< 0.02	NA	80%	120%	94%	80%	120%	95%	80%	120%
Sulfate	460716		7.2	7.2	0.0%	< 0.5	98%	80%	120%	100%	80%	120%	101%	80%	120%
Total Suspended Solids	465690		6	8	NA	< 2	100%	80%	120%	NA			104%	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY:

AGAT WORK ORDER: 19M508397
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis (Continued)

RPT Date: 2019-09-25			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Solids	462308		3240	3240	0.0%	< 10	105%	80%	120%	NA			NA	80%	120%
Total Sulfide	460844		< 0.02	< 0.02	NA	< 0.02	95%	80%	120%	98%	80%	120%	87%	80%	120%
Total Phenols (colorimetry)	462306	462306	0.003	0.003	NA	0.002	98%	80%	120%	80%	80%	120%	95%	80%	120%
Total Phosphorus	461065		< 0.02	< 0.02	NA	< 0.02	96%	80%	120%	91%	80%	120%	92%	80%	120%
Total Organic Carbon	445415		3.93	3.90	0.8%	< 0.30	94%	80%	120%	96%	80%	120%	105%	80%	120%

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M508397

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Fecal Coliforms	2019-08-23	2019-08-23	MIC-102-7013	MA.700-Fec.Ec 1.0	N/A
Total Coliforms	2019-08-23	2019-08-23	MIC-102-7017	MA.700-Col 1.0	N/A
Temperature upon receipt	2019-08-23	2019-08-23	N/A		N/A

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M508397

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Mercury	2019-08-26	2019-08-26	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Total Phosphorus	2019-09-07	2019-09-07			
Aluminum	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-08-26	2019-08-29	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-08-26	2019-08-29	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Total hardness	2019-08-26	2019-08-29	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Tin	2019-08-26	2019-08-29	MET-101-6107F	MA. 200 - Mét 1.2	ICP/OES
Iron	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-08-26	2019-08-29	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Titanium	2019-08-26	2019-08-29	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-08-26	2019-08-29	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-08-26	2019-08-29	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Radium-226			Subcontracted	Subcontracted	N/A
BOD5	2019-08-28	2019-09-02	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRY
BOD5 (day 0)					ELECTROMETRY
COD	2019-08-27	2019-08-27	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Dissolved Organic Carbon	2019-08-23	2019-08-23	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Dissolved Oxygen		2019-08-23	Special	SM 4500-O G . 21 ième ed.	DO METER
Fluoride	2019-08-23	2019-08-23	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
chromium VI	2019-08-22	2019-08-22	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Ammonia Nitrogen	2019-09-06	2019-09-06	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
pH	2019-08-22	2019-08-22	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRY
Reactive silica	2019-08-28	2019-08-28	INOR-101-6071F, non accrédité MDDELCC	AQ2 EPA-122A Rev 5	COLORIMÉTRIE
Total Kjeldahl Nitrogen	2019-08-29	2019-08-29	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Cyanide	2019-08-26	2019-08-26	INOR-101-6061F	MA. 300 - CN 1.2	SPECTROPHOTOMETER
Alkalinity	2019-08-22	2019-08-22	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION
Chloride	2019-08-23	2019-08-23	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrate	2019-08-23	2019-08-23	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-08-23	2019-08-23	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M508397

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Sulfate	2019-08-23	2019-08-23	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-08-27	2019-08-28	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Dissolved Solids	2019-08-26	2019-08-27	INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Total Sulfide	2019-08-23	2019-08-23	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Total Phenols (colorimetry)	2019-08-24	2019-08-24	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMETRY
Total Phosphorus	2019-09-07	2019-09-07	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Organic Carbon	2019-08-23	2019-08-23	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION



9770 Route Transcanadienne
St-Laurent, Québec
H4S 1V9
http://webearth.agatlabs.com

Tel.: 514.337.1000
Fax.: 514.333.3046
agatlabs.com

Laboratory use Only
 Arrival Condition: Good Poor (complete 'notes')
 Arrival Temperature: 24.13.5 186 AGAT Job Number: _____
 Notes: _____

Report To:
 Company: Tata Steel Minerals Canada
 Contact: Mariana Trindade
 Address: 1000 Sherbrooke West, Suite 1120
 Montreal, QC H3A 3G4

Project #: Goodwood
Quote #: RFQ 20190118

Invoice to: Same (Y/N) - Circle
 Company: Tata Steel Minerals Canada
 Contact: Jay Adhvaryu
 Email: jay.adhvaryu@tatasteelcanada.com

Phone: 514 333 3046 Fax: _____
 PO #: 3000000242

Report Information
 1. Name: Mariana Trindade
 Email: mariana.trindade@tatasteelcanada.com
 2. Name: Jean-Francois Dion
 Email: jeanfrancois.dion@tatasteelcanada.com

Regulatory Requirements (Check):
 List Guidelines on Report Do Not List Guidelines on Report
 PIRI Site Info (check all that apply):
 Tier 1 Res. Pot. Coarse
 Tier 2 Com N/Pot. Fine
 Gas Fuel Lube
 CCME CDWQ
 Ind Com
 Res/P Ag
 FWAL Sediment
 Other: NL MMR

Report Format
 Single PDF sample per page
 Multiple PDF samples per page
 Excel Format Included

Turnaround Time (TAT) Business Days
Regular TAT: 5 - 7 days
Rush TAT: 1 day 2 days
 3 - 4 days

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Fecal & Total Coliforms	Metals + Cations, Total	Mercury, Total	Hardness	Total Phosphorous & TKN	Conductivity & Alkalinity	Dissolved Organic Carbon	Dissolved Oxygen	Anions (F ⁻ , NO ₂ ⁻ , NO ₃ ⁻ , Cl ⁻ , SO ₄ ²⁻)	Ammonia as N & Reactive Silica	Chemical Oxygen Demand	BOD5 & pH	Phenols -4AAP - Mississauga	TOC	Sulphide as S ²⁻	Hexavalent Chromium	Cyanide, Total	Total Dissolved Solids & Total Suspended Solids	Radium-226	Petroleum Hydrocarb (C10-C50)
DSO4-ER-GW	21-Aug-2019 9:45 AM	water	14		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DSO4-EE-GW	21-Aug-2019 11:00 AM	water	14		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Sample Relinquished By (print name & sign) Pallav Sinha Date/Time 13:00 PM Samples Received By (print name and sign) [Signature] Date/Time 13:00 PM Special Instructions [Signature]

Sample Relinquished By (print name & sign) _____ Date/Time _____ Samples Received By (print name and sign) _____ Date/Time _____

Page _____ of _____ **Tata Steel - Quebec Conventionals**



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: QC Quarterly, Surface water

AGAT WORK ORDER: 19M521330

WATER ANALYSIS REVIEWED BY: Marie-Flora Coustou, Report Writer

DATE REPORTED: 2019-10-22

VERSION*: 1

PAGES (INCLUDING COVER): 8

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M521330

PROJECT: QC Quarterly, Surface water

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade

SAMPLING SITE: GOODWOOD

TP Low (Water)

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-10-22

Parameter	Unit	DSO4-ER-GW-		DSO4-EE-GW-	
		G / S	RDL	G / S	RDL
SAMPLE DESCRIPTION:		ULL-2019		ULL-2019	
SAMPLE TYPE:		SW		SW	
DATE SAMPLED:		2019-09-20		2019-09-20	
Total Phosphorus	mg/L	0.006	<0.006	<0.006	<0.006

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Certificate of Analysis

AGAT WORK ORDER: 19M521330

PROJECT: QC Quarterly, Surface water

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade

SAMPLING SITE: GOODWOOD

Total Metals Low Level

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-10-22

Parameter	Unit	DSO4-ER-GW-		DSO4-EE-GW-	
		G / S	RDL	554008	554096
Mercury	µg/L	0.003	<0.003	<0.003	<0.003
Thallium	µg/L	0.002	<0.002	<0.002	<0.002
Tin	µg/L	0.01	0.03	0.05	0.05
Titanium	µg/L	0.1	<0.1	1.3	1.3
Uranium	µg/L	0.005	<0.005	0.007	0.007

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
554008 Analysis performed at AGAT Burnaby.

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 19M521330

PROJECT: QC Quarterly, Surface water

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade

SAMPLING SITE: GOODWOOD

Ultra-Low Total Extractable Metals

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-10-22

Parameter	Unit	SAMPLE DESCRIPTION:		DSO4-ER-GW-	DSO4-EE-GW-
		G / S		ULL-2019	ULL-2019
		RDL		SW	SW
		DATE SAMPLED:		2019-09-20	2019-09-20
Aluminum	µg/L		0.5	8.8	16.1
Antimony	µg/L		0.005	<0.005	<0.005
Silver	µg/L		0.003	<0.003	0.004
Arsenic	µg/L		0.08	<0.08	<0.08
Barium	µg/L		0.03	0.35	3.31
Boron	µg/L		0.3	0.9	2.2
Cadmium	µg/L		0.006	0.007	0.023
Calcium	µg/L		20	90	271
Chromium	µg/L		0.04	0.24	0.27
Cobalt	µg/L		0.005	0.015	0.038
Copper	µg/L		0.05	0.27	0.46
Iron	µg/L		0.5	17.5	106
Magnesium	µg/L		10	52	194
Manganese	µg/L		0.03	7.07	26.0
Molybdenum	µg/L		0.01	0.05	0.29
Nickel	µg/L		0.03	0.25	0.27
Lead	µg/L		0.01	0.06	0.06
Potassium	µg/L		10	66	133
Selenium	µg/L		0.05	0.12	0.08
Sodium	µg/L		0.05	92.8	248
Vanadium	µg/L		2	<2	<2
Zinc	µg/L		0.5	2.8	2.3
Total Hardness	µg/L - CaCO3		1000	<1000	1480

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

554008-554096 A higher RDL indicates that a dilution was needed to reduce the concentration of certain analytes or to reduce matrix interferences.

Certified By:



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.

Quality Assurance

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly, Surface water
 SAMPLED BY: ADAM CALVERT

 AGAT WORK ORDER: 19M521330
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: GOODWOOD

Water Analysis

RPT Date: 2019-10-22			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Ultra-Low Total Extractable Metals															
Aluminum	556400		6.6	5.8	13.1%	< 0.5	86%	80%	120%	101%	80%	120%	96%	80%	120%
Antimony	556400		0.168	0.031	NA	< 0.005	118%	80%	120%	101%	80%	120%	115%	80%	120%
Silver	556400		0.006	0.005	NA	< 0.003	NA	80%	120%	96%	80%	120%	96%	80%	120%
Arsenic	556400		0.13	<0.08	NA	< 0.08	92%	80%	120%	93%	80%	120%	109%	80%	120%
Barium	556400		19.6	19.7	0.9%	< 0.03	87%	80%	120%	84%	80%	120%	NA	80%	120%
Boron	556400		119	124	4.4%	< 0.3	95%	80%	120%	104%	80%	120%	NA	80%	120%
Cadmium	556400		0.022	0.017	NA	< 0.006	95%	80%	120%	96%	80%	120%	96%	80%	120%
Calcium	556400		28800	29400	1.9%	< 20	83%	80%	120%	99%	80%	120%	NA	80%	120%
Chromium	556400		0.54	0.46	16.2%	< 0.04	92%	80%	120%	92%	80%	120%	102%	80%	120%
Cobalt	556400		0.074	0.053	NA	< 0.005	93%	80%	120%	93%	80%	120%	96%	80%	120%
Copper	556400		75.9	75.9	0.1%	< 0.05	102%	80%	120%	98%	80%	120%	NA	80%	120%
Iron	556400		318	319	0.1%	< 0.5	93%	80%	120%	92%	80%	120%	NA	80%	120%
Magnesium	556400		9020	9170	1.6%	< 10	94%	80%	120%	107%	80%	120%	NA	80%	120%
Manganese	556400		12.8	13.0	1.5%	< 0.03	87%	80%	120%	89%	80%	120%	NA	80%	120%
Molybdenum	556400		1.87	1.62	14.5%	< 0.01	91%	80%	120%	96%	80%	120%	97%	80%	120%
Nickel	556400		0.93	0.93	0.5%	< 0.03	95%	80%	120%	95%	80%	120%	95%	80%	120%
Lead	556400		0.77	0.70	9.4%	< 0.01	86%	80%	120%	109%	80%	120%	84%	80%	120%
Potassium	556400		5360	5060	5.7%	< 10	96%	80%	120%	105%	80%	120%	NA	80%	120%
Selenium	556400		0.20	0.63	NA	< 0.05	91%	80%	120%	89%	80%	120%	107%	80%	120%
Sodium	556400		154000	156000	1.4%	< 0.05	98%	80%	120%	105%	80%	120%	NA	80%	120%
Vanadium	556400		<0.02	<0.02	NA	< 0.02	97%	80%	120%	96%	80%	120%	94%	80%	120%
Zinc	556400		8.7	8.9	2.5%	< 0.5	95%	80%	120%	102%	80%	120%	100%	80%	120%

Comments: NA : Not applicable

NA for duplicate RPD indicates that RPD could not be calculated or that both results were less than 5x the RDL. NA for percent recovery in the Sample Spike section indicates that the results were not reported due to sample heterogeneity or the sample concentration was too high compared to the added standards. NA in the spiked blank or the CRM indicates that it was not a required part of the procedure. The percent recovery of the CRM is permitted to be outside of control limits of 80 to 120% if the RPD of the CRM is acceptable.

NA dans le pourcentage de récupération de l'échantillon fortifié indique que le résultat n'est pas fourni en raison de l'hétérogénéité de l'échantillon ou de la concentration trop élevée par rapport à l'ajout.

NA dans le blanc fortifié ou le MRC indique qu'il n'est pas requis par la procédure.

Le pourcentage de récupération du MRC peut être en dehors du critère d'acceptabilité de 80-120%, s'il est conforme à l'écart du certificat du matériau de référence.

TP Low (Water)

Total Phosphorus	554008	554008	<0.006	<0.006	NA	< 0.006	99%	90%	110%	96%	90%	110%	94%	80%	120%
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Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Total Metals Low Level

Mercury	560940		<0.03	0.03	NA	< 0.003	92%	85%	115%	91%	90%	110%			
Thallium	560522		< 0.002	< 0.002	NA	< 0.002	108%	85%	115%	99%	90%	110%			
Tin	560522		< 0.01	< 0.01	NA	< 0.01				95%	90%	110%			
Titanium	560522		1.7	1.5	12.5%	< 0.1				99%	90%	110%			



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly, Surface water
 SAMPLED BY: ADAM CALVERT

AGAT WORK ORDER: 19M521330
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: GOODWOOD

Water Analysis (Continued)

RPT Date: 2019-10-22			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Uranium	560522		1.01	1.03	2.0%	< 0.005	112%	85%	115%	99%	90%	110%			

Certified By: _____



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Method Summary

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly, Surface water
 SAMPLED BY: ADAM CALVERT

 AGAT WORK ORDER: 19M521330
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: GOODWOOD

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Total Phosphorus	2019-09-26	2019-09-26	INOR-93-1022	SM 4500-P B & E	SPECTROPHOTOMETER
Mercury	2019-09-26	2019-09-26	MET-181-6103	Modified from EPA 245.7	CV/AA
Thallium	2019-09-25	2019-09-26	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Tin	2019-09-25	2019-09-26	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Titanium	2019-09-25	2019-09-26	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Uranium	2019-09-25	2019-09-26	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Aluminum	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Barium	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-09-27	2019-09-27	MET-101-6105F, not accredited byDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Calcium	2019-09-27	2019-09-27	MET-101-6105F, not accredited byDDELCC	MA. 200 - Mét 1.2	ICP/MS
Chromium	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Cobalt	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Copper	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Iron	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Magnesium	2019-09-27	2019-09-27	MET-101-6105F, not accredited byDDELCC	MA. 200 - Mét 1.2	ICP/MS
Manganese	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Lead	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Potassium	2019-09-27	2019-09-27	MET-101-6105F, not accredited byDDELCC	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Sodium	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Zinc	2019-09-27	2019-09-27	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS



AGAT Laboratoires

9770 Route Transcanadienne

St-Laurent, Québec, H4S 1V9

Tél.: 514.337.1000 Téléc.: 514.333.3046

fr.agatlabs.com

À l'usage exclusif du laboratoire

Bon de travail AGAT: 7.3

Nb. de glacières: 2.3

Température à l'arrivée: _____

Glace Bloc réfrigérant Aucun

Scélé légal intact: Oui Non N/A

Chaîne de traçabilité Environnement

Eau potable RQEP (réseau) – Veuillez utiliser le formulaire du MDDELCC

Information pour le rapport

Compagnie : Tata Steel Minerals Canada
 Adresse : 1000 rue Sherbrooke Ouest
Montréal, QC H3A 3G4
 Téléphone : 514-764-6700 ext 705 Téléc.: _____
 Projet : QC Quarterly Surface Water
 Lieu de prélèvement : Goodwood
 Prélevé par : Adam Calvert

Rapport envoyé à

1. Nom : Mariana Trindade
 Courriel : mariana.trindade@tatasteelcanada.com
 2. Nom : Joan Email List
 Courriel : JOMCenvironment@tatasteelcanada.com

Critères à respecter

PRTC ABC RESC
 CCME
 Eau consommation
 Eau résurg. Surface
 Eau résurg. Salée
 CMM Sanitaire Pluvial
 Autre.

Format de rapport

Portrait (échantillon/page) Paysage (échantillons/page)

Délais d'analyse requis (Jours ouvrables)

Environnemental: Régulier: 5 à 7 jours Urgent: Même jour
 1 jour
 2 jours
 3 jours

Haute Résolution: Régulier: 10 à 15 jours Urgent: < 10 jours
 Date Require: _____

Facturé à

Même adresse: Oui Non

Compagnie : _____
 Contact : _____
 Courriel : _____
 Adresse : _____
 Bon de commande : 3000000296 Soumission : _____

Commentaires:

Matrice (légende)

EP Eau potable EB Eau brute EPI Eau de piscine
 S Sol B Boue SE Sédiment ES Eau de surface AF Affluent
 SL Solide EU Eau usée EF Effluent ST Eau souterraine A Air

IDENTIFICATION DE L'ÉCHANTILLON	PRÉLÈVEMENT		MATRICE	NB. DE CONTENANTS
	DATE (AA/MM/JJ)	HEURE		
<u>D504-ER-GW-ULL-2019</u>	<u>19/09/20</u>	<u>10:00am</u>	<u>ES</u>	<u>3</u>
<u>D504-EE-GW-ULL-2019</u>	<u>19/09/20</u>	<u>11:00am</u>	<u>ES</u>	<u>3</u>

Hydrocarbures pétroliers C10-C50	HAP	BTEX	HAM	HAC-HAM	THM	Chlorobenzènes	Phthalates	COSV	BPC: Congénères	Aroclor	CBNC	Éthylène glycol	Formaldéhyde	Huiles et graisses: Minérales	Totales	Pesticides: OC	OP	Herbicides	Diquat / Paraquat	Glyphosate	Phénols (GC-MS)	Indice phénolique (4AAP)	Métaux - Sol	Hg	Se	CrVI	Métaux - ST	Hg	CrVI	CrIII	U	Métaux: Filtré sur terrain	Filtré au lab	Métaux (spécifier):	Dureté totale	Alcalinité	Bromates	Conductivité	Chlorures	Fluorures	Sulfates	Bromures	Cyanures: Totaux	Disponibles	Oxydables	DCO	COT	NH ₃ + NH ₄	NTK	NO ₂ + NO ₃	NO ₃	P total	Solides: Totaux	Dissous	MES	MESV	Sulfures - Eau	Soufre total - Sol	pH	NO ₂	NO ₃	o-PO4	COD	Absorbance UV	Couleur	Turbidité	DBO ₅	DBO ₃	Carbonée	Coliformes: Totaux	Fécaux	E. coli	Microbiologie (autre):	HR/MS: Dioxines/Furanes	HAP	BPC	CMM 2008-47: Sanitaire	Pluvial	NP	NPE	RMD	REIMR art.
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XXX Ultra Low Level

Echantillon remis par (nom en lettres moulées et signature)
Adam Calvert / Adam Calvert

Date (AA/MM/JJ) 19/09/20 Heure 13:00

Echantillon reçu par (nom en lettres moulées et signature)

Date (AA/MM/JJ) _____ Heure 12:30

Page 1 de 1

Echantillon remis par (nom en lettres moulées et signature)

Date (AA/MM/JJ) _____ Heure _____

Echantillon reçu par (nom en lettres moulées et signature)

Date (AA/MM/JJ) _____ Heure _____
 N°: 230914 **207892**



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: QC Quarterly surface water

AGAT WORK ORDER: 19M521230

MICROBIOLOGY ANALYSIS REVIEWED BY: Katia Etienne, Microbiologiste

TRACE ORGANICS REVIEWED BY: Manal Seif, Report Writer

WATER ANALYSIS REVIEWED BY: Philippe Morneau, chimiste

DATE REPORTED: 2019-11-25

VERSION*: 1

PAGES (INCLUDING COVER): 13

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M521230
PROJECT: QC Quarterly surface water

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CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade
SAMPLING SITE: GOODWOOD

Tata Steel - QC Package - Microbiological

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-11-25

Parameter	Unit	DSO4-ER-GW		DSO4-EE-GW	
		G / S	RDL	G / S	RDL
SAMPLE DESCRIPTION:		-Q4-2019		-Q4-2019	
SAMPLE TYPE:		SW		SW	
DATE SAMPLED:		2019-09-20		2019-09-20	
Total Coliforms	CFU/100ml	2	1000	700	
Fecal Coliforms	CFU/100ml	2	<2	15	
Temperature upon receipt	°C	NA	8.6	8.6	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
553575-553660 Analysis performed passed the regulatory conservation time of 48 hours.

Certified By: _____



Mariana Trindade

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Certificate of Analysis

AGAT WORK ORDER: 19M521230
PROJECT: QC Quarterly surface water

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD
SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade
SAMPLING SITE: GOODWOOD

Petroleum Hydrocarbons in Groundwater

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-11-25

		DSO4-ER-GW		DSO4-EE-GW	
SAMPLE DESCRIPTION:		-Q4-2019		-Q4-2019	
SAMPLE TYPE:		SW		SW	
DATE SAMPLED:		2019-09-20		2019-09-20	
Parameter	Unit	G / S	RDL	553575	553660
Petroleum Hydrocarbons C10-C50	µg/L		100	136	<100

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

553575-553660 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



Handwritten signature

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Certificate of Analysis

AGAT WORK ORDER: 19M521230
PROJECT: QC Quarterly surface water

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD
SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade
SAMPLING SITE: GOODWOOD

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-11-25

Parameter	Unit	DSO4-ER-GW		DSO4-EE-GW		
		SAMPLE DESCRIPTION: -Q4-2019		-Q4-2019		
		SAMPLE TYPE: SW		SW		
		DATE SAMPLED: 2019-09-20		2019-09-20		
	G / S	RDL	553575	RDL	553660	
Mercury	µg/L		0.1	<0.1	0.1	<0.1
Total Phosphorus	µg/L - P		20	<20	20	147
Aluminum	µg/L		10	<10	10	37
Antimony	µg/L		1	<1	1	<1
Silver	µg/L		0.2	<0.2	0.2	<0.2
Arsenic	µg/L		1	<1	1	<1
Barium	µg/L		5	<5	5	<5
Boron	µg/L		40	<40	40	<40
Cadmium	µg/L		0.5	<0.5	0.5	<0.5
Calcium	µg/L		100	<100	100	177
Chromium	µg/L		1	<1	1	<1
Cobalt	µg/L		0.5	<0.5	0.5	<0.5
Copper	µg/L		1	<1	1	<1
Total Hardness	µg/L - CaCO3		1000	<1000	1000	1460
Tin	µg/L		5	<5	5	<5
Iron	µg/L		70	<70	70	181
Magnesium	µg/L		100	<100	100	246
Manganese	µg/L		1	9	1	37
Molybdenum	µg/L		1	<1	1	<1
Nickel	µg/L		1	<1	1	<1
Lead	µg/L		1	<1	1	<1
Potassium	µg/L		100	<100	100	138
Selenium	µg/L		1	<1	1	<1
Sodium	µg/L		200	<200	200	283
Thallium	µg/L		1	<1	1	<1
Titanium	µg/L		3	<3	3	<3
Uranium	µg/L		1.0	<1.0	0.5	<0.5

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M521230
PROJECT: QC Quarterly surface water

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD
SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade
SAMPLING SITE: GOODWOOD

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-11-25

Parameter	Unit	DSO4-ER-GW		DSO4-EE-GW	
		G / S	RDL	G / S	RDL
SAMPLE DESCRIPTION:		-Q4-2019		-Q4-2019	
SAMPLE TYPE:		SW		SW	
DATE SAMPLED:		2019-09-20		2019-09-20	
Vanadium	µg/L	1	<1	1	<1
Zinc	µg/L	3	<3	3	<3
Radium-226	Bq/L	0.005	<0.005	0.005	<0.005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M521230
PROJECT: QC Quarterly surface water

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD
SAMPLED BY: ADAM CALVERT

ATTENTION TO: Mariana Trindade
SAMPLING SITE: GOODWOOD

Tata Steel - QC Packages - Conventionals

DATE RECEIVED: 2019-09-23

DATE REPORTED: 2019-11-25

Parameter	Unit	DSO4-ER-GW		DSO4-EE-GW	
		G / S	RDL	553575	553660
SAMPLE DESCRIPTION: -Q4-2019 -Q4-2019					
SAMPLE TYPE: SW SW					
DATE SAMPLED: 2019-09-20 2019-09-20					
BOD5	mg/L - O2		2	3	3
BOD5 (day 0)			10/3/2019	10/3/2019	
COD	mg/L - O2		5	5	<5
Conductivity (Salinity - mS/cm)	mS/cm		2	<2	<2
Dissolved Organic Carbon	mg/L		0.30	0.67	1.00
Dissolved Oxygen	mg/L		3	10	10
Fluoride	mg/L		0.10	<0.10	<0.10
Chromium VI	mg/L		0.008	<0.008	<0.008
Ammonia Nitrogen	mg/L - N		0.02	0.13	0.19
pH	pH		NA	6.55	5.89
Reactive Silica	mg/L		0.05	<0.05	0.9920
Total Kjeldahl Nitrogen	mg/L - N		0.3	<0.3	<0.3
Total Cyanide	mg/L - CN		0.005	<0.005	<0.005
Total Organic Carbon	mg/L		0.30	1.00	1.63
Alkalinity	mg/L - CaCO3		1.5	<1.5	<1.5
Chloride	mg/L		0.5	<0.5	1.2
Nitrate	mg/L - N		0.02	<0.02	<0.02
Nitrite	mg/L - N		0.02	<0.02	<0.02
Sulfate	mg/L		0.5	0.5	1.5
Total Suspended Solids	mg/L		2	<2	3
Total Dissolved Solids	mg/L		10	<10	<10
Total Sulfide	mg/L S-2		0.02	<0.02	<0.02
Total Phenols (colorimetry)	mg/L		0.002	0.006	0.006
Total Phosphorus	mg/L - P		0.02	<0.02	0.15
Report Reviewer Montreal Chem.			x	x	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
553575 Holding time not met for pH.

Certified By: _____



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Quality Assurance

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly surface water
 SAMPLED BY: ADAM CALVERT

 AGAT WORK ORDER: 19M521230
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: GOODWOOD

Water Analysis															
RPT Date: 2019-11-25			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Tata Steel - QC Package - Metals

Mercury	1		NA	NA	NA	< 0.1	99%	80%	120%	107%	80%	120%	NA	80%	120%
Aluminum	553565		163	148	9.7%	< 10	111%	80%	120%	104%	80%	120%	NA	80%	120%
Antimony	553565		<1	<1	NA	< 1	112%	80%	120%	98%	80%	120%	109%	80%	120%
Silver	553565		<0.2	<0.2	NA	< 0.2	NA	80%	120%	99%	80%	120%	99%	80%	120%
Arsenic	553565		<1	<1	NA	< 1	95%	80%	120%	103%	80%	120%	104%	80%	120%
Barium	553565		55	53	4.1%	< 5	97%	80%	120%	99%	80%	120%	NA	80%	120%
Boron	553565		<40	<40	NA	< 40	108%	80%	120%	100%	80%	120%	114%	80%	120%
Cadmium	553565		<0.5	<0.5	NA	< 0.5	101%	80%	120%	102%	80%	120%	120%	80%	120%
Calcium	553565		14200	14000	1.5%	< 100	92%	80%	120%	91%	80%	120%	NA	80%	120%
Chromium	553565		1	1	NA	< 1	97%	80%	120%	102%	80%	120%	93%	80%	120%
Cobalt	553565		1.1	1.1	NA	< 0.5	99%	80%	120%	102%	80%	120%	89%	80%	120%
Copper	553565		3	3	NA	< 1	102%	80%	120%	101%	80%	120%	96%	80%	120%
Tin	553565		<5	<5	NA	< 5	NA	80%	120%	109%	80%	120%	100%	80%	120%
Iron	553565		181	163	NA	< 70	105%	80%	120%	118%	80%	120%	NA	80%	120%
Magnesium	553565		6130	6300	2.8%	< 100	106%	80%	120%	113%	80%	120%	NA	80%	120%
Manganese	553565		85	83	2.2%	< 1	106%	80%	120%	108%	80%	120%	NA	80%	120%
Molybdenum	553565		<1	<1	NA	< 1	95%	80%	120%	101%	80%	120%	96%	80%	120%
Nickel	553565		3	3	NA	< 1	101%	80%	120%	96%	80%	120%	97%	80%	120%
Lead	553565		<1	<1	NA	< 1	100%	80%	120%	102%	80%	120%	88%	80%	120%
Potassium	553565		3380	3490	3.4%	< 100	101%	80%	120%	111%	80%	120%	NA	80%	120%
Selenium	553565		<1	<1	NA	< 1	90%	80%	120%	92%	80%	120%	105%	80%	120%
Sodium	553565		2490	2480	0.6%	< 200	105%	80%	120%	109%	80%	120%	NA	80%	120%
Thallium	553565		<1	<1	NA	< 1	98%	80%	120%	100%	80%	120%	98%	80%	120%
Titanium	553565		14	12	NA	< 3	NA	80%	120%	108%	80%	120%	NA	80%	120%
Uranium	553565		<0.5	<0.5	NA	< 0.5	98%	80%	120%	106%	80%	120%	96%	80%	120%
Vanadium	553565		<1	<1	NA	< 1	98%	80%	120%	105%	80%	120%	98%	80%	120%
Zinc	553565		3	<3	NA	< 3	104%	80%	120%	87%	80%	120%	101%	80%	120%

Tata Steel - QC Packages - Conventionals

BOD5	578829		131	148	12.5%	< 2	67%	80%	120%	84%	80%	120%	NA	80%	120%
Conductivity (Salinity - mS/cm)	553316		66	65	1.5%	< 2	103%	80%	120%	105%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	2		NA	NA	NA	< 0.30	85%	80%	120%	84%	80%	120%	NA	80%	120%
Fluoride	553316		<0.10	<0.10	NA	< 0.10	87%	80%	120%	98%	80%	120%	102%	80%	120%
Chromium VI	538450	538450	0.808	0.810	0.2%	< 0.008	93%	80%	120%	98%	80%	120%	103%	80%	120%
Ammonia Nitrogen	545795		0.17	0.16	4.3%	< 0.02	105%	80%	120%	111%	80%	120%	NA	80%	120%
pH	553179		7.89	7.88	0.1%		98%	80%	120%	100%	80%	120%	NA		
Total Kjeldahl Nitrogen	553575	553575	<0.3	<0.3	NA	< 0.3	90%	80%	120%	80%	80%	120%	NA	80%	120%
Total Cyanide	553575	553575	<0.005	<0.005	NA	< 0.005	87%	80%	120%	99%	80%	120%	98%	80%	120%
Total Organic Carbon	553575	553575	1.00	0.99	NA	< 0.30	85%	80%	120%	84%	80%	120%	69%	80%	120%
Alkalinity	553565		13.4	14.4	7.1%	< 1.5	97%	80%	120%	99%	80%	120%	95%	80%	120%
Chloride	553316		1.6	1.4	NA	< 0.5	90%	80%	120%	85%	80%	120%	85%	80%	120%
Nitrate	553316		0.99	1.01	1.8%	< 0.02	88%	80%	120%	102%	80%	120%	104%	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: QC Quarterly surface water
SAMPLED BY: ADAM CALVERT

AGAT WORK ORDER: 19M521230
ATTENTION TO: Mariana Trindade
SAMPLING SITE: GOODWOOD

Water Analysis (Continued)

RPT Date: 2019-11-25			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Nitrite	553316		<0.02	<0.02	NA	< 0.02	NA	80%	120%	89%	80%	120%	89%	80%	120%
Sulfate	553316		8.2	8.2	0.1%	< 0.5	93%	80%	120%	96%	80%	120%	98%	80%	120%
Total Suspended Solids	554098		20	18	8.5%	< 2	97%	80%	120%	NA			90%	80%	120%
Total Dissolved Solids	553575	553575	<10	<10	NA	< 10	102%	80%	120%	NA			106%	80%	120%
Total Sulfide	538450	538450	0.802	0.810	1.0%	< 0.02	93%	80%	120%	98%	80%	120%	103%	80%	120%
Total Phenols (colorimetry)	553575	553575	0.006	0.005	NA	< 0.002	84%	80%	120%	120%	80%	120%	80%	80%	120%
Tata Steel - QC Packages - Conventionals															
Total Phosphorus	553660		0.15	0.12	22.2%	< 0.02	100%	80%	120%	NA	80%	120%	118%	80%	120%

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: QC Quarterly surface water
SAMPLED BY: ADAM CALVERT

AGAT WORK ORDER: 19M521230
ATTENTION TO: Mariana Trindade
SAMPLING SITE: GOODWOOD

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Total Coliforms	2019-09-23	2019-09-23	MIC-102-7017	MA.700-Col 1.0	N/A
Fecal Coliforms	2019-09-23	2019-09-23	MIC-102-7013	MA.700-Fec.Ec 1.0	N/A
Temperature upon receipt	2019-09-23	2019-09-23	N/A		N/A
Trace Organics Analysis					
Petroleum Hydrocarbons C10-C50	2019-10-04	2019-10-04	ORG-100-5104F	MA.400-HYD. 1.1	GC / FID

Method Summary

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly surface water
 SAMPLED BY: ADAM CALVERT

 AGAT WORK ORDER: 19M521230
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE: GOODWOOD

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Mercury	2019-09-24	2019-09-24	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Total Phosphorus	2019-09-30	2019-09-30	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Aluminum	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-09-24	2019-09-24	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-09-24	2019-09-24	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Total Hardness	2019-09-24	2019-09-24	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Tin	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Iron	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Magnesium	2019-09-24	2019-09-24	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-09-24	2019-09-24	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Sodium	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Titanium	2019-09-24	2019-09-24	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-09-24	2019-09-24	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-09-24	2019-09-24	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Radium-226			Subcontracted	Subcontracted	N/A
BOD5	2019-10-03	2019-10-08	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRY
BOD5 (day 0)					ELECTROMETRY
COD	2019-09-26	2019-09-27	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Conductivity (Salinity - mS/cm)	2019-09-26	2019-09-26	INOR-101-6016F	Standard method 2520	CONDUCTIVIMETRY
Dissolved Organic Carbon	2019-09-25	2019-09-25	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Dissolved Oxygen	2019-09-24	2019-09-24	INOR-101-6006F, unaccredited by MDDELCC	MA. 315 - DBO 1.1	DO METER
Fluoride	2019-09-26	2019-09-26	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Chromium VI	2019-09-23	2019-09-23	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Ammonia Nitrogen	2019-10-03	2019-10-03	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
pH	2019-09-23	2019-09-23	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRY
Reactive Silica	2019-10-07	2019-10-07	INOR-101-6071F, unaccredited by MDDELCC	AQ2 EPA-122A Rev 5	COLORIMETRY
Total Kjeldahl Nitrogen	2019-10-11	2019-10-11	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M521230

PROJECT: QC Quarterly surface water

ATTENTION TO: Mariana Trindade

SAMPLED BY: ADAM CALVERT

SAMPLING SITE: GOODWOOD

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Cyanide	2019-09-26	2019-09-26	INOR-101-6061F	MA. 300 - CN 1.2	COLORIMETRY
Total Organic Carbon	2019-09-25	2019-09-25	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
Alkalinity	2019-09-26	2019-09-26	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION
Chloride	2019-09-26	2019-09-26	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrate	2019-09-26	2019-09-26	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-09-26	2019-09-26	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Sulfate	2019-09-26	2019-09-26	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-09-24	2019-09-25	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Total Dissolved Solids	2019-09-26		INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Total Sulfide	2019-09-25	2019-09-25	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Total Phenols (colorimetry)	2019-09-24	2019-09-25	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMETRY
Total Phosphorus	2019-09-30	2019-09-30	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Report Reviewer Montreal Chem.		2019-11-25	NA	NA	

Chaîne de traçabilité - Environnement

Information du client

Compagnie : Tata Steel Minerals Canada
 Adresse : 1600 Rue Sherbrooke Ouest
Montreal, QC H3A 3G4
 Téléphone : 514-744-6700 ext. 705 Téléc.: _____
 Projet : QC Quarterly Surface Water
 Lieu de prélèvement : Goodwood
 Prélevé par : Adam Calvert

Rapport envoyé à

1. Nom : Mariana Trindade
 Courriel : mariana.trindade@tatasteelcanada.com
 2. Nom : Team Email List
 Courriel : TSMC.environment@tatasteelcanada.com

Critères à respecter

PRTC ABC RESC
 CCME Autre: _____
 Eau consommation
 Eau résurg. Surface
 Eau résurg. Salée
 CMM Sanitaire Pluvial

Délais d'analyse requis (jours ouvrables)

Environnemental: Régulier: 5 à 7 jours
 Urgent: < 12 heures
 24 heures
 48 heures
 72 heures

Haute Résolution: Régulier: 10 à 15 jours
 Urgent: < 10 jours

Date Requite: _____

AA/MM/JJ

Facturé à Même adresse: Oui Non

Compagnie : _____
 Contact : _____
 Courriel : _____
 Adresse : _____
 Bon de commande : 3000000296 Soumission : _____

Commentaires:

Matrice (légende)

EP Eau potable (Note pour réseau : Veuillez fournir votre formulaire MDDELCC)
 S Sol B Boue SE Sédiment ES Eau de surface AF Affluent
 SL Solide EU Eau usée EF Effluent ST Eau souterraine A Air

Format de rapport

Portrait (échantillon/page) **Paysage** (échantillons/page)

LES ÉCHANTILLONS REÇUS APRÈS 18 H SERONT ENREGISTRÉS COMME ÉTANT REÇUS LE JOUR OUVRABLE SUIVANT

IDENTIFICATION DE L'ÉCHANTILLON	PRÉLÈVEMENT		MATRICE	NB. DE CONTENANTS
	DATE (AA/MM/JJ)	HEURE		
DS04-FR-GW-Q4-2019	19/09/20	10:00am	ES	12
DS04-EE-GW-Q4-2019	19/09/20	11:00am	ES	12

LES ÉCHANTILLONS REÇUS APRÈS 18 H SERONT ENREGISTRÉS COMME ÉTANT REÇUS LE JOUR OUVRABLE SUIVANT															COURT DÉLAI DE CONSERVATION																																																									
<input type="checkbox"/> BTEX	<input type="checkbox"/> HAM	<input type="checkbox"/> COV	<input type="checkbox"/> HAC-HAM	<input type="checkbox"/> THM	<input type="checkbox"/> Hydrocarbures pétroliers 210-C50	<input type="checkbox"/> Phthalates	<input type="checkbox"/> BPC	<input type="checkbox"/> Congénères	<input type="checkbox"/> Aroclor	<input type="checkbox"/> Glycols (balayage)	<input type="checkbox"/> Formaldéhyde	<input type="checkbox"/> Huiles et graisses	<input type="checkbox"/> Minérales	<input type="checkbox"/> Totales	<input type="checkbox"/> Phénols (GC-MS)	<input type="checkbox"/> Indice phénolique (4AAP)	<input type="checkbox"/> 6 Métaux (Cd, Cr, Cu, Ni, Pb, Zn)	<input type="checkbox"/> 13 Métaux TC - Sol	<input type="checkbox"/> 17 Métaux TC - Eau	<input type="checkbox"/> Métaux (spécifier):	<input type="checkbox"/> Mercure	<input type="checkbox"/> Sélénium - Sol	<input type="checkbox"/> Dureté totale	<input type="checkbox"/> Alcalinité	<input type="checkbox"/> Bicarbonates	<input type="checkbox"/> Conductivité	<input type="checkbox"/> Chlorures	<input type="checkbox"/> Fluorures	<input type="checkbox"/> Sulfates	<input type="checkbox"/> Bromures	<input type="checkbox"/> Cyanures	<input type="checkbox"/> Total	<input type="checkbox"/> Oxydables	<input type="checkbox"/> DCO	<input type="checkbox"/> P total	<input type="checkbox"/> COC	<input type="checkbox"/> NH ₃	<input type="checkbox"/> NTK	<input type="checkbox"/> NO ₂ + NO ₃	<input type="checkbox"/> MES	<input type="checkbox"/> MESV	<input type="checkbox"/> Solides	<input type="checkbox"/> Total	<input type="checkbox"/> Dissous	<input type="checkbox"/> MES	<input type="checkbox"/> Sulfures - Eau	<input type="checkbox"/> Soufre total - Sol	<input type="checkbox"/> Métaux dissous filtrés au laboratoire:	<input type="checkbox"/> pH	<input type="checkbox"/> NO ₂	<input type="checkbox"/> NO ₃	<input type="checkbox"/> o-P04	<input type="checkbox"/> Absorbance UV	<input type="checkbox"/> Couleur	<input type="checkbox"/> Turbidité	<input type="checkbox"/> DBO ₅	<input type="checkbox"/> Carbonée	<input type="checkbox"/> Chrome hexavalent	<input type="checkbox"/> Coliformes	<input type="checkbox"/> Total	<input type="checkbox"/> Fécules	<input type="checkbox"/> E.coli	<input type="checkbox"/> Microbiologie (autre):	<input type="checkbox"/> HR/MS	<input type="checkbox"/> PCDD/PCDF	<input type="checkbox"/> HAP	<input type="checkbox"/> BPC	<input type="checkbox"/> CMM 2008-47	<input type="checkbox"/> Sanitaire	<input type="checkbox"/> Pluvial	<input type="checkbox"/> RMD	<input type="checkbox"/> REIMR art.
APPENDIX A pg. 5/12 - Lab Analysis Requirements																																																																								

Echantillon remis par (nom en lettres moulées et signature) <u>Adam Calvert / Adam Calvert</u>	Date (AA/MM/JJ) <u>19/09/20</u>	Heure <u>13:00</u>	Echantillon reçu par (nom en lettres moulées et signature)	Date (AA/MM/JJ) <u>12/30</u>	Heure <u>12:30</u>	Page <u>1</u> de <u>2</u>
Echantillon remis par (nom en lettres moulées et signature)	Date (AA/MM/JJ)	Heure	Echantillon reçu par (nom en lettres moulées et signature)	Date (AA/MM/JJ) <u>12/30</u>	Heure <u>12:30</u>	N°: 182530

Quebec parameters:	
METALS	CONVENTIONAL
Mercury (Hg)	BOD5
Total phosphorous	COD
Aluminum (Al)	Conductivity
Antimony (Sb)	Dissolved organic carbon
Silver (Ag)	Dissolved oxygen
Arsenic (As)	Fluoride (F)
Barium (Ba)	Hexavalent Chromium (Cr 6+)
Boron (B)	Nitrogen ammonia (N-NH3)
Cadmium (Cd)	pH
Calcium (Ca)	Reactive silica (SiO2)
Chromium (Cr)	TKN Total Kjeldahl Nitrogen
Cobalt (Co)	Total Cyanide (CN)
Copper (Cu)	Total Organic Carbon
Total Hardness (CaCO3)	Alkalinity Total (as CaCO3) pH 4.5
Tin (Sn)	Chloride (Cl)
Iron (Fe)	Nitrites (N-NO2-)
Magnesium (Mg)	Nitrates (N-NO3-)
Manganese (Mn)	Sulfates (SO4)
Molybdenum (Mo)	Total suspended solids (TSS)
Nickel (Ni)	Total dissolved solids
Lead (Pb)	Hydrogen Sulphide
Potassium (K)	Phenols-4AAP
Selenium (Se)	
Sodium (Na)	
Thallium (Tl)	
Titanium (Ti)	
Uranium (U)	
Vanadium (V)	
Zinc (Zn)	
Radium 226 (Ra)	

⇓

Métaux
Totaux

+ TKN et NH3
Sur tous.

⇓

TPH

Intenlab à envoyer à
AGAT Dartmouth avec

Critères Atlantique PIRI



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: QC Quarterly Surface Water-Sunny

AGAT WORK ORDER: 19M489624

MICROBIOLOGY ANALYSIS REVIEWED BY: Linda Maille, Superviseur Microbiology

TRACE ORGANICS REVIEWED BY: Félix Brasseur, chimiste

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-08-20

VERSION*: 1

PAGES (INCLUDING COVER): 14

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M489624

PROJECT: QC Quarterly Surface Water-Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE:

Microbiology - Surface Water

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-20

DS04-EE-SUN-

SAMPLE DESCRIPTION: Q1-2019

SAMPLE TYPE: SW

DATE SAMPLED: 2019-07-05

Parameter	Unit	G / S	RDL	336978
Total Coliforms	CFU/100ml		2	<2
Atypical Bacteria	CFU/100ml		2	170
Temperature upon receipt	°C		N/A	25.8

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
336978 The results are preliminary and subject to change if they are not certified.

Certified By:



Linda Maille

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Certificate of Analysis

AGAT WORK ORDER: 19M489624

PROJECT: QC Quarterly Surface Water-Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE:

Atlantic RBCA Tier 1 Hydrocarbons in Water (Version 3.0) - EPH Only

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-20

		DS04-EE-SUN-		
SAMPLE DESCRIPTION:		Q1-2019		
SAMPLE TYPE:		SW		
DATE SAMPLED:		2019-07-05		
Parameter	Unit	G / S	RDL	336978
>C10-C16 Hydrocarbons	mg/L		0.05	<0.05
>C16-C21 Hydrocarbons	mg/L		0.10	<0.10
>C21-C32 Hydrocarbons	mg/L		0.1	<0.1
Return to Baseline at C32				NR
Surrogate	Unit	Acceptable Limits		
Isobutylbenzene - EPH	%		70-130	99
n-Dotriacontane - EPH	%		70-130	105

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M489624

PROJECT: QC Quarterly Surface Water-Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE:

Inorganic Analyses - Surface Water

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-20

DS04-EE-SUN-

SAMPLE DESCRIPTION: Q1-2019

SAMPLE TYPE: SW

DATE SAMPLED: 2019-07-05

Parameter	Unit	G / S	RDL	336978
Ammonia Nitrogen	mg/L - N		0.02	0.08
Total Kjeldahl Nitrogen	mg/L - N		0.05	0.05
Chloride	mg/L		0.5	<0.5
Weak Acid Dissociable Cyanide	mg/L - CN		0.01	<0.01
BOD5	mg/L - O2		2	<2
Total Suspended Solids	mg/L		2	<2
Nitrate	mg/L - N		0.02	0.02
Nitrite	mg/L - N		0.02	<0.02
Dissolved Oxygen	mg/L - O2		3	10
pH	pH		NA	6.59
Total Phosphorus	mg/L - P		0.01	0.01
Total Phenols	mg/L		0.002	0.006
Sulfate	mg/L		0.5	2.1
COD	mg/L - O2		5	<5
Dissolved Organic Carbon	mg/L		0.30	1.98
Fluoride	mg/L		0.10	<0.10
Chromium VI	mg/L		0.008	<0.008
Reactive Silica	mg/L		0.05	<0.05
Alkalinity	mg/L - CaCO3		1.5	14.5
Dissolved Solids	mg/L		10	24
Total Organic Carbon	mg/L		0.30	2.08
Nitrite-Nitrate (Montreal) (mg/L -N)	mg/L - N		0.04	<0.04

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

336978 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By:



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Certificate of Analysis

AGAT WORK ORDER: 19M489624

PROJECT: QC Quarterly Surface Water-Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE:

Total Extractable Metals

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-20

DS04-EE-SUN-

SAMPLE DESCRIPTION: Q1-2019

SAMPLE TYPE: SW

DATE SAMPLED: 2019-07-05

Parameter	Unit	G / S	RDL	336978
Aluminum	µg/L		5	6
Antimony	µg/L		1	<1
Silver	µg/L		0.2	<0.2
Arsenic	µg/L		0.3	<0.3
Barium	µg/L		2	<2
Boron	µg/L		40	<40
Cadmium	µg/L		0.2	<0.2
Calcium	µg/L		100	2850
Chromium	µg/L		1	1
Cobalt	µg/L		0.5	<0.5
Copper	µg/L		1	<1
Iron	µg/L		60	126
Magnesium	µg/L		100	1950
Manganese	µg/L		1	9
Mercury	µg/L		0.01	0.02
Molybdenum	µg/L		1	<1
Nickel	µg/L		1	<1
Lead	µg/L		0.5	<0.5
Selenium	µg/L		1	<1
Sodium	µg/L		200	671
Thallium	µg/L		1	<1
Uranium	µg/L		0.5	<0.5
Vanadium	µg/L		1	<1
Zinc	µg/L		3	19
Tin	mg/L		0.005	<0.005
Titanium	mg/L		0.003	<0.003
Potassium	mg/L		0.100	0.164

Certified By: _____



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AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19M489624

PROJECT: QC Quarterly Surface Water-Sunny

9770 ROUTE TRANSCANADIENNE
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TEL (514)337-1000
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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE:

Total Extractable Metals

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-20

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

336978 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly Surface Water-Sunny
 SAMPLED BY: JFD

AGAT WORK ORDER: 19M489624
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE:

Trace Organics Analysis

RPT Date: 2019-08-20			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Atlantic RBCA Tier 1 Hydrocarbons in Water (Version 3.0) - EPH Only

>C10-C16 Hydrocarbons	1	-99999	0.82	0.82	0.0%	< 0.05	86%	70%	130%	85%	70%	130%	76%	70%	130%
>C16-C21 Hydrocarbons	1	-99999	2.68	2.68	0.0%	< 0.10	82%	70%	130%	85%	70%	130%	76%	70%	130%
>C21-C32 Hydrocarbons	1	-99999	1.36	1.34	1.0%	< 0.1	82%	70%	130%	85%	70%	130%	76%	70%	130%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution. If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By: _____



Félix Brousseau

AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.

Quality Assurance

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly Surface Water-Sunny
 SAMPLED BY: JFD

 AGAT WORK ORDER: 19M489624
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE:

Water Analysis															
RPT Date: 2019-08-20			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Extractable Metals															
Aluminum	337295		<5	<5	NA	< 5	87%	80%	120%	98%	80%	120%	105%	80%	120%
Antimony	337295		<1	<1	NA	< 1	108%	80%	120%	100%	80%	120%	NA	80%	120%
Silver	337295		<0.2	<0.2	NA	< 0.2	NA	80%	120%	103%	80%	120%	120%	80%	120%
Arsenic	337295		<0.3	<0.3	NA	< 0.3	96%	80%	120%	109%	80%	120%	119%	80%	120%
Barium	337295		<2	<2	NA	< 2	83%	80%	120%	94%	80%	120%	NA	80%	120%
Boron	337295		<40	<40	NA	< 40	97%	80%	120%	108%	80%	120%	NA	80%	120%
Cadmium	337295		<0.2	<0.2	NA	< 0.1	93%	80%	120%	102%	80%	120%	NA	80%	120%
Calcium	337295		3070	3060	0.3%	< 100	88%	80%	120%	102%	80%	120%	NA	80%	120%
Chromium	337295		<1	<1	NA	< 1	99%	80%	120%	107%	80%	120%	115%	80%	120%
Cobalt	337295		<2.0	<2.0	NA	< 0.5	101%	80%	120%	105%	80%	120%	109%	80%	120%
Copper	337295		<1	<1	NA	< 1	99%	80%	120%	111%	80%	120%	118%	80%	120%
Iron	337295		<60	<60	NA	< 60	98%	80%	120%	109%	80%	120%	NA	80%	120%
Magnesium	337295		2320	2500	7.5%	< 100	91%	80%	120%	103%	80%	120%	NA	80%	120%
Manganese	337295		<1	<1	NA	< 1	99%	80%	120%	101%	80%	120%	108%	80%	120%
Mercury	1		NA	NA	0.0%	< 0.01	101%	80%	120%	104%	80%	120%	NA	80%	120%
Molybdenum	337295		<1	<1	NA	< 1	97%	80%	120%	106%	80%	120%	110%	80%	120%
Nickel	337295		<1	<1	NA	< 1	95%	80%	120%	101%	80%	120%	114%	80%	120%
Lead	337295		<0.5	<0.5	NA	< 0.5	96%	80%	120%	110%	80%	120%	NA	80%	120%
Selenium	337295		<1	<1	NA	< 1	98%	80%	120%	109%	80%	120%	NA	80%	120%
Sodium	337295		339	355	NA	< 200	94%	80%	120%	118%	80%	120%	NA	80%	120%
Thallium	337295		<1	<1	NA	< 1	93%	80%	120%	103%	80%	120%	115%	80%	120%
Uranium	337295		<0.5	<0.5	NA	< 0.5	95%	80%	120%	107%	80%	120%	115%	80%	120%
Vanadium	337295		<1	<1	NA	< 1	101%	80%	120%	105%	80%	120%	113%	80%	120%
Zinc	337295		<3	<3	NA	< 3	99%	80%	120%	104%	80%	120%	NA	80%	120%
Tin	337295		<0.005	<0.005	NA	< 0.005	NA	80%	120%	105%	80%	120%	111%	80%	120%
Titanium	337295		<0.003	<0.003	NA	< 0.003	NA	80%	120%	105%	80%	120%	111%	80%	120%
Potassium	337295		0.196	0.209	NA	< 0.100	96%	80%	120%	99%	80%	120%	NA	80%	120%

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spiked blank or CRM indicates that it is not required by the procedure.

The percent of recovery of the CRM may be outside of the acceptability criteria of 80-120%, if conform to the criteria provided on the Certificate of Analysis of the reference material.

Inorganic Analyses - Surface Water

Ammonia Nitrogen	336978	336978	0.08	0.08	NA	< 0.02	108%	80%	120%	100%	80%	120%	NA	80%	120%
Chloride	327076		<0.5	<0.5	NA	< 0.5	95%	80%	120%	84%	80%	120%	111%	80%	120%
Weak Acid Dissociable Cyanide	331279		< 0.01	< 0.01	NA	< 0.01	109%	80%	120%	96%	80%	120%	104%	80%	120%
BOD5	39537		205	195	5.0%	< 2	85%	80%	120%	92%	80%	120%	87%	80%	120%
Total Suspended Solids	331756		73	69	5.6%	< 2	97%	80%	120%	NA			102%	80%	120%
Nitrate	327076		NA	NA	0.0%	< 0.02	96%	80%	120%	96%	80%	120%	96%	80%	120%
Nitrite	327076		<0.02	<0.02	NA	< 0.02	NA	80%	120%	91%	80%	120%	105%	80%	120%
pH	335947		5.98	5.96	0.3%		100%	80%	120%	101%	80%	120%	NA		

Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: QC Quarterly Surface Water-Sunny
SAMPLED BY: JFD

AGAT WORK ORDER: 19M489624
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis (Continued)

RPT Date: 2019-08-20			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Phenols	336978	336978	0.006	0.004	NA	0.002	95%	80%	120%	100%	80%	120%	NA	80%	120%
Sulfate	327076		NA	NA	0.0%	< 0.5	98%	80%	120%	95%	80%	120%	NA	80%	120%
COD	338021		15	16	NA	< 5	102%	80%	120%	87%	80%	120%	83%	80%	120%
Dissolved Organic Carbon	1		NA	NA	0.0%	< 0.30	111%	80%	120%	111%	80%	120%	NA	80%	120%
Fluoride	327076		<0.10	<0.10	NA	< 0.10	100%	80%	120%	105%	80%	120%	NA	80%	120%
Chromium VI	336978	336978	< 0.008	< 0.008	NA	< 0.008	105%	80%	120%	105%	80%	120%	83%	80%	120%
Reactive Silica	372785		< 0.05	< 0.05	NA	< 0.05	102%	90%	110%	105%	70%	130%	112%	70%	130%
Alkalinity	309314		21.6	24.2	11.4%	< 1.5	95%	80%	120%	93%	80%	120%	NA	80%	120%
Dissolved Solids	318088		< 10	16	NA	< 10	101%	80%	120%	NA			104%	80%	120%
Total Organic Carbon	331880		1.26	1.27	NA	< 0.30	111%	80%	120%	111%	80%	120%	98%	80%	120%

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

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Certified By: _____




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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M489624

PROJECT: QC Quarterly Surface Water-Sunny

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Total Coliforms	2019-07-10	2019-07-10	MIC-102-7017	MA.700-Col 1.0	N/A
Atypical Bacteria	2019-07-10	2019-07-10	MIC-102-7017	MA.700-Col1.0	N/A
Temperature upon receipt	2019-07-08	2019-07-08	N/A		N/A
Trace Organics Analysis					
>C10-C16 Hydrocarbons	2019-07-12	2019-07-15	ORG-120-5101	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
>C16-C21 Hydrocarbons	2019-07-12	2019-07-15	ORG-120-5101	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
>C21-C32 Hydrocarbons	2019-07-12	2019-07-15	ORG-120-5101	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Return to Baseline at C32	2019-07-12	2019-07-15	ORG-120-5101	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Isobutylbenzene - EPH	2019-07-12	2019-07-15	ORG-120-5101	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
n-Dotriacontane - EPH	2019-07-12	2019-07-15	ORG-120-5101	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID

Method Summary

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly Surface Water-Sunny
 SAMPLED BY: JFD

 AGAT WORK ORDER: 19M489624
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Ammonia Nitrogen	2019-07-17	2019-07-17	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
Total Kjeldahl Nitrogen		2019-07-30	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Chloride	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Weak Acid Dissociable Cyanide	2019-07-11	2019-07-11	INOR-101-6036F	MA. 300 - CN 1.2	COLORIMETRY
BOD5	2019-07-31	2019-08-05	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRIC
Total Suspended Solids	2019-07-11	2019-07-12	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Nitrate	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Dissolved Oxygen		2019-08-07	INOR-101-6006F, unaccredited by MDDELCC	MA. 315 - DBO 1.1	ELECTROMETRIC
pH	2019-07-10	2019-07-10	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRIC
Total Phosphorus		2019-08-01	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Phenols	2019-07-16	2019-07-16	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMETRY
Sulfate	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
COD	2019-08-06	2019-08-06	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Dissolved Organic Carbon	2019-07-10	2019-07-10	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Fluoride	2019-07-10	2019-07-10	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Chromium VI	2019-07-10	2019-07-10	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Reactive Silica	2019-08-06	2019-08-06	INOR-101-6071F, unaccredited by MDDELCC	AQ2 EPA-122A Rev 5	COLORIMETRY
Alkalinity	2019-07-12	2019-07-12	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION
Dissolved Solids	2019-07-17	2019-07-18	INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Total Organic Carbon	2019-07-10	2019-07-10	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
Aluminum	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Barium	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-07-11	2019-07-13	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Calcium	2019-07-11	2019-07-13	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Chromium	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Cobalt	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Copper	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Iron	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Magnesium	2019-07-11	2019-07-13	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Manganese	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Mercury	2019-07-11	2019-07-11	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Molybdenum	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Lead	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Sodium	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-07-11	2019-07-13	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M489624

PROJECT: QC Quarterly Surface Water-Sunny

ATTENTION TO: Mariana Trindade

SAMPLED BY:JFD

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Vanadium	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Tin	2019-07-11	2019-07-13	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Titanium	2019-07-11	2019-07-13	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Potassium	2019-07-11	2019-07-13	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS



AGAT Laboratoires

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Québec, G1P 4P3

Tél.: 418.266.5511 Téléc.: 418.653.2335

fr.agatlabs.com

À l'usage de l'inspecteur / 190489
Boîte de travail (GA) 624
Nb. de glacières:
Température à l'arrivée: 26.4°C / 25.8°C / 25.9°C

Chaîne de traçabilité Environnement

Eau potable RQEP (réseau) – Veuillez utiliser le formulaire du MDDELCC

Information pour le rapport

Compagnie: Tata Steel Minerals Canada
Adresse: 1000 Rue Sherbrooke Ouest, Montreal, QC, H3A 3G4
Téléphone: 514.764.6700 x.765 Téléc.:
Projet: QC Quarterly Surface Water - Sunny
Lieu de prélèvement: DS04 QC
Prélevé par: JFD

Rapport envoyé à

1. Nom: Mariana Trindade
Courriel: mariana.trindade@tatasteelcanada.com
2. Nom: TSMC Environment Team
Courriel: * Team Email List *

Critères à respecter

PRTC ABC RESC
 CCME
 Eau consommation
 Eau résurg. Surface
 Eau résurg. Salée
CMM Sanitaire Pluvial
 Autre.

Format de rapport

Portrait (échantillon/page) Paysage (échantillons/page)

Délais d'analyse requis (jours ouvrables)

Environnemental: Haute Résolution:
Régulier: 5 à 7 jours Régulier: 10 à 15 jours
Urgent: Même jour Urgent: < 10 jours
 1 jour Date Requête:
 2 jours
 3 jours AA/MM/JJ

Facturé à

Même adresse: Oui Non

Compagnie: _____
Contact: _____
Courriel: _____
Adresse: _____
Bon de commande: 3000000296 Soumission: _____

Commentaires:

Matrice (légende)

EP Eau potable EB Eau brute EPI Eau de piscine
S Sol B Boue SE Sédiment ES Eau de surface AF Affluent
SL Solide EU Eau usée EF Effluent ST Eau souterraine A Air

IDENTIFICATION DE L'ÉCHANTILLON	PRÉLÈVEMENT		MATRICE	NB. DE CONTENANTS
	DATE (AA/MM/JJ)	HEURE		
DS04-EE-SUN-Q1-2019 (19/07/05)	19/07/05	8:30am	ES	16
"APPENDIX A - p. 5/12 - Laboratory Analysis"				

Hydrocarbures pétroliers C10-C50	HAP	BTEX	HAM	HAC-HAM	THM	Chlorobenzènes	Phtalates	COSV	BPC: Congénères	Aroclor	CBNC	Éthylène glycol	Formaldéhyde	Huiles et graisses: Minérales	Totales	Pesticides: OC	OP	Herbicides	Diquat / Paraquat	Glyphosate	Phénols (GC-MS)	Indice phénologique (4AAP)	Métaux - Sol	Hg	Se	CrVI	Métaux - ST	Hg	CrVI	CrIII	U	Métaux: Filtré sur terrain	Filtré au lab	Métaux (spécifier):	Dureté totale	Alcalinité	Bromates	Conductivité	Chlorures	Fluorures	Sulfates	Bromures	Cyanures: Totaux	Disponibles	Oxydables	DCO	COT	NH ₃ + NH ₄	NTK	NO ₂ + NO ₃	P total	Solides: Totaux	Dissous	MES	MESV	Sulfures - Eau	Soufre total - Sol	pH	NO ₂	NO ₃	o-PO4	COD	Absorbance UV	Couleur	Turbidité	DBO ₅	DBO ₆	Carbonée	Coliformes: Totaux	Fécaux	E.coli	Microbiologie (autre):	HR/MS: Dioxines/Furanes	HAP	BPC	CMM 2008-47: Sanitaire	Pluvial	NP	NPE	RMD	REIMR art.
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Echantillon remis par (nom en lettres moulées et signature) <u>Adam Calvert / Adam Calvert</u>	Date (AA/MM/JJ) <u>(19/07/05)</u>	Heure <u>13:00</u>	Echantillon reçu par (nom en lettres moulées et signature) <u>ABa</u>	Date (AA/MM/JJ) <u>8/11/19</u>	Heure <u>13:00</u>	Page <u>1</u> de <u>1</u>
Echantillon remis par (nom en lettres moulées et signature)	Date (AA/MM/JJ)	Heure	Echantillon reçu par (nom en lettres moulées et signature)	Date (AA/MM/JJ)	Heure	N°: <u>072305</u>

Quebec parameters:

DSO4 2a (Sunny and Goodwood) environmental monitoring and G.

METALS	CONVENTIONAL	MICROBIOLOGICAL TESTS	PETROLEUM HYDROCARBONS
Mercury (Hg)	BOD5	Total coliforms	Petroleum Hydrocarbons (C10-C50)
Total phosphorous	COD	Fecal coliforms	
Aluminum (Al)	Conductivity		
Antimony (Sb)	Dissolved organic carbon		
Silver (Ag)	Dissolved oxygen		
Arsenic (As)	Fluoride (F)		
Barium (Ba)	Hexavalent Chromium (Cr 6+)		
Boron (B)	Nitrogen ammonia (N-NH3)		
Cadmium (Cd)	pH		
Calcium (Ca)	Reactive silica (SiO2)		
Chromium (Cr)	TKN Total Kjeldahl Nitrogen		
Cobalt (Co)	Total Cyanide (CN)		
Copper (Cu)	Total Organic Carbon		
Total Hardness (CaCO3)	Alkalinity Total (as CaCO3) pH 4.5		
Tin (Sn)	Chloride (Cl)		
Iron (Fe)	Nitrites (N-NO2-)		
Magnesium (Mg)	Nitrates (N-NO3-)		
Manganese (Mn)	Sulfates (SO4)		
Molybdenum (Mo)	Total suspended solids (TSS)		
Nickel (Ni)	Total dissolved solids		
Lead (Pb)	Hydrogen Sulphide		
Potassium (K)	Phenols-4AAP		
Selenium (Se)			
Sodium (Na)			
Thallium (Tl)			
Titanium (Ti)			
Uranium (U)			
Vanadium (V)			
Zinc (Zn)			
Radium 226 (Ra)			



TPH

Interlab à envoyer à

AGAT Dartmouth avec

critères Atlantique PIRI



Métaux

+ TKN et NH3

Totaux

Sur tous.



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: QC Quarterly Surface Water-Sunny

AGAT WORK ORDER: 19M489628

MICROBIOLOGY ANALYSIS REVIEWED BY: Linda Maille, Superviseur Microbiology

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-08-30

VERSION*: 1

PAGES (INCLUDING COVER): 13

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M489628

PROJECT: QC Quarterly Surface Water-Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: DSO4 QC

Microbiology - Surface Water

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-30

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q1-2019

SAMPLE TYPE: SW

DATE SAMPLED: 2019-07-04

Parameter	Unit	G / S	RDL	337295
Total Coliforms	CFU/100ml		2	9
Atypical Bacteria	CFU/100ml		2	9
Fecal Coliforms	CFU/100ml		2	<2
Temperature upon receipt	°C		N/A	11.1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
337295 The results are preliminary and subject to change if they are not certified.

Certified By:



Linda Houllé

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Certificate of Analysis

AGAT WORK ORDER: 19M489628

PROJECT: QC Quarterly Surface Water-Sunny

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FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: DSO4 QC

Inorganic Analyses

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-30

		DSO4-ER-SUN-	
SAMPLE DESCRIPTION:		Q1-2019	
SAMPLE TYPE:		SW	
DATE SAMPLED:		2019-07-04	
Parameter	Unit	G / S	RDL
			337295
Alkalinity	mg/L - CaCO3	1.5	15.2
Ammonia Nitrogen	mg/L - N	0.02	0.06
Total Kjeldahl Nitrogen	mg/L - N	0.3	<0.3
Dissolved Organic Carbon	mg/L	0.30	0.53
Total Organic Carbon	mg/L	0.30	0.67
Chloride	mg/L	0.5	<0.5
Hexavalent Chromium	mg/L	0.008	<0.008
Conductivity (25 Celsius)	µmhos/cm	2	33
Total Cyanide	mg/L - CN	0.005	<0.005
BOD5	mg/L - O2	2	<2
Fluoride	mg/L	0.10	<0.10
Total Suspended Solids	mg/L	2	<2
Nitrate	mg/L - N	0.02	0.07
Nitrite	mg/L - N	0.02	<0.02
Dissolved Oxygen	mg/L - O2	3	12
pH	pH	NA	6.91
Total Phosphorus	mg/L - P	0.01	<0.01
Reactive Silica	mg/L	0.05	5.09
Dissolved Solids	mg/L	10	16
Sulfate	mg/L	0.5	1.8
Total Sulfide	mg/L S-2	0.02	<0.02
Nitrite-Nitrate (Montreal) (mg/L -N)	mg/L - N	0.04	0.07

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

337295 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M489628

PROJECT: QC Quarterly Surface Water-Sunny

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CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JFD

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO4 QC

Subcontracting

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-30

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q1-2019

SAMPLE TYPE: SW

DATE SAMPLED: 2019-07-04

Parameter	Unit	G / S	RDL	337295
Radium-226	Bq/L	0.005	0.006	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M489628

PROJECT: QC Quarterly Surface Water-Sunny

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ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: DSO4 QC

Total Extractable Metals

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-30

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q1-2019

SAMPLE TYPE: SW

DATE SAMPLED: 2019-07-04

Parameter	Unit	G / S	RDL	337295
Aluminum	µg/L		5	<5
Antimony	µg/L		1	<1
Silver	µg/L		0.2	<0.2
Arsenic	µg/L		0.3	<0.3
Barium	µg/L		2	<2
Boron	µg/L		40	<40
Cadmium	µg/L		0.2	<0.2
Calcium	µg/L		100	3070
Chromium	µg/L		1	<1
Cobalt	µg/L		2.0	<2.0
Copper	µg/L		1	<1
Tin	µg/L		5	<5
Iron	µg/L		60	<60
Magnesium	µg/L		100	2320
Manganese	µg/L		1	<1
Mercury	µg/L		0.01	0.02
Molybdenum	µg/L		1	<1
Nickel	µg/L		1	<1
Lead	µg/L		0.5	<0.5
Potassium	µg/L		100	196
Selenium	µg/L		1	<1
Sodium	µg/L		200	339
Thallium	µg/L		1	<1
Titanium	µg/L		3	<3
Uranium	µg/L		0.5	<0.5
Vanadium	µg/L		1	<1
Zinc	µg/L		3	<3

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M489628

PROJECT: QC Quarterly Surface Water-Sunny

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JFD

SAMPLING SITE: DSO4 QC

Total Extractable Metals

DATE RECEIVED: 2019-07-08

DATE REPORTED: 2019-08-30

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q1-2019

SAMPLE TYPE: SW

DATE SAMPLED: 2019-07-04

Parameter	Unit	G / S	RDL	337295
Hardness	µg/L - CaCO3	1000	17200	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

337295 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: QC Quarterly Surface Water-Sunny
SAMPLED BY: JFD

AGAT WORK ORDER: 19M489628
ATTENTION TO: Mariana Trindade
SAMPLING SITE: DSO4 QC

Water Analysis															
RPT Date: 2019-08-30			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Total Extractable Metals

Aluminum	337295	337295	<5	<5	NA	< 5	87%	80%	120%	98%	80%	120%	105%	80%	120%
Antimony	337295	337295	<1	<1	NA	< 1	108%	80%	120%	100%	80%	120%	NA	80%	120%
Silver	337295	337295	<0.2	<0.2	NA	< 0.2	NA	80%	120%	103%	80%	120%	120%	80%	120%
Arsenic	337295	337295	<0.3	<0.3	NA	< 0.3	96%	80%	120%	109%	80%	120%	119%	80%	120%
Barium	337295	337295	<2	<2	NA	< 2	83%	80%	120%	94%	80%	120%	NA	80%	120%
Boron	337295	337295	<40	<40	NA	< 40	97%	80%	120%	108%	80%	120%	NA	80%	120%
Cadmium	337295	337295	<0.2	<0.2	NA	< 0.2	93%	80%	120%	102%	80%	120%	NA	80%	120%
Calcium	337295	337295	3070	3060	0.3%	< 100	88%	80%	120%	102%	80%	120%	NA	80%	120%
Chromium	337295	337295	<1	<1	NA	< 1	99%	80%	120%	107%	80%	120%	115%	80%	120%
Cobalt	337295	337295	<2.0	<2.0	NA	< 0.5	101%	80%	120%	105%	80%	120%	109%	80%	120%
Copper	337295	337295	<1	<1	NA	< 1	99%	80%	120%	111%	80%	120%	118%	80%	120%
Tin	337295	337295	<5	<5	NA	< 5	NA	80%	120%	105%	80%	120%	111%	80%	120%
Iron	337295	337295	<60	<60	NA	< 60	98%	80%	120%	109%	80%	120%	NA	80%	120%
Magnesium	337295	337295	2320	2500	7.5%	< 100	91%	80%	120%	103%	80%	120%	NA	80%	120%
Manganese	337295	337295	<1	<1	NA	< 1	99%	80%	120%	101%	80%	120%	108%	80%	120%
Mercury	1		NA	NA	0.0%	< 0.01	101%	80%	120%	104%	80%	120%	NA	80%	120%
Molybdenum	337295	337295	<1	<1	NA	< 1	97%	80%	120%	106%	80%	120%	110%	80%	120%
Nickel	337295	337295	<1	<1	NA	< 1	95%	80%	120%	101%	80%	120%	114%	80%	120%
Lead	337295	337295	<0.5	<0.5	NA	< 0.5	96%	80%	120%	110%	80%	120%	NA	80%	120%
Potassium	337295	337295	196	209	NA	< 100	96%	80%	120%	99%	80%	120%	NA	80%	120%
Selenium	337295	337295	<1	<1	NA	< 1	98%	80%	120%	109%	80%	120%	NA	80%	120%
Sodium	337295	337295	339	355	NA	< 200	94%	80%	120%	118%	80%	120%	NA	80%	120%
Thallium	337295	337295	<1	<1	NA	< 1	93%	80%	120%	103%	80%	120%	115%	80%	120%
Titanium	337295	337295	<3	<3	NA	< 3	NA	80%	120%	105%	80%	120%	111%	80%	120%
Uranium	337295	337295	<0.5	<0.5	NA	< 0.5	95%	80%	120%	107%	80%	120%	115%	80%	120%
Vanadium	337295	337295	<1	<1	NA	< 1	101%	80%	120%	105%	80%	120%	113%	80%	120%
Zinc	337295	337295	<3	<3	NA	< 3	99%	80%	120%	104%	80%	120%	NA	80%	120%

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spiked blank or CRM indicates that it is not required by the procedure.

The percentage of recovery of the CRM may be outside of the acceptability criteria of 80-120%, if conform to the criteria provided on the Certificate of Analysis of the reference material.

Inorganic Analyses

Alkalinity	309314		21.6	24.2	11.4%	< 1.5	95%	80%	120%	93%	80%	120%	NA	80%	120%
Ammonia Nitrogen	316867		0.38	0.42	10.0%	< 0.02	109%	80%	120%	116%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	1		NA	NA	0.0%	< 0.30	111%	80%	120%	111%	80%	120%	NA	80%	120%
Total Organic Carbon	331880		1.26	1.27	NA	< 0.30	111%	80%	120%	111%	80%	120%	98%	80%	120%
Chloride	327076		<0.5	<0.5	NA	< 0.5	95%	80%	120%	84%	80%	120%	111%	80%	120%
Hexavalent Chromium	336978		< 0.008	< 0.008	NA	< 0.008	105%	80%	120%	105%	80%	120%	83%	80%	120%
Conductivity (25 Celsius)	346254		600	602	0.3%	< 2	101%	80%	120%	102%	80%	120%	101%	80%	120%
Total Cyanide	324688		<0.005	<0.005	NA	< 0.005	77%	80%	120%	101%	80%	120%	83%	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: QC Quarterly Surface Water-Sunny
SAMPLED BY: JFD

AGAT WORK ORDER: 19M489628
ATTENTION TO: Mariana Trindade
SAMPLING SITE: DSO4 QC

Water Analysis (Continued)

RPT Date: 2019-08-30			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BOD5	1		NA	NA	0.0%	< 2	80%	80%	120%	82%	80%	120%	102%	80%	120%
Fluoride	327076		<0.10	<0.10	NA	< 0.10	100%	80%	120%	105%	80%	120%	NA	80%	120%
Total Suspended Solids	331756		73	69	5.6%	< 2	97%	80%	120%	NA			102%	80%	120%
Nitrate	327076		NA	NA	0.0%	< 0.02	96%	80%	120%	96%	80%	120%	96%	80%	120%
Nitrite	327076		<0.02	<0.02	NA	< 0.02	NA	80%	120%	91%	80%	120%	105%	80%	120%
pH	338682		8.01	8.07	0.7%		100%	80%	120%	101%	80%	120%	NA		
Reactive Silica	352891		< 0.05	< 0.05	NA	< 0.05	104%	90%	110%	109%	70%	130%	109%	70%	130%
Dissolved Solids	318088		< 10	< 10	NA	< 10	101%	80%	120%	NA			104%	80%	120%
Sulfate	327076		NA	NA	0.0%	< 0.5	98%	80%	120%	95%	80%	120%	NA	80%	120%
Total Sulfide	325484		0.05	0.05	NA	< 0.02	86%	80%	120%	89%	80%	120%	NA	80%	120%

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percent recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spiked blank or CRM indicates that it is not required by the procedure.

The percentage of recovery of the CRM may be outside of the acceptability criteria of 80-120%, if conform to the criteria provided on the Certificate of Analysis of the reference material.

Certified By: _____



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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M489628

PROJECT: QC Quarterly Surface Water-Sunny

ATTENTION TO: Mariana Trindade

SAMPLED BY:JFD

SAMPLING SITE:DSO4 QC

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Total Coliforms	2019-07-10	2019-07-10	MIC-102-7017	MA.700-Col 1.0	N/A
Atypical Bacteria	2019-07-10	2019-07-10	MIC-102-7017	MA.700-Col1.0	N/A
Fecal Coliforms	2019-07-10	2019-07-10	MIC-102-7013	MA.700-Fec.Ec 1.0	N/A
Temperature upon receipt	2019-07-10	2019-07-10	N/A		N/A

Method Summary

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: QC Quarterly Surface Water-Sunny
 SAMPLED BY:JFD

 AGAT WORK ORDER: 19M489628
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE:DSO4 QC

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Alkalinity	2019-07-12	2019-07-12	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION
Ammonia Nitrogen	2019-07-17	2019-07-17	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
Total Kjeldahl Nitrogen		2019-07-30	INOR-101-6048F	MA.300-NTPPT 2.0	COLORIMETRY
Dissolved Organic Carbon	2019-07-11	2019-07-11	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Total Organic Carbon	2019-07-11	2019-07-11	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
Chloride	2019-07-11	2019-07-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Hexavalent Chromium	2019-07-10	2019-07-10	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Conductivity (25 Celsius)	2019-07-18	2019-07-18	INOR-101-6016F	MA.115-Cond. 1.1	CONDUCTIVIMETER
Total Cyanide	2019-07-19	2019-07-19	INOR-101-6061F	MA. 300 - CN 1.2	COLORIMETRY
BOD5	2019-08-02	2019-08-07	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRIC
Fluoride	2019-07-11	2019-07-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-07-11	2019-07-12	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Nitrate	2019-07-11	2019-07-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-07-11	2019-07-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Dissolved Oxygen		2019-08-07	INOR-101-6006F, unaccredited by MDDELCC	MA. 315 - DBO 1.1	ELECTROMETRIC
pH	2019-07-10	2019-07-10	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRIC
Total Phosphorus		2019-08-01	INOR-101-6048F	MA.300-NTPPT 2.0	COLORIMETRY
Reactive Silica	2019-08-06	2019-08-06	INOR-101-6071F, unaccredited by MDDELCC	AQ2 EPA-122A Rev 5	COLORIMETRY
Dissolved Solids	2019-07-17	2019-07-18	INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Sulfate	2019-07-11	2019-07-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Sulfide	2019-07-16	2019-07-16	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Radium-226		2019-07-08	Subcontracted	Subcontracted	N/A
Aluminum	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-07-11	2019-07-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-07-11	2019-07-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Tin	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Iron	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Magnesium	2019-07-11	2019-07-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Mercury	2019-07-11	2019-07-11	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Molybdenum	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-07-11	2019-07-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M489628

PROJECT: QC Quarterly Surface Water-Sunny

ATTENTION TO: Mariana Trindade

SAMPLED BY:JFD

SAMPLING SITE:DSO4 QC

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Sodium	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Titanium	2019-07-11	2019-07-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-07-11	2019-07-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-07-11	2019-07-12	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Hardness	2019-07-12	2019-07-12	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS



AGAT Laboratoires

350 rue Franquet, Ville de Québec,
Québec, G1P 4P3
Tél.: 418.266.5511 Téléc.: 418.653.2335
fr.agatlabs.com

À l'usage des clients du laboratoire
Bon de travail: **191489628**
Nb. de glacières: **1**
Température à l'arrivée: **11.30 11.30 11.10**

Chaîne de traçabilité Environnement

Eau potable RQEP (réseau) - Veuillez utiliser le formulaire du MDDELCC

Information pour le rapport
Compagnie: Tata Steel Minerals Canada
Adresse: 1000 Rue Sherbrooke Ouest, Montreal, QC, H3A 3G4
Téléphone: 514.764.6700 x.765 Téléc.: _____
Projet: QC Quarterly Surface Water - Sunny
Lieu de prélèvement: DS04 QC
Prélevé par: JFD

Rapport envoyé à
1. Nom: Mariana Trindade
Courriel: mariana.trindade@tatasteelcanada.com
2. Nom: TSMC Environment Team
Courriel: *Team Email List*

Critères à respecter
 PRTC ABC RESC
 CCME
 Eau consommation
 Eau résurg. Surface
 Eau résurg. Salée
 CMM Sanitaire Pluvial
 Autre: _____

Glace Bloc réfrigérant Aucun
Scellé légal intact: Oui Non N/A

Délais d'analyse requis (jours ouvrables)
Environnemental: Haute Résolution:
Régulier: 5 à 7 jours Régulier: 10 à 15 jours
Urgent: Même jour Urgent: < 10 jours
 1 jour Date Requite: _____
 2 jours
 3 jours
AA/MM/JJ

Facturé à Mème adresse: Oui Non
Compagnie: _____
Contact: _____
Courriel: _____
Adresse: _____
Bon de commande: 3000000296 Soumission: _____

Commentaires:

Matrice (légende)

EP	Eau potable	EB	Eau brute	EPI	Eau de piscine
S	Sol	B	Boue	SE	Sédiment
ES	Eau de surface	AF	Affluent		
SL	Solide	EU	Eau usée	EF	Effluent
ST	Eau souterraine	A	Air		

Format de rapport
 Portrait (échantillon/page) Paysage (échantillons/page)

IDENTIFICATION DE L'ÉCHANTILLON	PRÉLÈVEMENT		MATRICE	NB DE CONTENANTS	ANALYSES																																																																												
	DATE (AA/MM/JJ)	HEURE			Hydrocarbures pétroliers C10-C50	HAP	BTEX	HAC-HAM	THM	Chlorobenzènes	Phtalates	COSV	BPC: Congénères	Aroclor	CBNC	Éthylène glycol	Formaldéhyde	Huiles et graisses: Minérales	Totales	Pesticides: OC	OP	Herbicides	Diquat / Paraquat	Glyphosate	Phénols (GC-MS)	Indice phénolique (4AAP)	Métaux - Sol	Hg	Se	CrVI	Métaux - ST	Hg	CrVI	CrIII	U	Métaux: Filtré sur terrain	Filtré au lab	Métaux (spécifier):	Dureté totale	Alcalinité	Bromates	Conductivité	Chlorures	Fluorures	Sulfates	Bromures	Cyanures: Totaux	Disponibles	Oxydables	DCO	COT	NH ₃ + NH ₄	NTK	NO ₂ + NO ₃	P total	Solides: Totaux	Dissous	MES	MESV	Sulfures - Eau	Soufre total - Sol	pH	NO ₂	NO ₃	o-P04	COD	Absorbance UV	Couleur	Turbidité	DBO ₅	DBO ₃ Carbonée	Coliformes: Totaux	Fécaux	E. coli	Microbiologie (autre):	HR/MS: Dioxines/Furanes	HAP	BPC	CMM 2008-47: Sanitaire	Pluvial	NP
DS04 - ER - SUN - Q1 - 2019	(19/07/04)	10:00am	ES	16	"APPENDIX A - p. 5/12 - Laboratory Analysis"																																																																												

Echantillon remis par (nom en lettres moulées et signature) <u>Adam Calvert / Adam Calvert</u>	Date (AA/MM/JJ) <u>(19/07/04)</u>	Heure <u>13:00</u>	Echantillon reçu par (nom en lettres moulées et signature) <u>ABa</u>	Date (AA/MM/JJ) <u>08-07-19</u>	Heure <u>13:00</u>	Page <u>1</u> de <u>1</u>
Echantillon remis par (nom en lettres moulées et signature)	Date (AA/MM/JJ)	Heure	Echantillon reçu par (nom en lettres moulées et signature)	Date (AA/MM/JJ)	Heure	N°: <u>072304</u>

Quebec parameters:

DSO4 2a (Sunny and Goodwood) environmental monitoring and G

METALS	CONVENTIONALIS	MICROBIOLOGICAL TESTS	PETROLEUM HYDROCARBONS
Mercury (Hg)	BOD5	Total coliforms	Petroleum Hydrocarbons (C10-C50)
Total phosphorous	COD	Fecal coliforms	
Aluminum (Al)	Conductivity		
Antimony (Sb)	Dissolved organic carbon		
Silver (Ag)	Dissolved oxygen		
Arsenic (As)	Fluoride (F)		
Barium (Ba)	Hexavalent Chromium (Cr 6+)		
Boron (B)	Nitrogen ammonia (N-NH3)		
Cadmium (Cd)	pH		
Calcium (Ca)	Reactive silica (SiO2)		
Chromium (Cr)	TKN Total Kjeldahl Nitrogen		
Cobalt (Co)	Total Cyanide (CN)		
Copper (Cu)	Total Organic Carbon		
Total Hardness (CaCO3)	Alkalinity Total (as CaCO3) pH 4.5		
Tin (Sn)	Chloride (Cl)		
Iron (Fe)	Nitrites (N-NO2-)		
Magnesium (Mg)	Nitrates (N-NO3-)		
Manganese (Mn)	Sulfates (SO4)		
Molybdenum (Mo)	Total suspended solids (TSS)		
Nickel (Ni)	Total dissolved solids		
Lead (Pb)	Hydrogen Sulphide		
Potassium (K)	Phenols-4AAP		
Selenium (Se)			
Sodium (Na)			
Thallium (Tl)			
Titanium (Ti)			
Uranium (U)			
Vanadium (V)			
Zinc (Zn)			
Radium 226 (Ra)			



TPH

Interlab à envoyer à

AGAT Dartmouth avec

Critères Atlantic PIRI



Métaux

Totaux

+ TKN et NH3

Sur tous.



Certificat d'analyse

Client : **AGAT Laboratoires**

Responsable : Sous-traitance Agat-Montréal

Adresse : 9770, route Transcanadienne

St-Laurent Québec H4S 1V9

tél.: (514) 337-1000 (00)

fax.: (514) 333-3046

Numéro de projet : V-90869

Lieu de prélèvement : 419325 (DSO4-EE-SUN)

Date de prélèvement : 05 août 2019

Échantillon : 419325 (DSO4-EE-SUN)

Heure de prélèvement : N/D

Nom du préleveur : n/d

Date de réception : 23 août 2019

Type d'échantillon : Eau

Réseau :

Date d'émission : 12 septembre 2019

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

Les échantillons seront conservés pendant 30 jours à partir de la date du rapport à moins d'avis écrit du client.

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Certificat d'analyse

Numéro de projet : V-90869

Échantillon : 419325 (DSO4-EE-SUN)

Date de prélèvement : 05 août 2019

Lieu de prélèvement : 419325 (DSO4-EE-SUN)

Heure de prélèvement : N/D

Paramètres	Résultats	Méthode d'analyse	Date d'analyse
Radium (RA 226)	<0.002 Becquerels/L	M-RA-2.0	12 septembre 2019

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Limite de détection rapportée

Numéro de projet : V-90869

Échantillon : 419325 (DSO4-EE-SUN)

Date de prélèvement : 05 août 2019

Lieu de prélèvement : 419325 (DSO4-EE-SUN)

Heure de prélèvement : N/D

Paramètre	Valeur	Unité	Méthode	Accréditation
Radium (RA 226)	0.002	Becquerels/L	M-RA-2.0	Oui

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Informations supplémentaires

Numéro de projet : V-90869

Échantillon : 419325 (DSO4-EE-SUN)

Date de prélèvement : 05 août 2019

Lieu de prélèvement : 419325 (DSO4-EE-SUN)

Heure de prélèvement : N/D

<u>Méthode laboratoire</u>	<u>Méthode de référence</u>
M-RA-2.0	APHA 7500-Ra B et EPA P.13 (EMSL-CI)

Sauf indication contraire, tous les échantillons ont été reçus en bon état.
Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Certificat d'analyse

Client : **AGAT Laboratoires**

Responsable : Sous-traitance Agat-Montréal

Adresse : 9770, route Transcanadienne

St-Laurent Québec H4S 1V9

tél.: (514) 337-1000 (00)

fax.: (514) 333-3046

Numéro de projet : V-90870

Lieu de prélèvement : 419378 (DSO4-ER-SUN)

Date de prélèvement : 05 août 2019

Échantillon : 419378 (DSO4-ER-SUN)

Heure de prélèvement : N/D

Nom du préleveur : n/d

Date de réception : 23 août 2019

Type d'échantillon : Eau

Réseau :

Date d'émission : 12 septembre 2019

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

Les échantillons seront conservés pendant 30 jours à partir de la date du rapport à moins d'avis écrit du client.

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Certificat d'analyse

Numéro de projet : V-90870

Échantillon : 419378 (DSO4-ER-SUN)

Date de prélèvement : 05 août 2019

Lieu de prélèvement : 419378 (DSO4-ER-SUN)

Heure de prélèvement : N/D

Paramètres	Résultats	Méthode d'analyse	Date d'analyse
Radium (RA 226)	<0.002 Becquerels/L	M-RA-2.0	12 septembre 2019

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Limite de détection rapportée

Numéro de projet : V-90870

Échantillon : 419378 (DSO4-ER-SUN)

Date de prélèvement : 05 août 2019

Lieu de prélèvement : 419378 (DSO4-ER-SUN)

Heure de prélèvement : N/D

Paramètre	Valeur	Unité	Méthode	Accréditation
Radium (RA 226)	0.002	Becquerels/L	M-RA-2.0	Oui

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Certificat contrôle qualité

Numéro de projet : V-90870

Échantillon : 419378 (DSO4-ER-SUN)

Date de prélèvement : 05 août 2019

Lieu de prélèvement : 419378 (DSO4-ER-SUN)

Heure de prélèvement : N/D

Paramètres

Radium (RA 226) Becquerels/L	Blanc <0.002
	Nom Standard MR 76422
	Valeur obtenue 5.250
	Justesse 86.8%
	Intervalle 5.143 - 6.958

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



Informations supplémentaires

Numéro de projet : V-90870

Échantillon : 419378 (DSO4-ER-SUN)

Date de prélèvement : 05 août 2019

Lieu de prélèvement : 419378 (DSO4-ER-SUN)

Heure de prélèvement : N/D

<u>Méthode laboratoire</u>	<u>Méthode de référence</u>
M-RA-2.0	APHA 7500-Ra B et EPA P.13 (EMSL-CI)

Sauf indication contraire, tous les échantillons ont été reçus en bon état.
Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: QC-Quarterly Surface Water - Sunny

AGAT WORK ORDER: 19M502165

MICROBIOLOGY ANALYSIS REVIEWED BY: Linda Maille, Superviseur Microbiology

TRACE ORGANICS REVIEWED BY: Manal Seif, Report Writer

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-09-16

VERSION*: 1

PAGES (INCLUDING COVER): 11

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M502165

PROJECT: QC-Quarterly Surface Water - Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Microbiological

DATE RECEIVED: 2019-08-07

DATE REPORTED: 2019-09-16

Parameter	Unit	SAMPLE DESCRIPTION:		DSO4-EE-SUN	DSO4-ER-SUN
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-08-05	2019-08-05
		G / S	RDL	419325	419378
Fecal Coliforms	CFU/100ml		2	<2	<2
Total Coliforms	CFU/100ml		2	370	8
Temperature upon receipt	°C		NA	7.0	7.0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
419325-419378 Analysis performed passed the regulatory conservation time of 48 hours.

Certified By:



Linda Haille

AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Certificate of Analysis

AGAT WORK ORDER: 19M502165

PROJECT: QC-Quarterly Surface Water - Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-08-07

DATE REPORTED: 2019-09-16

Parameter	Unit	SAMPLE DESCRIPTION:		DSO4-EE-SUN	DSO4-ER-SUN
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-08-05	2019-08-05
		G / S	RDL	419325	419378
Mercury	µg/L		0.1	<0.1	<0.1
Total Phosphorus	µg/L - P		20	123	246
Aluminum	µg/L		10	13	<10
Antimony	µg/L		1	<1	<1
Silver	µg/L		0.2	<0.2	<0.2
Arsenic	µg/L		1	<1	<1
Barium	µg/L		5	<5	<5
Boron	µg/L		40	<40	<40
Cadmium	µg/L		0.5	<0.5	<0.5
Calcium	µg/L		100	2660	2870
Chromium	µg/L		1	<1	<1
Cobalt	µg/L		0.5	<0.5	<0.5
Copper	µg/L		1	<1	<1
Total hardness	µg/L - CaCO3		1000	13730	14870
Tin	mg/L		0.5	<0.5	<0.5
Iron	µg/L		70	<70	<70
Manganese	µg/L		1	12	<1
Molybdenum	µg/L		1	<1	<1
Nickel	µg/L		1	<1	<1
Lead	µg/L		1	<1	<1
Potassium	µg/L		100	128	154
Thallium	µg/L		1	<1	<1
Titanium	µg/L		3	<3	<3
Uranium	µg/L		0.5	<0.5	<0.5
Vanadium	µg/L		1	<1	<1
Zinc	µg/L		3	<3	<3
Radium-226	Bq/L		0.002	<0.002	<0.002
Report Reviewer Montreal Chem.				J ROUSSI	J ROUSSI

Certified By:



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19M502165

PROJECT: QC-Quarterly Surface Water - Sunny

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-08-07

DATE REPORTED: 2019-09-16

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M502165

PROJECT: QC-Quarterly Surface Water - Sunny

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Packages - Conventionals

DATE RECEIVED: 2019-08-07

DATE REPORTED: 2019-09-16

Parameter	Unit	SAMPLE DESCRIPTION:		DSO4-EE-SUN	DSO4-ER-SUN
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-08-05	2019-08-05
		G / S	RDL	419325	419378
BOD5	mg/L - O2		2	<2	<2
COD	mg/L - O2		5	<5	<5
Dissolved Organic Carbon	mg/L		0.30	1.12	0.39
Total Organic Carbon	mg/L		0.30	1.20	0.34
Dissolved Oxygen	mg/L		3	9	11
Fluoride	mg/L		0.10	0.21	0.20
chromium VI	mg/L		0.008	<0.008	<0.008
Ammonia Nitrogen	mg/L - N		0.02	0.11	0.17
Reactive silica	mg/L		0.05	5.98	5.42
Total Kjeldahl Nitrogen	mg/L - N		0.3	17.0	0.3
Total Cyanide	mg/L - CN		0.005	<0.005	<0.005
Alkalinity	mg/L - CaCO3		1.5	13.1	14.7
Chloride	mg/L		0.50	<0.50	<0.50
Nitrate	mg/L - N		0.02	<0.02	0.06
Nitrite	mg/L - N		0.02	<0.02	<0.02
Sulfate	mg/L		0.50	1.72	1.29
Total Suspended Solids	mg/L		2	<2	<2
Dissolved Solids	mg/L		10	18	14
Total Sulfide	mg/L S-2		0.02	<0.02	<0.02
Total Phenols (colorimetry)	mg/L		0.002	0.002	0.006
Total Phosphorus	mg/L - P		0.02	0.12	0.25
pH	pH		NA	7.66	7.28

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: QC-Quarterly Surface Water - Sunny
SAMPLED BY:

AGAT WORK ORDER: 19M502165
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis															
RPT Date: 2019-09-16			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Tata Steel - QC Packages - Conventionals

BOD5	1		NA	NA	0.0%	< 2	77%	80%	120%	93%	80%	120%	98%	80%	120%
COD	419325	419325	<5	<5	NA	< 5	82%	80%	120%	81%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	1		NA	NA	0.0%	< 0.30	95%	80%	120%	88%	80%	120%	NA	80%	120%
Total Organic Carbon	416441		3.32	3.30	0.6%	< 0.30	95%	80%	120%	88%	80%	120%	80%	80%	120%
Fluoride	412945		<0.10	<0.10	NA	< 0.10	90%	80%	120%	91%	80%	120%	NA	80%	120%
chromium VI	409135		< 0.008	< 0.008	NA	< 0.008	100%	80%	120%	102%	80%	120%	NA	80%	120%
Ammonia Nitrogen	425712		0.24	0.27	11.8%	< 0.02	118%	80%	120%	100%	80%	120%	NA	80%	120%
Reactive silica	312168		2.12	2.10	0.9%	< 0.05	102%	90%	110%	111%	70%	130%	113%	70%	130%
Total Kjeldahl Nitrogen	422916		164	162	1.2%	< 0.3	118%	80%	120%	92%	80%	120%	NA	80%	120%
Total Cyanide	429841		<0.005	<0.005	NA	< 0.005	96%	80%	120%	120%	80%	120%	111%	80%	120%
Alkalinity	419378	419378	14.7	14.6	0.7%	< 1.5	96%	80%	120%	94%	80%	120%	93%	80%	120%
Chloride	412945		1.57	1.57	NA	< 0.5	93%	80%	120%	74%	80%	120%	82%	80%	120%
Nitrate	412945		0.08	0.08	NA	< 0.02	89%	80%	120%	93%	80%	120%	96%	80%	120%
Nitrite	412945		<0.02	<0.02	NA	< 0.02	NA	80%	120%	84%	80%	120%	87%	80%	120%
Sulfate	412945		6.77	7.05	4.1%	< 0.5	98%	80%	120%	86%	80%	120%	93%	80%	120%
Total Suspended Solids	411555		11	7	NA	< 2	100%	80%	120%	NA			105%	80%	120%
Dissolved Solids	413936		24	32	NA	< 10	101%	80%	120%	NA			106%	80%	120%
Total Sulfide	402678		< 0.02	< 0.02	NA	< 0.02	109%	80%	120%	86%	80%	120%	95%	80%	120%
Total Phenols (colorimetry)	419325	419325	0.002	0.002	NA	< 0.002	96%	80%	120%	110%	80%	120%	90%	80%	120%
Total Phosphorus	411859		0.28	0.29	3.5%	< 0.02	101%	80%	120%	115%	80%	120%	NA	80%	120%
pH	412279		7.87	7.79	1.0%		103%	80%	120%	103%	80%	120%	NA		

Tata Steel - QC Package - Metals

Mercury	1		NA	NA	0.0%	< 0.1	101%	80%	120%	104%	80%	120%	105%	80%	120%
Total Phosphorus	411859		285	292	2.4%	< 20	101%	80%	120%	115%	80%	120%	NA	80%	120%
Aluminum	413936		<10	<10	NA	< 10	89%	80%	120%	96%	80%	120%	114%	80%	120%
Antimony	413936		<1	<1	NA	< 1	106%	80%	120%	93%	80%	120%	NA	80%	120%
Silver	413936		<0.2	<0.2	NA	< 0.2	NA	80%	120%	104%	80%	120%	97%	80%	120%
Arsenic	413936		<1	<1	NA	< 1	96%	80%	120%	100%	80%	120%	NA	80%	120%
Barium	413936		<5	<5	NA	< 5	91%	80%	120%	96%	80%	120%	NA	80%	120%
Boron	413936		<40	<40	NA	< 40	99%	80%	120%	107%	80%	120%	NA	80%	120%
Cadmium	413936		<0.5	<0.5	NA	< 0.5	95%	80%	120%	102%	80%	120%	NA	80%	120%
Calcium	413936		2520	2510	0.4%	< 100	91%	80%	120%	96%	80%	120%	NA	80%	120%
Chromium	413936		<1	<1	NA	< 1	101%	80%	120%	111%	80%	120%	111%	80%	120%
Cobalt	413936		<0.5	<0.5	NA	< 0.5	102%	80%	120%	108%	80%	120%	112%	80%	120%
Copper	413936		11	10	9.5%	< 1	103%	80%	120%	104%	80%	120%	NA	80%	120%
Tin	413936		<0.5	<0.5	NA	< 0.5	NA	80%	120%	97%	80%	120%	114%	80%	120%
Iron	413936		<70	<70	NA	< 70	102%	80%	120%	110%	80%	120%	NA	80%	120%
Manganese	413936		<1	<1	NA	< 1	94%	80%	120%	101%	80%	120%	115%	80%	120%
Molybdenum	413936		<1	<1	NA	< 1	95%	80%	120%	96%	80%	120%	117%	80%	120%
Nickel	413936		<1	<1	NA	< 1	105%	80%	120%	103%	80%	120%	120%	80%	120%
Lead	413936		<1	<1	NA	< 1	101%	80%	120%	105%	80%	120%	107%	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: QC-Quarterly Surface Water - Sunny
SAMPLED BY:

AGAT WORK ORDER: 19M502165
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis (Continued)

RPT Date: 2019-09-16			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Potassium	413936		<100	<100	NA	< 100	94%	80%	120%	95%	80%	120%	107%	80%	120%
Thallium	413936		<1	<1	NA	< 1	101%	80%	120%	103%	80%	120%	119%	80%	120%
Titanium	413936		<3	<3	NA	< 3	NA	80%	120%	93%	80%	120%	NA	80%	120%
Uranium	413936		<0.5	<0.5	NA	< 0.5	100%	80%	120%	105%	80%	120%	120%	80%	120%
Vanadium	413936		<1	<1	NA	< 1	102%	80%	120%	106%	80%	120%	109%	80%	120%
Zinc	413936		3	<3	NA	< 3	100%	80%	120%	96%	80%	120%	NA	80%	120%

Certified By: _____



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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M502165

PROJECT: QC-Quarterly Surface Water - Sunny

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Fecal Coliforms	2019-08-08	2019-08-08	MIC-102-7013	MA.700-Fec.Ec 1.0	N/A
Total Coliforms	2019-08-08	2019-08-08	MIC-102-7017	MA.700-Col 1.0	N/A
Temperature upon receipt	2019-08-07	2019-08-08	N/A		N/A

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M502165

PROJECT: QC-Quarterly Surface Water - Sunny

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Mercury	2019-08-09	2019-08-09	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Total Phosphorus	2019-08-21	2019-08-21	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMÉTRIE
Aluminum	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-08-08	2019-08-10	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-08-08	2019-08-10	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Total hardness	2019-08-08	2019-08-09	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Tin	2019-08-08	2019-08-10	MET-101-6107F	MA. 200 - Mét 1.2	ICP/OES
Iron	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-08-08	2019-08-10	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Titanium	2019-08-08	2019-08-09	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-08-08	2019-08-10	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-08-08	2019-08-10	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Radium-226		2019-09-12	Subcontracted	Subcontracted	N/A
Report Reviewer Montreal Chem.			NA	NA	
BOD5	2019-08-22	2019-08-27	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRY
COD	2019-08-16	2019-08-16	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Dissolved Organic Carbon	2019-08-12	2019-08-12	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Total Organic Carbon	2019-08-12	2019-08-12	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
Dissolved Oxygen		2019-08-29	Special	SM 4500-O G . 21 ième ed.	DO METER
Fluoride	2019-08-11	2019-08-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
chromium VI	2019-08-09	2019-08-09	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Ammonia Nitrogen	2019-08-15	2019-08-15	INOR-101-6051F	MA. 303 - N 2.0	COLORIMÉTRIE
Reactive silica	2019-08-13	2019-08-13	INOR-101-6071F, non accrédité MDDELCC	AQ2 EPA-122A Rev 5	COLORIMÉTRIE
Total Kjeldahl Nitrogen	2019-08-20	2019-08-20	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMÉTRIE
Total Cyanide	2019-08-14	2019-08-14	INOR-101-6061F	MA. 300 - CN 1.2	COLORIMÉTRIE
Alkalinity	2019-08-12	2019-08-12	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION
Chloride	2019-08-11	2019-08-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrate	2019-08-11	2019-08-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-08-11	2019-08-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M502165

PROJECT: QC-Quarterly Surface Water - Sunny

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Sulfate	2019-08-11	2019-08-11	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-08-09	2019-08-10	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Dissolved Solids	2019-08-13	2019-08-14	INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Total Sulfide	2019-08-13	2019-08-13	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Total Phenols (colorimetry)	2019-08-09	2019-08-09	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMÉTRIE
Total Phosphorus	2019-08-21	2019-08-21	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMÉTRIE
pH	2019-08-08	2019-08-08	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRY

197 502165



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St-Laurent, Québec
H4S 1V9
http://webearth.agatlabs.com

Tel.: 514.337.1000
Fax.: 514.333.3046
agatlabs.com

Laboratory use Only

Arrival Condition: Good Poor (complete 'notes')
Arrival Temperature: _____ AGAT Job Number: _____
Notes: _____

Report To:
Company: Tata Steel Minerals Canada
Contact: Mariana Trindade
Address: 1000 Sherbrooke West, Suite 1120
Montreal, QC H3A 3G4

Project #: QC Quarterly Surface Water - Sunny
Quote #: RFQ 20190118

Invoice to: Same (Y/N) - Circle
Company: Tata Steel Minerals Canada
Contact: Jay Adhvaryu
Email: jay.adhvaryu@tatasteelcanada.com
Phone: _____ Fax: _____
PO #: 3000000242

Report Information
1. Name: Mariana Trindade
Email: mariana.trindade@tatasteelcanada.com
2. Name: Jean-Francois Dion
Email: jeanfrancois.dion@tatasteelcanada.com

Regulatory Requirements (Check):
 List Guidelines on Report Do Not List Guidelines on Report
 PIRI Site Info (check all that apply):
 Tier 1 Res. Pot. Coarse
 Tier 2 Com N/Pot. Fine
 Gas Fuel Lube
 CCME CDWQ
 Ind
 Com
 Res/P
 Ag
 FWAL
 Sediment
 Other NL MMER

Report Format
 Single PDF sample per page
 Multiple PDF samples
 Format Included

Turnaround Time (TAT) Business Days
Regular TAT: 5 - 7 days
Rush TAT: 1 day 2 days
 3 - 4 days

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Field Filtered/Preserved	Metals, Total (Including Hardness)	Mercury, Total	BOD5	Total Phosphorous & TKN	Conductivity & pH	TOC & DOC	Dissolved Oxygen	Anions (Cl, F, SO4, NO2, NO3)	Ammonia as N	Reactive Silica	COD	Phenols -4AAP - Mississauga	Hexavalent Chromium	Sulphide as H2S	Alkalinity (pH 4.5)	Total Cyanide	Total Dissolved Solids	Total Suspended Solids	Total Coliforms & Fecal Coliforms	PHC (C10-C50)	Radium-226 - H2Lab
DSO4-EE-SUN	Aug 5 / 17:40	water	15	Q2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DSO4-ER-SUN	Aug 5 / 14:15	water	15	Q2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Sample Relinquished By (print name & sign) Jean-Francois Dion Date/Time 05/06/13 00 Samples Received By (print name and sign) _____ Date/Time _____ Special Instructions _____

Sample Relinquished By (print name & sign) _____ Date/Time _____ Samples Received By (print name and sign) _____ Date/Time _____ **Tata Steel -QC Effluent**

Page _____ of _____

Noted 190801 T-72



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Goodwood

AGAT WORK ORDER: 19M530908

MICROBIOLOGY ANALYSIS REVIEWED BY: Katia Etienne, Microbiologiste

TRACE ORGANICS REVIEWED BY: Robert Roch, Chimiste

WATER ANALYSIS REVIEWED BY: Marie-Flora Coustou, Report Writer

DATE REPORTED: 2019-12-03

VERSION*: 1

PAGES (INCLUDING COVER): 16

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M530908

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Microbiological

DATE RECEIVED: 2019-10-15

DATE REPORTED: 2019-12-03

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q3-2019

SAMPLE TYPE: Water

DATE SAMPLED: 2019-10-11

Parameter	Unit	G / S	RDL	619685
Total Coliforms	CFU/100ml		2	56
Fecal Coliforms	CFU/100ml		2	16
Temperature upon receipt	°C		NA	8.9
Analysis started by				1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

619685 Analysis performed passed the regulatory conservation time of 48 hours.

Certified By: _____



Mariana Trindade

AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Certificate of Analysis

AGAT WORK ORDER: 19M530908

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Petroleum Hydrocarbons in Water

DATE RECEIVED: 2019-10-15

DATE REPORTED: 2019-12-03

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q3-2019

SAMPLE TYPE: Water

DATE SAMPLED: 2019-10-11

Parameter	Unit	G / S	RDL	619685
Petroleum Hydrocarbons C10-C50	µg/L		100	140
Surrogate	Unit	Acceptable Limits		
Nonane	%	40-140		61

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

619685 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



Robert Roch

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-10-15

DATE REPORTED: 2019-12-03

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q3-2019

SAMPLE TYPE: Water

DATE SAMPLED: 2019-10-11

Parameter	Unit	G / S	RDL	619685
Mercury	µg/L		0.1	<0.1
Aluminum	µg/L		10	<10
Antimony	µg/L		1	<1
Silver	µg/L		0.2	<0.2
Arsenic	µg/L		1	<1
Barium	µg/L		5	<5
Boron	µg/L		40	<40
Cadmium	µg/L		0.5	<0.5
Calcium	µg/L		100	3340
Chromium	µg/L		1	<1
Cobalt	µg/L		0.5	<0.5
Copper	µg/L		1	<1
Total hardness	µg/L - CaCO3		1000	18300
Tin	µg/L		5	<5
Iron	µg/L		70	<70
Magnesium	µg/L		100	2420
Manganese	µg/L		1	<1
Molybdenum	µg/L		1	<1
Nickel	µg/L		1	<1
Lead	µg/L		1	<1
Potassium	µg/L		100	220
Selenium	µg/L		1	<1
Sodium	µg/L		200	374
Thallium	µg/L		1	<1
Titanium	µg/L		3	<3
Uranium	µg/L		0.5	<0.5
Vanadium	µg/L		1	<1

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SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-10-15

DATE REPORTED: 2019-12-03

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q3-2019

SAMPLE TYPE: Water

DATE SAMPLED: 2019-10-11

Parameter	Unit	G / S	RDL	619685
Zinc	µg/L		3	<3
Radium-226	Bq/L		0.005	0.007
Total Hardness	µg/L - CaCO3		1000	18300

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

Tata Steel - QC Packages - Conventionals

DATE RECEIVED: 2019-10-15

DATE REPORTED: 2019-12-03

DSO4-ER-SUN-

SAMPLE DESCRIPTION: Q3-2019

SAMPLE TYPE: Water

DATE SAMPLED: 2019-10-11

Parameter	Unit	G / S	RDL	619685
BOD5	mg/L - O2		2	<2
COD	mg/L - O2		5	<5
Conductivité (Salinité - mS/cm)	mS/cm		2	45
Dissolved Organic Carbon	mg/L		0.30	0.46
Dissolved Oxygen	mg/L		3	9
Fluoride	mg/L		0.10	0.15
chromium VI	mg/L		0.008	<0.008
Ammonia Nitrogen	mg/L - N		0.02	0.05
pH	pH		NA	7.42
Reactive silica	mg/L		0.05	4.62
Total Kjeldahl Nitrogen	mg/L - N		0.3	<0.3
Total Cyanide	mg/L - CN		0.005	<0.005
Alkalinity	mg/L - CaCO3		1.5	17.2
Chloride	mg/L		0.5	<0.5
Nitrate	mg/L - N		0.02	0.08
Nitrite	mg/L - N		0.02	<0.02
Sulfate	mg/L		0.5	1.7
Total Suspended Solids	mg/L		2	<2
Dissolved Solids	mg/L		10	36
Total Sulfide	mg/L S-2		0.02	<0.02
Total Phenols (colorimetry)	mg/L		0.002	0.002
Total Phosphorus	mg/L - P		0.02	<0.02
Total Organic Carbon	mg/L		0.30	0.61

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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SAMPLED BY:

SAMPLING SITE:

DATE RECEIVED: 2019-10-15

DATE REPORTED: 2019-12-03

Parameter	Unit	SAMPLE TYPE:	
		G / S	RDL
			0.02
Aluminum	µg/L		0.5
Antimony	µg/L		0.005
Silver	µg/L		0.03
Arsenic	µg/L		0.08
Barium	µg/L		0.03
Boron	µg/L		0.3
Cadmium	µg/L		0.006
Calcium	µg/L		20
Chromium	µg/L		0.04
Cobalt	µg/L		0.005
Copper	µg/L		0.05
Iron	µg/L		0.5
Magnesium	µg/L		10
Manganese	µg/L		0.03
			0.01
Molybdenum	µg/L		0.01
Nickel	µg/L		0.03
Lead	µg/L		0.01
Potassium	µg/L		10
Selenium	µg/L		0.05
Sodium	µg/L		0.05
			0.02
			0.05
			1
Vanadium	µg/L		0.2
Zinc	µg/L		0.5
			0.01

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CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

DATE RECEIVED: 2019-10-15		DATE REPORTED: 2019-12-03	
SAMPLE TYPE:		DATE SAMPLED:	
Parameter	Unit	G / S	RDL
Total Hardness	µg/L - CaCO3		1000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY:

AGAT WORK ORDER: 19M530908
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Trace Organics Analysis

RPT Date: 2019-12-03			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE		MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons in Water															
Petroleum Hydrocarbons C10-C50		MR	4420	4240	0.0%	< 100	NA	70%	130%	118%	70%	130%	NA	70%	130%
Nonane		MR	92%	98%	0.0%	68	NA	40%	140%	92%	40%	140%	NA	40%	140%

Comments: NA : Non applicable
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
NA as the percentage of recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.
NA in the spike blank or CRM indicates that it is not required by the procedure.

Certified By: _____



Robert Roch

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Quality Assurance

 CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: Goodwood
 SAMPLED BY:

 AGAT WORK ORDER: 19M530908
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE:

Water Analysis															
RPT Date: 2019-12-03			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Tata Steel - QC Package - Metals															
Mercury	619714		<0.1	<0.1	NA	< 0.1	106%	80%	120%	112%	80%	120%	115%	80%	120%
Aluminum	619537		25	21	NA	< 10	102%	80%	120%	103%	80%	120%	NA	80%	120%
Antimony	619537		<1	<1	NA	< 1	113%	80%	120%	99%	80%	120%	113%	80%	120%
Silver	619537		<0.2	<0.2	NA	< 0.2	NA	80%	120%	99%	80%	120%	102%	80%	120%
Arsenic	619537		1	2	NA	< 1	98%	80%	120%	103%	80%	120%	110%	80%	120%
Barium	619537		58	58	0.0%	< 5	99%	80%	120%	97%	80%	120%	NA	80%	120%
Boron	619537		241	235	NA	< 40	108%	80%	120%	101%	80%	120%	NA	80%	120%
Cadmium	619537		<0.5	<0.5	NA	< 0.5	100%	80%	120%	94%	80%	120%	102%	80%	120%
Calcium	619537		58800	58700	0.0%	< 100	97%	80%	120%	97%	80%	120%	NA	80%	120%
Chromium	619537		<1	<1	NA	< 1	100%	80%	120%	101%	80%	120%	94%	80%	120%
Cobalt	619537		1.2	1.2	NA	< 0.5	101%	80%	120%	103%	80%	120%	89%	80%	120%
Copper	619537		<1	1	NA	< 1	107%	80%	120%	100%	80%	120%	111%	80%	120%
Tin	619537		<5	<5	NA	< 5	NA	80%	120%	102%	80%	120%	102%	80%	120%
Iron	619537		<70	<70	NA	< 70	104%	80%	120%	102%	80%	120%	NA	80%	120%
Magnesium	619537		9800	10100	2.6%	< 100	110%	80%	120%	109%	80%	120%	NA	80%	120%
Manganese	619537		26	26	0.9%	< 1	92%	80%	120%	103%	80%	120%	92%	80%	120%
Molybdenum	619537		48	48	0.2%	< 1	103%	80%	120%	100%	80%	120%	116%	80%	120%
Nickel	619537		13	13	0.7%	< 1	108%	80%	120%	100%	80%	120%	104%	80%	120%
Lead	619537		<1	<1	NA	< 1	101%	80%	120%	102%	80%	120%	NA	80%	120%
Potassium	619537		13100	13400	2.3%	< 100	105%	80%	120%	104%	80%	120%	NA	80%	120%
Selenium	619537		6	7	3.2%	< 1	96%	80%	120%	90%	80%	120%	114%	80%	120%
Sodium	619537		65600	66600	1.4%	< 200	111%	80%	120%	106%	80%	120%	NA	80%	120%
Thallium	619537		<1	<1	NA	< 1	100%	80%	120%	101%	80%	120%	96%	80%	120%
Titanium	619537		<3	<3	NA	< 3	NA	80%	120%	101%	80%	120%	98%	80%	120%
Uranium	619537		<0.5	<0.5	NA	< 0.5	100%	80%	120%	100%	80%	120%	93%	80%	120%
Vanadium	619537		<1	<1	NA	< 1	102%	80%	120%	99%	80%	120%	96%	80%	120%
Zinc	619537		5	6	NA	< 3	99%	80%	120%	98%	80%	120%	NA	80%	120%
Tata Steel - QC Packages - Conventionals															
BOD5	1		NA	NA	NA	< 2	95%	80%	120%	98%	80%	120%	NA	80%	120%
COD	619714		24	20	NA	< 5	107%	80%	120%	94%	80%	120%	85%	80%	120%
Conductivité (Salinité - mS/cm)	619685		45	47	4.3%	< 2	105%	80%	120%	104%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	1		NA	NA	NA	< 0.30	103%	80%	120%	101%	80%	120%	NA	80%	120%
Fluoride	620878		<0.10	<0.10	NA	< 0.10	103%	80%	120%	103%	80%	120%	NA	80%	120%
chromium VI	619685		< 0.008	< 0.008	0.0%	< 0.008	97%	80%	120%	104%	80%	120%	103%	80%	120%
Ammonia Nitrogen	747538		1.02	1.19	15.4%	< 0.02	113%	80%	120%	98%	80%	120%	NA	80%	120%
pH	620150		7.59	7.66	0.9%		100%	80%	120%	100%	80%	120%	NA		
Reactive silica	599418		5.41	5.14	5.1%	< 0.05	95%	90%	110%	98%	70%	130%	109%	70%	130%
Total Kjeldahl Nitrogen	646734		4.0	3.9	0.4%	< 0.3	104%	80%	120%	112%	80%	120%	NA	80%	120%
Total Cyanide	619685	619685	<0.005	<0.005	NA	< 0.005	86%	80%	120%	108%	80%	120%	107%	80%	120%
Alkalinity	619714		10.9	11.3	3.6%	< 1.5	96%	80%	120%	91%	80%	120%	94%	80%	120%
Chloride	620878		<0.5	<0.5	NA	< 0.5	114%	80%	120%	92%	80%	120%	116%	80%	120%

Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY:

AGAT WORK ORDER: 19M530908
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis (Continued)

RPT Date: 2019-12-03			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Nitrate	620878		<0.02	<0.02	NA	< 0.02	105%	80%	120%	102%	80%	120%	104%	80%	120%
Nitrite	620878		<0.02	<0.02	NA	< 0.02	NA	80%	120%	92%	80%	120%	93%	80%	120%
Sulfate	620878		<0.5	<0.5	NA	< 0.5	110%	80%	120%	100%	80%	120%	100%	80%	120%
Total Suspended Solids	617283		10	10	NA	< 2	101%	80%	120%	NA			105%	80%	120%
Dissolved Solids	619714		50	56	11.3%	< 10	102%	80%	120%	NA			109%	80%	120%
Total Sulfide	610873		0.031	0.033	0.0%	< 0.02	85%	80%	120%	103%	80%	120%	84%	80%	120%
Total Phenols (colorimetry)	619685	619685	0.002	0.003	NA	< 0.002	101%	80%	120%	110%	80%	120%	100%	80%	120%
Total Phosphorus	692461		1.21	1.24	2.4%	< 0.02	89%	80%	120%	105%	80%	120%	NA	80%	120%
Total Organic Carbon	605406		5.26	5.19	1.5%	< 0.30	103%	80%	120%	101%	80%	120%	102%	80%	120%
	610393		<0.02	<0.02	NA	< 0.02	104%	90%	110%	108%	90%	110%	101%	80%	120%
	620546		<0.01	<0.01	NA	< 0.01	100%	85%	115%	97%	90%	110%			
	628363		0.04	<0.02	NA	< 0.02	89%	85%	115%	101%	90%	110%			
	628363		<0.05	<0.05	NA	< 0.05				104%	90%	110%			
	628363		1	1	NA	< 1				100%	90%	110%			
	628363		0.71	0.71	0.0%	< 0.01	89%	85%	115%	98%	90%	110%			
Aluminum	726620		3.2	2.9	10.4%	< 0.5	94%	80%	120%	93%	80%	120%	120%	80%	120%
Antimony	726620		<0.005	<0.005	NA	< 0.005	130%	80%	120%	99%	80%	120%	NA	80%	120%
Silver	726620		<0.003	<0.003	NA	< 0.003	NA	80%	120%	97%	80%	120%	NA	80%	120%
Arsenic	726620		0.17	<0.08	NA	< 0.08	108%	80%	120%	105%	80%	120%	NA	80%	120%
Barium	726620		38.8	42.2	8.4%	< 0.03	111%	80%	120%	95%	80%	120%	NA	80%	120%
Boron	726620		131	147	11.3%	< 0.3	111%	80%	120%	101%	80%	120%	NA	80%	120%
Cadmium	726620		<0.006	<0.006	NA	< 0.006	112%	80%	120%	97%	80%	120%	NA	80%	120%
Calcium	726620		28600	29900	4.4%	< 20	100%	80%	120%	93%	80%	120%	NA	80%	120%
Chromium	726620		0.88	0.79	11.1%	< 0.04	111%	80%	120%	97%	80%	120%	NA	80%	120%
Cobalt	726620		0.014	0.013	NA	< 0.005	112%	80%	120%	98%	80%	120%	NA	80%	120%
Copper	726620		4.46	3.71	18.5%	< 0.05	115%	80%	120%	98%	80%	120%	NA	80%	120%
Iron	726620		595	624	4.7%	< 0.5	118%	80%	120%	105%	80%	120%	NA	80%	120%
Magnesium	726620		3600	3690	2.5%	< 10	106%	80%	120%	95%	80%	120%	NA	80%	120%
Manganese	726620		94.6	98.3	3.8%	< 0.03	118%	80%	120%	106%	80%	120%	NA	80%	120%
Molybdenum	726620		2.49	2.17	13.6%	< 0.01	110%	80%	120%	94%	80%	120%	NA	80%	120%
Nickel	1		0.7	0.3	NA	< 0.03	111%	80%	120%	105%	80%	120%	NA	80%	120%
Lead	726620		0.27	0.20	NA	< 0.01	119%	80%	120%	117%	80%	120%	103%	80%	120%
Potassium	726620		5090	4850	4.7%	< 10	106%	80%	120%	94%	80%	120%	NA	80%	120%
Selenium	726620		0.74	0.45	NA	< 0.05	119%	80%	120%	101%	80%	120%	NA	80%	120%
Sodium	726620		12600	12400	2.3%	< 0.05	110%	80%	120%	96%	80%	120%	NA	80%	120%
Vanadium	726620		<0.02	<0.02	NA	< 0.02	118%	80%	120%	103%	80%	120%	94%	80%	120%
Zinc	726620		12	12	NA	< 0.5	113%	80%	120%	110%	80%	120%	NA	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
 PROJECT: Goodwood
 SAMPLED BY:

AGAT WORK ORDER: 19M530908
 ATTENTION TO: Mariana Trindade
 SAMPLING SITE:

Water Analysis (Continued)

RPT Date: 2019-12-03			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE				
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M530908

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Total Coliforms	2019-10-17	2019-10-17	MIC-102-7017	MA.700-Col 1.0	N/A
Fecal Coliforms	2019-10-17	2019-10-17	MIC-102-7013	MA.700-Fec.Ec 1.0	N/A
Temperature upon receipt	2019-10-16	2019-10-16	N/A		N/A
Analysis started by	2019-10-17	2019-10-17			
Trace Organics Analysis					
Petroleum Hydrocarbons C10-C50	2019-10-22	2019-10-22	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID
Nonane	2019-10-22	2019-10-22	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M530908

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Mercury	2019-10-18	2019-10-18	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Aluminum	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-10-17	2019-10-17	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-10-17	2019-10-17	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Total hardness	2019-10-17	2019-10-17	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Tin	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Iron	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Magnesium	2019-10-17	2019-10-17	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-10-17	2019-10-17	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Sodium	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Titanium	2019-10-17	2019-10-17	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-10-17	2019-10-17	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-10-17	2019-10-17	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Radium-226			Subcontracted	Subcontracted	N/A
BOD5	2019-11-20	2019-11-25	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRY
COD	2019-10-21	2019-10-21	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Conductivité (Salinité - mS/cm)	2019-10-21	2019-10-21	INOR-101-6016F	Standard method 2520	CONDUCTIVIMÉTRIE
Dissolved Organic Carbon	2019-10-17	2019-10-17	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Dissolved Oxygen	2019-10-17	2019-10-17	Special	SM 4500-O G . 21 ième ed.	DO METER
Fluoride	2019-10-24	2019-10-24	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
chromium VI	2019-10-15	2019-10-15	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Ammonia Nitrogen	2019-12-02	2019-12-02	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
pH	2019-10-16	2019-10-16	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRY
Reactive silica	2019-10-24	2019-10-25	INOR-101-6071F, non accrédité MDDELCC	AQ2 EPA-122A Rev 5	COLORIMÉTRIE
Total Kjeldahl Nitrogen	2019-11-25	2019-11-25	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Cyanide	2019-10-17	2019-10-17	INOR-101-6061F	MA. 300 - CN 1.2	SPECTROPHOTOMETER
Alkalinity	2019-10-18	2019-10-18	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M530908

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Chloride	2019-10-24	2019-10-24	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrate	2019-10-24	2019-10-24	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-10-24	2019-10-24	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Sulfate	2019-10-24	2019-10-24	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-10-17	2019-10-18	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Dissolved Solids	2019-10-18		INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Total Sulfide	2019-10-22	2019-10-22	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Total Phenols (colorimetry)	2019-10-18	2019-10-18	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMETRY
Total Phosphorus	2019-11-22	2019-11-22	INOR-101-6048F	MA.300-NPPT 2.0	COLORIMETRY
Total Organic Carbon	2019-10-17	2019-10-17	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
	2019-10-17	2019-10-22			
Aluminum	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-11-22	2019-11-22	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-11-22	2019-11-22	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Iron	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Magnesium	2019-11-22	2019-11-22	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-11-22	2019-11-22	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Sodium	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-11-22	2019-11-22	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS

AGAT Laboratories

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Tel.: 514.337.1000
Fax.: 514.333.3046
agatlabs.com

Laboratory use Only

Arrival Condition: Good Poor (complete 'notes')
Arrival Temperature: 11,8 8,9 9,1 AGAT Job Number: 134530908
Notes:

Report To:
Company: Tata Steel Minerals Canada
Contact: Mariana Trindade
Address: 1000 Sherbrooke West, Suite 1120
Montreal, QC H3A 3G4

Project #: Goodwood
Quote #: RFQ 20190118

Invoice to: Same (Y/N) - Circle
Company: Tata Steel Minerals Canada
Contact: Jay Adhvaryu
Email: jay.adhvaryu@tatasteelcanada.com
Phone: _____ Fax: _____
PO #: 3000000242

Report Information
1. Name: Mariana Trindade
Email: mariana.trindade@tatasteelcanada.com
2. Name: Jean-Francois Dion
Email: jeanfrancois.dion@tatasteelcanada.com

Regulatory Requirements (Check):
 List Guidelines on Report Do Not List Guidelines on Report
 PIRI Site Info (check all that apply):
 Tier 1 Res. Pot. Coarse
 Tier 2 Com. N/Pot. Fine
 Gas Fuel Lube
 CCME CDWQ
 Ind
 Com
 Res/P
 Ag
 FWAL
 Sediment
 Other NL MMER

Report Format
 Single PDF sample per page
 Multiple PDF samples per page
 Excel Format Included

Turnaround Time (TAT) Business Days
Regular TAT: 5 - 7 days
Rush TAT: 1 day 2 days
 3 - 4 days

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Fecal & Total Coliforms	Metals + Cations, Total	Mercury, Total	Hardness	Total Phosphorous & TKV	Conductivity & Alkalinity	Dissolved Organic Carbon	Dissolved Oxygen	Anions (F ⁻ , NO ₂ ⁻ , NO ₃ ⁻ , Cl ⁻ , SO ₄ ²⁻)	Ammonia as N & Reactive Silica	Chemical Oxygen Demand	BOD5 & pH	Phenols -4AAP - Mississauga	TOC	Sulphide as S ₂ -	Hexavalent Chromium	Cyanide, Total	Total Dissolved Solids & Total Suspended Solids	Radium-226	Petroleum Hydrocarb (C10-C50)
DSO4-EE-SUN		water		Q3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DSO4-ER-SUN - Q3 - 2019	Oct 11/2019 10:00	water	14	Q3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DSO4-ER-SUN - ULL - Q3 - 2019	Oct 11/2019 10:00	water	3	Q3	"ULL"																			

Sample Relinquished By (print name & sign) <u>Adam Calvert / Adam Calvert</u>	Date/Time <u>Oct 11/2019 13:00</u>	Samples Received By (print name and sign)	Date/Time	Special Instructions
Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	Tata Steel - Quebec Conventionals
				Page <u>1</u> of <u>1</u>

AB 15/11/2019
19h15



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Goodwood

AGAT WORK ORDER: 19M527928

MICROBIOLOGY ANALYSIS REVIEWED BY: Katia Etienne, Microbiologiste

TRACE ORGANICS REVIEWED BY: Robert Roch, Chimiste

WATER ANALYSIS REVIEWED BY: Marie-Flora Coustou, Report Writer

DATE REPORTED: 2019-12-04

VERSION*: 1

PAGES (INCLUDING COVER): 14

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY: JEAN FRANCOIS DION

SAMPLING SITE:

Tata Steel - QC Package - Microbiological

DATE RECEIVED: 2019-10-07

DATE REPORTED: 2019-12-04

SAMPLE DESCRIPTION: DSO4-EE-SUN

SAMPLE TYPE: Water

DATE SAMPLED: 2019-09-27

Parameter	Unit	G / S	RDL	599418
Total Coliforms	CFU/100ml		2	52
Fecal Coliforms	CFU/100ml		2	23
Temperature upon receipt	°C		NA	8.6
Analysis started by				1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
599418 Analysis performed passed the regulatory conservation time of 48 hours.

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

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CANADA H4S 1V9
TEL (514)337-1000
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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JEAN FRANCOIS DION

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

Petroleum Hydrocarbons in Water

DATE RECEIVED: 2019-10-07

DATE REPORTED: 2019-12-04

SAMPLE DESCRIPTION: DSO4-EE-SUN

SAMPLE TYPE: Water

DATE SAMPLED: 2019-09-27

Parameter	Unit	G / S	RDL	599418
Petroleum Hydrocarbons C10-C50	µg/L		100	<100
Surrogate	Unit	Acceptable Limits		
Nonane	%	40-140		80

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

599418 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



Robert Roch

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Certificate of Analysis

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JEAN FRANCOIS DION

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-10-07

DATE REPORTED: 2019-12-04

SAMPLE DESCRIPTION: DSO4-EE-SUN

SAMPLE TYPE: Water

DATE SAMPLED: 2019-09-27

Parameter	Unit	G / S	RDL	599418
Mercury	µg/L		0.1	<0.1
Aluminum	µg/L		10	<10
Antimony	µg/L		1	<1
Silver	µg/L		0.2	<0.2
Arsenic	µg/L		1	<1
Barium	µg/L		5	<5
Boron	µg/L		40	<40
Cadmium	µg/L		0.5	<0.5
Calcium	µg/L		100	2590
Chromium	µg/L		1	<1
Cobalt	µg/L		0.5	<0.5
Copper	µg/L		1	<1
Total hardness	µg/L - CaCO3		1000	18000
Tin	µg/L		5	<5
Iron	µg/L		70	<70
Magnesium	µg/L		100	2790
Manganese	µg/L		1	7
Molybdenum	µg/L		1	<1
Nickel	µg/L		1	<1
Lead	µg/L		1	<1
Potassium	µg/L		100	247
Selenium	µg/L		1	<1
Sodium	µg/L		200	826
Thallium	µg/L		1	<1
Titanium	µg/L		3	<3
Uranium	µg/L		0.5	<0.5
Vanadium	µg/L		1	<1
Zinc	µg/L		3	<3

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JEAN FRANCOIS DION

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

Tata Steel - QC Package - Metals

DATE RECEIVED: 2019-10-07

DATE REPORTED: 2019-12-04

SAMPLE DESCRIPTION: DSO4-EE-SUN

SAMPLE TYPE: Water

DATE SAMPLED: 2019-09-27

Parameter	Unit	G / S	RDL	599418
Radium-226	Bq/L		0.005	0.01
Total Hardness	µg/L - CaCO3		1000	18000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

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ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JEAN FRANCOIS DION

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

Tata Steel - QC Packages - Conventionals

DATE RECEIVED: 2019-10-07

DATE REPORTED: 2019-12-04

SAMPLE DESCRIPTION: DSO4-EE-SUN

SAMPLE TYPE: Water

DATE SAMPLED: 2019-09-27

Parameter	Unit	G / S	RDL	599418
BOD5	mg/L - O2		2	<2
COD	mg/L - O2		5	<5
Conductivité (Salinité - mS/cm)	mS/cm		2	<2
Dissolved Organic Carbon	mg/L		0.30	1.03
Dissolved Oxygen	mg/L		3	8
Fluoride	mg/L		0.10	<0.10
chromium VI	mg/L		0.008	<0.008
Ammonia Nitrogen	mg/L - N		0.02	0.08
pH	pH		NA	7.89
Reactive silica	mg/L		0.1	5.4
Total Kjeldahl Nitrogen	mg/L - N		0.3	<0.3
Total Cyanide	mg/L - CN		0.005	<0.005
Alkalinity	mg/L - CaCO3		1.5	15.0
Chloride	mg/L		0.5	<0.5
Nitrate	mg/L - N		0.02	<0.02
Nitrite	mg/L - N		0.02	<0.02
Sulfate	mg/L		0.5	2.4
Total Suspended Solids	mg/L		2	<2
Dissolved Solids	mg/L		10	46
Total Sulfide	mg/L S-2		0.02	0.06
Total Phenols (colorimetry)	mg/L		0.002	0.002
Total Phosphorus	mg/L - P		0.02	<0.02
Total Organic Carbon	mg/L		0.30	1.20

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



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AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

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TEL (514)337-1000
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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: JEAN FRANCOIS DION

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

DATE RECEIVED: 2019-10-07

DATE REPORTED: 2019-12-04

Parameter	Unit	SAMPLE TYPE:	
		G / S	RDL
Total Phosphorus	mg/L		0.002

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY: JEAN FRANCOIS DION

AGAT WORK ORDER: 19M527928
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Trace Organics Analysis

RPT Date: 2019-12-04			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE		MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons in Water															
Petroleum Hydrocarbons C10-C50		MR	2880	2870	0.3%	< 100	NA	70%	130%	77%	70%	130%	NA	70%	130%
Nonane		MR	73%	87%	NR	56	NA	40%	140%	73%	40%	140%	NA	40%	140%

Comments: NA : Non applicable
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
NA as the percentage of recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.
NA in the spike blank or CRM indicates that it is not required by the procedure.

Certified By: _____



Robert Roch

AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.

Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY: JEAN FRANCOIS DION

AGAT WORK ORDER: 19M527928
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis															
RPT Date: 2019-12-04			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Tata Steel - QC Package - Metals

Mercury	599361		< 0.04	< 0.04	NA	< 0.1	94%	80%	120%	102%	80%	120%	103%	80%	120%
Aluminum	610869		490	520	5.9%	< 10	99%	80%	120%	106%	80%	120%	NA	80%	120%
Antimony	610869		9	10	10.5%	< 1	109%	80%	120%	99%	80%	120%	NA	80%	120%
Silver	610869		<0.2	<0.2	NA	< 0.2	NA	80%	120%	96%	80%	120%	104%	80%	120%
Arsenic	610869		<1	<1	NA	< 1	97%	80%	120%	95%	80%	120%	NA	80%	120%
Barium	610869		22	24	NA	< 5	94%	80%	120%	99%	80%	120%	NA	80%	120%
Boron	610869		2850	2700	5.4%	< 40	108%	80%	120%	105%	80%	120%	NA	80%	120%
Cadmium	610869		331	346	4.4%	< 0.5	95%	80%	120%	96%	80%	120%	NA	80%	120%
Calcium	610869		30900	32200	4.1%	< 100	90%	80%	120%	97%	80%	120%	NA	80%	120%
Chromium	610869		269	287	6.5%	< 1	96%	80%	120%	99%	80%	120%	NA	80%	120%
Cobalt	610869		<0.5	<0.5	NA	< 0.5	96%	80%	120%	100%	80%	120%	98%	80%	120%
Copper	610869		12	13	8.0%	< 1	102%	80%	120%	98%	80%	120%	NA	80%	120%
Tin	610869		<5	<5	NA	< 5	NA	80%	120%	100%	80%	120%	95%	80%	120%
Iron	610869		<70	<70	NA	< 70	95%	80%	120%	108%	80%	120%	NA	80%	120%
Magnesium	610869		9480	10300	8.3%	< 100	115%	80%	120%	113%	80%	120%	NA	80%	120%
Manganese	610869		2	2	NA	< 1	90%	80%	120%	103%	80%	120%	99%	80%	120%
Molybdenum	610869		7	7	0.0%	< 1	96%	80%	120%	97%	80%	120%	109%	80%	120%
Nickel	610869		205	227	10.2%	< 1	103%	80%	120%	101%	80%	120%	NA	80%	120%
Lead	610869		17	18	5.7%	< 1	98%	80%	120%	100%	80%	120%	NA	80%	120%
Potassium	610869		18400	19400	5.3%	< 100	109%	80%	120%	107%	80%	120%	NA	80%	120%
Selenium	610869		<1	1	NA	< 1	105%	80%	120%	90%	80%	120%	118%	80%	120%
Sodium	610869		354000	341000	3.7%	< 200	115%	80%	120%	109%	80%	120%	NA	80%	120%
Thallium	610869		<1	<1	NA	< 1	96%	80%	120%	98%	80%	120%	99%	80%	120%
Titanium	610869		<3	<3	NA	< 3	NA	80%	120%	97%	80%	120%	97%	80%	120%
Uranium	610869		<0.5	<0.5	NA	< 0.5	95%	80%	120%	103%	80%	120%	102%	80%	120%
Vanadium	610869		<1	<1	NA	< 1	96%	80%	120%	98%	80%	120%	NA	80%	120%
Zinc	610869		9	5	NA	< 3	100%	80%	120%	104%	80%	120%	NA	80%	120%

Tata Steel - QC Packages - Conventionals

BOD5	641162		106	119	11.6%	< 2	129%	80%	120%	86%	80%	120%	NA	80%	120%
COD	599418	599418	< 5	< 5	NA	< 5	89%	80%	120%	90%	80%	120%	NA	80%	120%
Conductivité (Salinité - mS/cm)	599418	599418	< 2	< 2	0.0%	< 2	104%	80%	120%	103%	80%	120%	NA	80%	120%
Dissolved Organic Carbon	1		NA	NA	NA	< 0.30	113%	80%	120%	107%	80%	120%	NA	80%	120%
Fluoride	612444		<0.10	<0.10	NA	< 0.10	105%	80%	120%	110%	80%	120%	NA	80%	120%
chromium VI	599418	599418	< 0.008	< 0.008	NA	< 0.008	91%	80%	120%	106%	80%	120%	NA	80%	120%
Ammonia Nitrogen	599418	599418	0.08	0.08	NA	< 0.02	118%	80%	120%	95%	80%	120%	102%	80%	120%
pH	605416		6.42	6.64	3.4%		100%	80%	120%	100%	80%	120%			
Reactive silica	599418	599418	5.4	5.1	5.7%	< 0.05	95%	90%	110%	89%	70%	130%	109%	70%	130%
Total Kjeldahl Nitrogen	602821		3.9	4.1	5.0%	< 0.3	85%	80%	120%	95%	80%	120%	NA	80%	120%
Total Cyanide	604196		<0.005	<0.005	NA	< 0.005	86%	80%	120%	101%	80%	120%	NA	80%	120%
Alkalinity	600339		2	2	NA	< 1.5	99%	80%	120%	91%	80%	120%	97%	80%	120%
Chloride	612444		44.8	44.4	0.9%	< 0.5	104%	80%	120%	93%	80%	120%	NA	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Goodwood
SAMPLED BY: JEAN FRANCOIS DION

AGAT WORK ORDER: 19M527928
ATTENTION TO: Mariana Trindade
SAMPLING SITE:

Water Analysis (Continued)

RPT Date: 2019-12-04			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Nitrate	612444		<0.5	<0.5	NA	< 0.02	100%	80%	120%	104%	80%	120%	106%	80%	120%
Nitrite	612444		<0.5	<0.5	NA	< 0.02	NA	80%	120%	94%	80%	120%	94%	80%	120%
Sulfate	612444		4.2	3.7	12.7%	< 0.5	103%	80%	120%	102%	80%	120%	103%	80%	120%
Total Suspended Solids	607931		6	7	NA	< 2	100%	80%	120%	NA			103%	80%	120%
Dissolved Solids	605406		58	60	3.4%	< 10	103%	80%	120%	NA			107%	80%	120%
Total Sulfide	604155		0.4	0.4	0.0%	< 0.02	99%	80%	120%	94%	80%	120%	NA	80%	120%
Total Phenols (colorimetry)	599418	599418	0.002	0.002	NA	< 0.002	96%	80%	120%	100%	80%	120%	85%	80%	120%
Total Phosphorus	584531		1.19	1.19	0.0%	< 0.02	89%	80%	120%	83%	80%	120%	NA	80%	120%
Total Organic Carbon	599812		9.08	9.04	0.4%	< 0.30	113%	80%	120%	107%	80%	120%	NA	80%	120%
Total Phosphorus	602892		0.020	0.019	5.1%	< 0.002	99%	90%	110%	102%	90%	110%	83%	80%	120%

Certified By: _____



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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY: JEAN FRANCOIS DION

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis					
Total Coliforms	2019-10-11	2019-10-11	MIC-102-7017	MA.700-Col 1.0	N/A
Fecal Coliforms	2019-10-11	2019-10-11	MIC-102-7013	MA.700-Fec.Ec 1.0	N/A
Temperature upon receipt	2019-10-08	2019-10-08	N/A		N/A
Analysis started by	2019-10-11	2019-10-11			
Trace Organics Analysis					
Petroleum Hydrocarbons C10-C50	2019-10-15	2019-10-15	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID
Nonane	2019-10-15	2019-10-15	ORG-100-5104F	MA.400-HYD. 1.1	GC/FID

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY: JEAN FRANCOIS DION

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Mercury	2019-10-15	2019-10-15	MET-101-6102F	MA. 200 Hg 1.1	COLD VAPOR/AA
Aluminum	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Antimony	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Silver	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Arsenic	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Barium	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Boron	2019-10-12	2019-10-15	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Cadmium	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Calcium	2019-10-12	2019-10-15	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Chromium	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Cobalt	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Copper	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Total hardness	2019-10-15	2019-10-15	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Tin	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Iron	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Magnesium	2019-10-12	2019-10-15	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Met 1.2	ICP/MS
Manganese	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Molybdenum	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Nickel	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Lead	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Potassium	2019-10-12	2019-10-15	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Selenium	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Sodium	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Mét 1.2	ICP/MS
Thallium	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Titanium	2019-10-12	2019-10-15	MET-101-6105F, non accrédité par le MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Uranium	2019-10-12	2019-10-15	MET-101-6105F, unaccredited by MDDELCC	MA. 200 - Mét 1.2	ICP/MS
Vanadium	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Zinc	2019-10-12	2019-10-15	MET-101-6105F	MA. 200 - Met 1.2	ICP/MS
Radium-226			Subcontracted	Subcontracted	N/A
BOD5	2019-10-24	2019-10-29	INOR-101-6006F	MA. 315 - DBO 1.1	ELECTROMETRY
COD	2019-10-16	2019-10-16	INOR-101-6042F	MA.315-DCO 1.1	SPECTROPHOTOMETRY
Conductivité (Salinité - mS/cm)	2019-10-21	2019-10-21	INOR-101-6016F	Standard method 2520	CONDUCTIVIMÉTRIE
Dissolved Organic Carbon	2019-10-15	2019-10-15	INOR-101-6049F, unaccredited by MDDELCC	MA.300-C1.0	INFRARED DETECTION
Dissolved Oxygen	2019-11-05	2019-11-05	Special	SM 4500-O G . 21 ième ed.	DO METER
Fluoride	2019-10-16	2019-10-16	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
chromium VI	2019-10-11	2019-10-11	INOR-101-6034F	MA. 200 - CrHex 1.1	SPECTROPHOTOMETRY
Ammonia Nitrogen	2019-10-24	2019-10-24	INOR-101-6051F	MA. 303 - N 2.0	COLORIMETRY
pH	2019-10-11	2019-10-11	INOR-101-6021F	MA. 100 - pH 1.1	ELECTROMETRY
Reactive silica	2019-10-24	2019-10-25	INOR-101-6071F, non accrédité MDDELCC	AQ2 EPA-122A Rev 5	COLORIMÉTRIE
Total Kjeldahl Nitrogen	2019-11-07	2019-11-07	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Cyanide	2019-10-11	2019-10-11	INOR-101-6061F	MA. 300 - CN 1.2	SPECTROPHOTOMETER
Alkalinity	2019-10-16	2019-10-16	INOR-101-6000F, unaccredited by MDDELCC	MA. 315 - Alc-Aci 1.0	TITRATION

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M527928

PROJECT: Goodwood

ATTENTION TO: Mariana Trindade

SAMPLED BY: JEAN FRANCOIS DION

SAMPLING SITE:

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Chloride	2019-10-16	2019-10-16	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrate	2019-10-16	2019-10-16	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Nitrite	2019-10-16	2019-10-16	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Sulfate	2019-10-16	2019-10-16	INOR-101-6004F	MA. 300 - Ions 1.3	ION CHROMATOGRAPHY
Total Suspended Solids	2019-10-15	2019-10-16	INOR-101-6028F	MA. 115 - S.S. 1.2	GRAVIMETRY
Dissolved Solids	2019-10-16	2019-10-17	INOR-101-6054F	MA.115-S.D. 1.0	GRAVIMETRY
Total Sulfide	2019-10-17	2019-10-17	INOR-101-6055F	MA.300-S 1.2	SPECTROPHOTOMETRY
Total Phenols (colorimetry)	2019-10-11	2019-10-11	INOR-101-6062F	MA. 404 - I. Phé 2.2	COLORIMETRY
Total Phosphorus	2019-11-06	2019-11-06	INOR-101-6048F	MA.300-NTPT 2.0	COLORIMETRY
Total Organic Carbon	2019-10-15	2019-10-15	INOR-101-6049F	MA.300-C1.0	INFRARED DETECTION
Total Phosphorus	2019-10-15	2019-10-15	INOR-93-1022	SM 4500-P B & E	SPECTROPHOTOMETER

P.6 'C'

AGAT Laboratories

9770 Route Transcanadienne
St-Laurent, Québec
H4S 1V9
http://webearth.agatlabs.com

Tel.: 514.337.1000
Fax.: 514.333.3046
agatlabs.com

Laboratory use Only

Arrival Condition: Good Poor (complete 'notes')

Arrival Temperature: _____ AGAT Job Number: _____

Notes: _____

19M 527928

Report To:
Company: Tata Steel Minerals Canada
Contact: Mariana Trindade
Address: 1000 Sherbrooke West, Suite 1120
Montreal, QC H3A 3G4

Project #: Goodwood
Quote #: RFQ 20190118

Invoice to: Same (Y/N) - Circle
Company: Tata Steel Minerals Canada
Contact: Jay Adhvaryu
Email: jay.adhvaryu@tatasteelcanada.com
Phone: _____ Fax: _____
PO #: 3000000242

Report Information

1. Name: Mariana Trindade
Email: mariana.trindade@tatasteelcanada.com

2. Name: Jean-Francois Dion
Email: jeanfrancois.dion@tatasteelcanada.com

Regulatory Requirements (Check):

List Guidelines on Report Do Not List Guidelines on Report

PIRI Site Info (check all that apply):

Tier 1 Res. PoL Coarse
 Tier 2 Com N/PoL Fine
 Gas Fuel Lube
 CCME CDWQ
 Ind Com Res/P
 Ag FWAL
 Sediment
 Other: NL MMER

Report Format

Single PDF sample per page
 Multiple PDF samples per page
 Excel Format Included

Turnaround Time (TAT) Business Days

Regular TAT: 5 - 7 days
Rush TAT: 1 day 2 days
 3 - 4 days

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Fecal & Total Coliforms	Metals + Cations, Total	Mercury, Total	Hardness	Total Phosphorous & TKN	Conductivity & Alkalinity	Dissolved Organic Carbon	Dissolved Oxygen	Anions (F ⁻ , NO ₂ ⁻ , NO ₃ ⁻ , Cl ⁻ , SO ₄ ²⁻)	Ammonia as N & Reactive Silica	Chemical Oxygen Demand	BOD5 & pH	Phenols -4AAP - Mississauga	TOC	Sulphide as S ₂	Hexavalent Chromium	Cyanide, Total	Total Dissolved Solids & Total Suspended Solids	Radium-226	Petroleum Hydrocarb (C10-C50)
DSO4-EE-SUN	Sep 26/14:38	water	14	Q3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DSO4-EE-SUN		water		Q3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DSO4-EE-Sun (UBL / ultra-low metals) metals, Hg, Prot		water	3			X	X	X																

Sample Relinquished By (print name & sign): Jean-Francois Dion / JFD Date/Time: 09/27-11:30

Sample Received By (print name and sign): _____ Date/Time: _____

Special Instructions: _____

Tata Steel - Quebec Conventionals
Page 1 of 1

AGAT
191007
15430
Page 14 of 14

D. Sediment Quality

Your P.O. #: 2200002147
 Your Project #: SEDIMENT GOODWOOD
 Site#: TSMC
 Site Location: DS04 LA
 Your C.O.C. #: 157354-13-01

Attention: Mariana Trindade

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

Report Date: 2019/05/01
 Report #: R2437253
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B911218

Received: 2019/04/09, 10:00

Sample Matrix: Sediment
 # Samples Received: 2

Analyses	Quantity	Date	Date	Laboratory Method	Primary Reference
		Extracted	Analyzed		
Anions (1)	2	2019/04/12	2019/04/14	STL SOP-00014	MA.300-Ions 1.3 R3 m
Conductivity (1)	2	2019/04/12	2019/04/13	STL SOP-00038	SM 23 2510-B m
Total Extractable Metals (low level) (1)	2	2019/04/12	2019/04/12	STL SOP-00006	MA.200-Mét. 1.2 R5 m
Ammonia Nitrogen (1)	2	2019/04/12	2019/04/15	STL SOP-00040	MA.300-N 2.0 R2 m
pH (1)	2	2019/04/15	2019/04/15	STL SOP-00016	MA.100-pH 1.1 R3 m
Particle size (pipettes & sieves) (2)	2	N/A	N/A		
Total Phosphorus (1)	2	N/A	2019/04/15	STL SOP-00006	MA.200-Mét. 1.2 R5 m
Sulfur (1)	2	N/A	2019/04/29	STL SOP-00028	MA. 310-CS 1.0 R3 m
Extractable Silica by ICP (1)	2	2019/04/30	2019/04/30	STL SOP-00006	MA.200-Mét. 1.2 R5 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

(1) This test was performed by Maxxam -Ville St. Laurent

Attention: Mariana Trindade

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

Your P.O. #: 2200002147
Your Project #: SEDIMENT GOODWOOD
Site#: TSMC
Site Location: DS04 LA
Your C.O.C. #: 157354-13-01

Report Date: 2019/05/01
Report #: R2437253
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B911218

Received: 2019/04/09, 10:00

(2) This test was performed by Maxxam Analytics - Bedford

Note: All parameters included in the present certificate are accredited by the MDDELCC unless stated otherwise.

Encryption Key

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

Martine Lepage, Project Manager

Email: MLepage@maxxam.ca

Phone# (418)543-3788 Ext:7066201

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

Maxxam Job #: B911218
Report Date: 2019/05/01

TATA STEEL MINERALS CANADA
Client Project #: SEDIMENT GOODWOOD
Site Location: DS04 LA
Your P.O. #: 2200002147

TOTAL EXTRACTABLE METALS (SEDIMENT)

Maxxam ID					GH8612			GH8629		
Sampling Date					2019/04/06 12:28			2019/04/06 13:19		
COC Number					157354-13-01			157354-13-01		
	Units	A	B	C	FRA-EEGW	RDL	QC Batch	MIGRATION-EEGW	RDL	QC Batch
% MOISTURE	%	-	-	-	82	N/A	N/A	89	N/A	N/A
METALS										
Aluminum (Al) †	mg/kg	-	-	-	14000	20	1981295	16000	20	1981295
Antimony (Sb) †	mg/kg	-	-	-	0.57	0.10	1981295	0.48	0.10	1981295
Silver (Ag) †	mg/kg	2	20	40	0.77	0.50	1981295	1.1	0.50	1981295
Arsenic (As) †	mg/kg	6	30	50	13	2.0	1981295	4.6	2.0	1981295
Barium (Ba) †	mg/kg	340	500	2000	61	4.0	1981295	140	4.0	1981295
Beryllium (Be) †	mg/kg	-	-	-	0.91	0.10	1981295	0.82	0.10	1981295
Bismuth (Bi) †	mg/kg	-	-	-	<2.0	2.0	1981295	<2.0	2.0	1981295
Boron (B) †	mg/kg	-	-	-	2.4	2.0	1981295	2.7	2.0	1981295
Cadmium (Cd) †	mg/kg	1.5	5	20	0.68	0.10	1981295	0.83	0.10	1981295
Calcium (Ca) †	mg/kg	-	-	-	260	20	1981295	560	20	1981295
Chromium (Cr) †	mg/kg	100	250	800	39	1.0	1981295	32	1.0	1981295
Copper (Cu) †	mg/kg	50	100	500	29	1.0	1981295	33	1.0	1981295
Cobalt (Co) †	mg/kg	25	50	300	10	1.0	1981295	5.1	1.0	1981295
Tin (Sn) †	mg/kg	5	50	300	<1.0	1.0	1981295	<1.0	1.0	1981295
Iron (Fe) †	mg/kg	-	-	-	93000	100	1981295	33000	10	1981295
Magnesium (Mg) †	mg/kg	-	-	-	3100	5.0	1981295	3000	5.0	1981295
Manganese (Mn) †	mg/kg	1000	1000	2200	460	2.0	1981295	160	2.0	1981295
Molybdenum (Mo) †	mg/kg	2	10	40	2.3	0.50	1981295	1.9	0.50	1981295
Nickel (Ni) †	mg/kg	50	100	500	24	0.50	1981295	32	0.50	1981295
Mercury (Hg) †	mg/kg	0.2	2	10	0.15	0.010	1981295	0.15	0.010	1981295
Phosphorus (P) †	mg/kg	-	-	-	800	20	1981295	370	20	1981295
Potassium (K) †	mg/kg	-	-	-	810	20	1981295	990	20	1981295
Lead (Pb) †	mg/kg	50	500	1000	14	1.0	1981295	13	1.0	1981295
Silicon (Si) †	mg/kg	-	-	-	430	20	1985190	370	20	1985093
Sodium (Na) †	mg/kg	-	-	-	33	10	1981295	40	10	1981295
Strontium (Sr) †	mg/kg	-	-	-	<5.0	5.0	1981295	5.0	5.0	1981295
Tellurium (Te) †	mg/kg	-	-	-	<0.50	0.50	1981295	<0.50	0.50	1981295
Thallium (Tl) †	mg/kg	-	-	-	0.12	0.10	1981295	0.11	0.10	1981295
Titanium (Ti) †	mg/kg	-	-	-	480	2.0	1981295	310	2.0	1981295
Uranium (U) †	mg/kg	-	-	-	<2.0	2.0	1981295	<2.0	2.0	1981295
Vanadium (V) †	mg/kg	-	-	-	42	2.0	1981295	39	2.0	1981295
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable † Parameter is not accreditable										

Maxxam Job #: B911218
Report Date: 2019/05/01

TATA STEEL MINERALS CANADA
Client Project #: SEDIMENT GOODWOOD
Site Location: DS04 LA
Your P.O. #: 2200002147

TOTAL EXTRACTABLE METALS (SEDIMENT)

Maxxam ID					GH8612			GH8629		
Sampling Date					2019/04/06 12:28			2019/04/06 13:19		
COC Number					157354-13-01			157354-13-01		
	Units	A	B	C	FRA-EEGW	RDL	QC Batch	MIGRATION-EEGW	RDL	QC Batch
Zinc (Zn) †	mg/kg	140	500	1500	110	5.0	1981295	130	5.0	1981295
RDL = Reportable Detection Limit QC Batch = Quality Control Batch † Parameter is not accreditable										

Maxxam Job #: B911218
Report Date: 2019/05/01

TATA STEEL MINERALS CANADA
Client Project #: SEDIMENT GOODWOOD
Site Location: DS04 LA
Your P.O. #: 2200002147

CONVENTIONAL PARAMETERS (SEDIMENT)

Maxxam ID					GH8612	GH8612		GH8629		
Sampling Date					2019/04/06 12:28	2019/04/06 12:28		2019/04/06 13:19		
COC Number					157354-13-01	157354-13-01		157354-13-01		
	Units	A	B	C	FRA-EEGW	FRA-EEGW Lab-Dup	RDL	MIGRATION-EEGW	RDL	QC Batch
% MOISTURE	%	-	-	-	82	82	N/A	89	N/A	N/A
CONVENTIONALS										
Conductivity †	mS/cm	0.7	0.7	1.4	<0.020	N/A	0.020	<0.020	0.020	1981422
Nitrogen ammonia (N-NH3) †	mg/kg	-	-	-	<25	N/A	25	32	5.0	1981421
pH †	pH	-	-	-	8.86	N/A	N/A	7.76	N/A	1981538
Sulfur (S) †	% g/g	0.04	0.2	0.2	0.12	N/A	0.010	0.20	0.010	1984768
Chloride (Cl) †	mg/kg	-	-	-	<1.0	1.2	1.0	<1.0	1.0	1981386
Nitrate (N) and Nitrite(N) †	mg/kg	-	-	-	<1.0	<1.0	1.0	<1.0	1.0	1981386
Sulfates (SO4) †	mg/kg	-	-	-	<5.0	<5.0	5.0	6.1	5.0	1981386
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable † Parameter is not accreditable										

Maxxam Job #: B911218
Report Date: 2019/05/01

TATA STEEL MINERALS CANADA
Client Project #: SEDIMENT GOODWOOD
Site Location: DS04 LA
Your P.O. #: 2200002147

GENERAL COMMENTS

A,B,C: Soil Criteria following appendix 2 of the " Guide d'intervention-Protection des sols et réhabilitation des terrains contaminés. MELCC, 2019." entitled " Grille des critères génériques pour les sols". The soil criteria refer to the St. Lawrence Lowlands Geological Province.

Groundwater criteria A and B follow the appendix 7 entitled "Grille des critères de qualité des eaux souterraines" of the document mentioned above. The criterion A refers to " Drinking Water " and the criterion B refers to "Seepage into Surface Water".

These criteria references are shown for visual aid only, and should not be interpreted otherwise.

- = This parameter is not part of the regulation.

TOTAL EXTRACTABLE METALS (SEDIMENT)

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

Results relate only to the items tested.

Maxxam Job #: B911218
Report Date: 2019/05/01

TATA STEEL MINERALS CANADA
Client Project #: SEDIMENT GOODWOOD
Site Location: DS04 LA
Your P.O. #: 2200002147

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
1981295	FS	Spiked Blank	Aluminum (Al)	2019/04/12		100	%
			Antimony (Sb)	2019/04/12		118	%
			Silver (Ag)	2019/04/12		116	%
			Arsenic (As)	2019/04/12		103	%
			Barium (Ba)	2019/04/12		105	%
			Beryllium (Be)	2019/04/12		106	%
			Bismuth (Bi)	2019/04/12		106	%
			Boron (B)	2019/04/12		118	%
			Cadmium (Cd)	2019/04/12		104	%
			Calcium (Ca)	2019/04/12		101	%
			Chromium (Cr)	2019/04/12		103	%
			Copper (Cu)	2019/04/12		107	%
			Cobalt (Co)	2019/04/12		102	%
			Tin (Sn)	2019/04/12		109	%
			Iron (Fe)	2019/04/12		89	%
			Magnesium (Mg)	2019/04/12		96	%
			Manganese (Mn)	2019/04/12		103	%
			Molybdenum (Mo)	2019/04/12		104	%
			Nickel (Ni)	2019/04/12		104	%
			Mercury (Hg)	2019/04/12		111	%
			Phosphorus (P)	2019/04/12		99	%
			Potassium (K)	2019/04/12		99	%
			Lead (Pb)	2019/04/12		107	%
			Sodium (Na)	2019/04/12		102	%
			Strontium (Sr)	2019/04/12		98	%
			Tellurium (Te)	2019/04/12		102	%
			Thallium (Tl)	2019/04/12		104	%
			Titanium (Ti)	2019/04/12		100	%
			Uranium (U)	2019/04/12		104	%
			Vanadium (V)	2019/04/12		102	%
			Zinc (Zn)	2019/04/12		104	%
			1981295	FS	Method Blank	Aluminum (Al)	2019/04/12
Antimony (Sb)	2019/04/12	<0.10					mg/kg
Silver (Ag)	2019/04/12	<0.50					mg/kg
Arsenic (As)	2019/04/12	<2.0					mg/kg
Barium (Ba)	2019/04/12	<4.0					mg/kg
Beryllium (Be)	2019/04/12	<0.10					mg/kg
Bismuth (Bi)	2019/04/12	<2.0					mg/kg
Boron (B)	2019/04/12	<2.0					mg/kg
Cadmium (Cd)	2019/04/12	<0.10					mg/kg
Calcium (Ca)	2019/04/12	<20					mg/kg
Chromium (Cr)	2019/04/12	<1.0					mg/kg
Copper (Cu)	2019/04/12	<1.0					mg/kg
Cobalt (Co)	2019/04/12	<1.0					mg/kg
Tin (Sn)	2019/04/12	<1.0					mg/kg
Iron (Fe)	2019/04/12	<10					mg/kg
Magnesium (Mg)	2019/04/12	<5.0					mg/kg
Manganese (Mn)	2019/04/12	<2.0		mg/kg			
Molybdenum (Mo)	2019/04/12	<0.50		mg/kg			
Nickel (Ni)	2019/04/12	<0.50		mg/kg			
Mercury (Hg)	2019/04/12	<0.010		mg/kg			

Maxxam Job #: B911218
Report Date: 2019/05/01

TATA STEEL MINERALS CANADA
Client Project #: SEDIMENT GOODWOOD
Site Location: DS04 LA
Your P.O. #: 2200002147

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Phosphorus (P)	2019/04/12	<20		mg/kg
			Potassium (K)	2019/04/12	<20		mg/kg
			Lead (Pb)	2019/04/12	<1.0		mg/kg
			Sodium (Na)	2019/04/12	<10		mg/kg
			Strontium (Sr)	2019/04/12	<5.0		mg/kg
			Tellurium (Te)	2019/04/12	<0.50		mg/kg
			Thallium (Tl)	2019/04/12	<0.10		mg/kg
			Titanium (Ti)	2019/04/12	<2.0		mg/kg
			Uranium (U)	2019/04/12	<2.0		mg/kg
			Vanadium (V)	2019/04/12	<2.0		mg/kg
			Zinc (Zn)	2019/04/12	<5.0		mg/kg
1981386	JGZ	Spiked Blank	Chloride (Cl)	2019/04/14		98	%
			Nitrate (N) and Nitrite(N)	2019/04/14		96	%
			Sulfates (SO4)	2019/04/14		96	%
1981386	JGZ	Method Blank	Chloride (Cl)	2019/04/14	<1.0		mg/kg
			Nitrate (N) and Nitrite(N)	2019/04/14	<1.0		mg/kg
			Sulfates (SO4)	2019/04/14	<5.0		mg/kg
1981421	ECA	QC Standard	Nitrogen ammonia (N-NH3)	2019/04/15		85	%
1981421	ECA	Spiked Blank	Nitrogen ammonia (N-NH3)	2019/04/15		97	%
1981421	ECA	Method Blank	Nitrogen ammonia (N-NH3)	2019/04/15	<5.0		mg/kg
1981422	MR4	Spiked Blank	Conductivity	2019/04/13		106	%
1981422	MR4	Method Blank	Conductivity	2019/04/13	<0.020		mS/cm
1981538	SRA	QC Standard	pH	2019/04/15		100	%
1981538	SRA	Spiked Blank	pH	2019/04/15		102	%
1984768	GGC	QC Standard	Sulfur (S)	2019/04/29		106	%
1984768	GGC	Method Blank	Sulfur (S)	2019/04/29	<0.010		% g/g
1985093	RNP	Spiked Blank	Silicon (Si)	2019/04/30		92	%
1985093	RNP	Method Blank	Silicon (Si)	2019/04/30	<20		mg/kg
1985190	RNP	Spiked Blank	Silicon (Si)	2019/04/30		92	%
1985190	RNP	Method Blank	Silicon (Si)	2019/04/30	<20		mg/kg

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

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


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

Maxxam Job #: B911218
Report Date: 2019/05/01

TATA STEEL MINERALS CANADA
Client Project #: SEDIMENT GOODWOOD
Site Location: DS04 LA
Your P.O. #: 2200002147

VALIDATION SIGNATURE PAGE

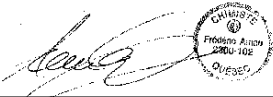
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



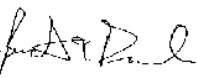
Aurelie Lebel, Project Manager Assistant



Caroline Bougie, B.Sc. Chemist



Frederic Arnau, B.Sc., Chemist, Scientific Service Specialist



Jonathan Fauvel, B.Sc, Chimiste, Supervisor, Inorganics



Miryam Assayag



Veronic Beausejour, B.Sc., Chemist, Supervisor

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E. Air Quality

Your P.O. #: 2200002147
 Your Project #: PASSIVE NO2 / DS03-4
 Site#: 2019/02/07 - 2019/03/14
 Site Location: Timmins, Newfoundland

Attention: TARA OAK

Tata Steel Mineral Canada
 1000, Sherbrooke St West
 Montreal, QC
 CANADA H3A 3G4

Report Date: 2019/03/28
 Report #: R2703086
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B920821
Received: 2019/03/22, 12:42

Sample Matrix: Air
 # Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
NO2 Passive Analysis	4	2019/03/25	2019/03/28	PTC SOP-00148	Passive NO2 in ATM

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 Results relate only to the items tested.

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
 Levi Manchak, Project Manager SR
 Email: LManchak@maxxam.ca
 Phone# (780)378-8542

=====

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

Maxxam Job #: B920821
Report Date: 2019/03/28

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: JFD

RESULTS OF CHEMICAL ANALYSES OF AIR

Maxxam ID		VK2997	VK2998	VK2999	VK3000		
Sampling Date		2019/02/06 09:11	2019/02/06 14:37	2019/02/06 12:23	2019/02/07 11:02		
	UNITS	DS03-AQS6-NO2	DS03-AQS7-NO2	DS03-AQS8-NO2	DS03-AQS9-NO2	RDL	QC Batch
Passive Monitoring							
Calculated NO2	ppb	<0.1	0.4	<0.1	<0.1	0.1	9357868
RDL = Reportable Detection Limit							

Maxxam Job #: B920821
Report Date: 2019/03/28

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: JFD

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B920821
Report Date: 2019/03/28

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: JFD

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9357868	YL6	Spiked Blank	Calculated NO2			99	%	90 - 110
9357868	YL6	Method Blank	Calculated NO2		<0.1		ppb	

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

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

Maxxam Job #: B920821
Report Date: 2019/03/28

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: JFD

VALIDATION SIGNATURE PAGE

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



Linda Lin, Supervisor, Centre for Passive Sampling Technology

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

Your P.O. #: 2200002147
 Your Project #: DS03-4
 Site#: TSMC
 Your C.O.C. #: 157354-13-01

Attention: Mariana Trindade

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

Report Date: 2019/05/24
 Report #: R2442285
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B911463
Received: 2019/04/10, 09:30

Sample Matrix: Water
 # Samples Received: 9

Analyses	Quantity	Date	Date	Laboratory Method	Primary Reference
		Extracted	Analyzed		
Weight of particles (1)	9	2019/04/12	2019/04/12	STL SOP-00020	MA100–Part. 1.0 R4 m
Extractable Metals in Impinger (1)	9	2019/05/17	2019/05/19	STL SOP-00075	MA.200–Mét. 1.2 R5 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

(1) This test was performed by Maxxam -Ville St. Laurent

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

Your P.O. #: 2200002147
Your Project #: DS03-4
Site#: TSMC
Your C.O.C. #: 157354-13-01

Attention: Mariana Trindade

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

Report Date: 2019/05/24
Report #: R2442285
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B911463
Received: 2019/04/10, 09:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: MLepage@maxxam.ca
Phone# (418)543-3788 Ext:7066201

=====

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

METALS (WATER)

Maxxam ID		GH9721	GH9743	GH9744	GH9745		
Sampling Date		2019/04/06 11:50	2019/04/06 10:22	2019/03/31 15:00	2019/03/31 16:00		
COC Number		157354-13-01	157354-13-01	157354-13-01	157354-13-01		
	Units	DS04-AQS1-SN-2019	DS04-AQS2-SN-2019	DS04-AQS3-SN-2019	DS04-AQS4-SN-2019	RDL	QC Batch
METALS							
Antimony (Sb) †	ug	<0.1	<0.1	0.3	<0.1	0.1	1990309
Silver (Ag) †	ug	<0.5	<0.5	<0.5	<0.5	0.5	1990309
Arsenic (As) †	ug	<0.1	<0.1	0.6	0.1	0.1	1990309
Barium (Ba) †	ug	1.75	0.38	5.28	1.36	0.05	1990309
Beryllium (Be) †	ug	<0.05	<0.05	<0.05	<0.05	0.05	1990309
Cadmium (Cd) †	ug	<0.05	<0.05	<0.05	<0.05	0.05	1990309
Calcium (Ca) †	ug	421	46	1140	409	5	1990309
Chromium (Cr) †	ug	0.3	0.1	1.0	0.6	0.1	1990309
Mercury (Hg) †	ug	<0.05	<0.05	<0.05	<0.05	0.05	1990309
Nickel (Ni) †	ug	0.9	0.2	1.7	1.2	0.1	1990309
Lead (Pb) †	ug	0.6	<0.5	0.6	<0.5	0.5	1990309
Thallium (Tl) †	ug	<0.1	<0.1	<0.1	<0.1	0.1	1990309
Vanadium (V) †	ug	<0.2	<0.2	0.4	<0.2	0.2	1990309
Zinc (Zn) †	ug	15.5	4.4	13.1	5.3	0.1	1990309
RDL = Reportable Detection Limit QC Batch = Quality Control Batch † Parameter is not accreditable							

METALS (WATER)

Maxxam ID		GH9746	GH9747	GH9748	GH9749		
Sampling Date		2019/04/06 09:25	2019/04/06 16:04	2019/04/08 07:05	2019/04/06 16:59		
COC Number		157354-13-01	157354-13-01	157354-13-01	157354-13-01		
	Units	DS04-AQS5-SN-2019	DS03-AQS6-SN-2019	DS03-AQS7-SN-2019	DS03-AQS8-SN-2019	RDL	QC Batch
METALS							
Antimony (Sb) †	ug	0.1	<0.1	0.2	<0.1	0.1	1990309
Silver (Ag) †	ug	<0.5	<0.5	<0.5	<0.5	0.5	1990309
Arsenic (As) †	ug	<0.1	0.4	1.3	<0.1	0.1	1990309
Barium (Ba) †	ug	2.02	2.74	3.75	1.33	0.05	1990309
Beryllium (Be) †	ug	<0.05	<0.05	<0.05	<0.05	0.05	1990309
Cadmium (Cd) †	ug	<0.05	<0.05	<0.05	<0.05	0.05	1990309
Calcium (Ca) †	ug	297	423	439	285	5	1990309
Chromium (Cr) †	ug	0.3	0.4	1.6	0.4	0.1	1990309
Mercury (Hg) †	ug	<0.05	<0.05	0.19	<0.05	0.05	1990309
Nickel (Ni) †	ug	0.2	1.2	0.9	0.3	0.1	1990309
Lead (Pb) †	ug	<0.5	0.9	0.8	<0.5	0.5	1990309
Thallium (Tl) †	ug	<0.1	<0.1	<0.1	<0.1	0.1	1990309
Vanadium (V) †	ug	<0.2	0.4	1.0	<0.2	0.2	1990309
Zinc (Zn) †	ug	7.0	8.9	18.4	8.7	0.1	1990309
RDL = Reportable Detection Limit QC Batch = Quality Control Batch † Parameter is not accreditable							

METALS (WATER)

Maxxam ID		GH9750		
Sampling Date		2019/04/06 15:32		
COC Number		157354-13-01		
	Units	DS03-AQS9-SN-2019	RDL	QC Batch
METALS				
Antimony (Sb) †	ug	<0.1	0.1	1990309
Silver (Ag) †	ug	<0.5	0.5	1990309
Arsenic (As) †	ug	<0.1	0.1	1990309
Barium (Ba) †	ug	1.84	0.05	1990309
Beryllium (Be) †	ug	<0.05	0.05	1990309
Cadmium (Cd) †	ug	0.46	0.05	1990309
Calcium (Ca) †	ug	299	5	1990309
Chromium (Cr) †	ug	0.3	0.1	1990309
Mercury (Hg) †	ug	<0.05	0.05	1990309
Nickel (Ni) †	ug	0.6	0.1	1990309
Lead (Pb) †	ug	<0.5	0.5	1990309
Thallium (Tl) †	ug	<0.1	0.1	1990309
Vanadium (V) †	ug	<0.2	0.2	1990309
Zinc (Zn) †	ug	25.7	0.1	1990309
RDL = Reportable Detection Limit QC Batch = Quality Control Batch † Parameter is not accreditable				

CONVENTIONAL PARAMETERS (WATER)

Maxxam ID		GH9721	GH9743	GH9744	GH9745		
Sampling Date		2019/04/06 11:50	2019/04/06 10:22	2019/03/31 15:00	2019/03/31 16:00		
COC Number		157354-13-01	157354-13-01	157354-13-01	157354-13-01		
	Units	DS04-AQS1-SN-2019	DS04-AQS2-SN-2019	DS04-AQS3-SN-2019	DS04-AQS4-SN-2019	RDL	QC Batch

CONVENTIONALS							
Weight of particles	g	0.030	0.0022	0.063	0.011	0.0010	1981494
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							

Maxxam ID		GH9746	GH9747	GH9748	GH9749		
Sampling Date		2019/04/06 09:25	2019/04/06 16:04	2019/04/08 07:05	2019/04/06 16:59		
COC Number		157354-13-01	157354-13-01	157354-13-01	157354-13-01		
	Units	DS04-AQS5-SN-2019	DS03-AQS6-SN-2019	DS03-AQS7-SN-2019	DS03-AQS8-SN-2019	RDL	QC Batch

CONVENTIONALS							
Weight of particles	g	0.014	0.051	0.083	0.0048	0.0010	1981494
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							

Maxxam ID		GH9750		
Sampling Date		2019/04/06 15:32		
COC Number		157354-13-01		
	Units	DS03-AQS9-SN-2019	RDL	QC Batch
CONVENTIONALS				
Weight of particles	g	0.019	0.0010	1981494
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

GENERAL COMMENTS

METALS (WATER)

Please note that due to a manipulation error, there was a loss of sample for GH9743 and GH9747 during the evaporation process. The analysis was done with the highest volume possible.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
	1981494	AHK	Spiked Blank	Weight of particles	2019/04/12		102	%
	1981494	AHK	Method Blank	Weight of particles	2019/04/12	<0.0010		g
	1990309	RNP	Spiked Blank	Antimony (Sb)	2019/05/19		93	%
				Silver (Ag)	2019/05/19		88	%
				Arsenic (As)	2019/05/19		88	%
				Barium (Ba)	2019/05/19		92	%
				Beryllium (Be)	2019/05/19		91	%
				Cadmium (Cd)	2019/05/19		85	%
				Calcium (Ca)	2019/05/19		85	%
				Chromium (Cr)	2019/05/19		84	%
				Mercury (Hg)	2019/05/19		95	%
				Nickel (Ni)	2019/05/19		84	%
				Lead (Pb)	2019/05/19		95	%
				Thallium (Tl)	2019/05/19		92	%
				Vanadium (V)	2019/05/19		84	%
				Zinc (Zn)	2019/05/19		85	%
	1990309	RNP	Method Blank	Antimony (Sb)	2019/05/19	<0.1		ug
				Silver (Ag)	2019/05/19	<0.5		ug
				Arsenic (As)	2019/05/19	<0.1		ug
				Barium (Ba)	2019/05/19	<0.05		ug
				Beryllium (Be)	2019/05/19	<0.05		ug
				Cadmium (Cd)	2019/05/19	<0.05		ug
				Calcium (Ca)	2019/05/19	22,RDL=5		ug
				Chromium (Cr)	2019/05/19	0.6, RDL=0.1		ug
				Mercury (Hg)	2019/05/19	<0.05		ug
				Nickel (Ni)	2019/05/19	0.2, RDL=0.1		ug
				Lead (Pb)	2019/05/19	<0.5		ug
				Thallium (Tl)	2019/05/19	<0.1		ug
				Vanadium (V)	2019/05/19	<0.2		ug
				Zinc (Zn)	2019/05/19	0.7, RDL=0.1		ug
<p>RDL = Reportable Detection Limit</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p>								

VALIDATION SIGNATURE PAGE

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



Caroline Bougie

Caroline Bougie, B.Sc. Chemist



Myriam Assayag

Miryam Assayag

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



NOM DU CLIENT: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

À L'ATTENTION DE: Mariana Trindade

N° DE PROJET: NO2 air Monitoring

N° BON DE TRAVAIL: 19M501597

DATE DU RAPPORT: 2019-08-23

VERSION*: 1

NOMBRE DE PAGES: 5

Si vous désirez de l'information concernant cette analyse, S.V.P. contactez votre chargé de projets au (514) 337-1000.

*NOTES

Nous disposerons des échantillons dans les 30 jours suivants les analyses. S.V.P. Contactez le laboratoire si vous désirez avoir un délai d'entreposage.



NOM DU CLIENT: TATA STEEL MINERALS CANADA LTD

PRÉLEVÉ PAR:

À L'ATTENTION DE: Mariana Trindade

LIEU DE PRÉLÈVEMENT:

Passive Air Quality Sampling

DATE DE RÉCEPTION: 2019-08-06

DATE DU RAPPORT: 2019-08-23

	AQS2- Q1/ 26Jun/19,16:43 27Jul/19,14:50	AQS4- Q1/ 26Jun/19,14:54 26Jul/19,16:55	AQS6- Q1/ 24Jun/19,10:03 26Jul/19,14:06	AQS7- Q1/ 28Jun/19,08:11 28Jul/19,10:19	AQS8- Q1/ 28Jun/19,07:23 26Jul/19,09:54	AQS9- Q1/ 27Jun/19,18:42 28Jul/19,08:58			
IDENTIFICATION DE L'ÉCHANTILLON:	/NO2	/NO2	/NO2	/NO2	/NO2	/NO2			
MATRICE:	Air	Air	Air	Air	Air	Air			
DATE D'ÉCHANTILLONNAGE:									
Paramètre	Unités	C / N	LDR	420781	420782	420783	420784	420785	420786
Ambient Nitrogen Dioxide	ppbv	0.4	<0.4	<0.4	0.8	<0.4	<0.4	<0.4	<0.4

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes

420781-420786 All samples are field blank subtracted.

All passives samples have been calculated using the weather data recorded at "MONTREAL INTL A" weather station.

Certifié par: _____

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDELCC. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDELCC.



Certificat d'analyse

N° BON DE TRAVAIL: 19M501597

N° DE PROJET: NO2 air Monitoring

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

NOM DU CLIENT: TATA STEEL MINERALS CANADA LTD

PRÉLEVÉ PAR:

À L'ATTENTION DE: Mariana Trindade

LIEU DE PRÉLÈVEMENT:

Passive Quality Assurance

DATE DE RÉCEPTION: 2019-08-06

DATE DU RAPPORT: 2019-08-23

				BLANK/ 26Jun/19,16:43 27Jul/19,14:50
IDENTIFICATION DE L'ÉCHANTILLON:				/NO2
MATRICE:				Air
DATE D'ÉCHANTILLONNAGE:				
Paramètre	Unités	C / N	LDR	420787
Ambient Nitrogen Dioxide	ppbv		0.4	<0.4

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes

Certifié par: _____

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDELCC. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDELCC.



Contrôle de qualité

NOM DU CLIENT: TATA STEEL MINERALS CANADA LTD

N° BON DE TRAVAIL: 19M501597

N° DE PROJET: NO2 air Monitoring

À L'ATTENTION DE: Mariana Trindade

PRÉLEVÉ PAR:

LIEU DE PRÉLÈVEMENT:

Qualité de l'air															
Date du rapport: 2019-08-23			DUPLICATA			MATÉRIAU DE RÉFÉRENCE			BLANC FORTIFIÉ			ÉCH. FORTIFIÉ			
PARAMÈTRE	Lot	N° éch.	Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.

Passive Air Quality Sampling

Ambient Nitrogen Dioxide	81	NA				< 0.4	99%	90%	110%	94%	80%	120%	105%	80%	120%
--------------------------	----	----	--	--	--	-------	-----	-----	------	-----	-----	------	------	-----	------

Commentaires: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
 Sample spikes and duplicates are not from the same sample.

Certifié par: _____

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDELCC. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDELCC. Les pourcentages de différence relative sont calculés à partir des données brutes. Il se peut que le pourcentage de différence relative ne reflète pas les valeurs dupliquées rapportées en raison de l'arrondissement des résultats finaux.

Sommaire de méthode

NOM DU CLIENT: TATA STEEL MINERALS CANADA LTD

N° BON DE TRAVAIL: 19M501597

N° DE PROJET: NO2 air Monitoring

À L'ATTENTION DE: Mariana Trindade

PRÉLEVÉ PAR:

LIEU DE PRÉLÈVEMENT:

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Qualité de l'air					
Ambient Nitrogen Dioxide	2019-08-19	2019-08-19	AQM-43-16004	Inhouse Method	ION CHROMATOGRAPH
Ambient Nitrogen Dioxide	2019-08-19	2019-08-19	AQM-43-16004	Inhouse Method	ION CHROMATOGRAPH



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Schefferville

AGAT WORK ORDER: 19C515546

AIR QUALITY MONITORING REVIEWED BY: Carmen Andrei, AQM Lab Coordinator

DATE REPORTED: Sep 18, 2019

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (403) 736-5300

***NOTES**

VERSION 1: No blank has been submitted for analysis. All samples are lab blank subtracted.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



AGAT Laboratories

Air Quality Summary

AGAT WORK ORDER: 19C515546

PROJECT: Schefferville

2420-42 AVE. NE
CALGARY, ALBERTA
CANADA T2E 7T6
TEL (403)736-5300

<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLING SITE:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

Parameter	Unit	Number of Samples	Peak Reading	Network Average
Ambient Nitrogen Dioxide	ppbv	6	1.6	1.0



Certificate of Analysis

AGAT WORK ORDER: 19C515546

PROJECT: Schefferville

2420-42 AVE. NE
CALGARY, ALBERTA
CANADA T2E 7T6
TEL (403)736-5300

<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

SAMPLED BY:

Passive Air Quality Sampling

DATE RECEIVED: 2019-09-09

DATE REPORTED: 2019-09-18

		AQS2-Q2	AQS4-Q2	AQS6-Q2	AQS7-Q2	AQS8-Q2	AQS9-Q2		
		27Jul/19,14:50	26Jul/19,16:56	26Jul/19,14:06	28Jul/19,10:14	28Jul/19,09:54	28Jul/19,08:58		
		26Aug/19,09:30	26Aug/19,10:20	25Aug/19,17:31	31Aug/19,16:59	31Aug/19,14:33	31Aug/19,11:34		
SAMPLE DESCRIPTION:		/NO2	/NO2	/NO2	/NO2	/NO2	/NO2		
SAMPLE TYPE:		FILTER	FILTER	FILTER	FILTER	FILTER	FILTER		
DATE SAMPLED:									
Parameter	Unit	G / S	RDL	511945	511946	511947	511948	511949	511950
Ambient Nitrogen Dioxide	ppbv		0.4	0.9	0.5	1.2	0.7	0.8	1.6

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Ambient Air Quality Objective
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

511945-511950 No blank has been submitted for analysis. All samples are lab blank subtracted.

Analysis performed at AGAT Calgary (unless marked by *)

Certified By:



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Schefferville
SAMPLING SITE:

AGAT WORK ORDER: 19C515546
ATTENTION TO: Mariana Trindade
SAMPLED BY:

Air Quality Monitoring

RPT Date: Sep 18, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Passive Air Quality Sampling						< 0.4	102%	90%	110%	104%	80%	120%	102%	80%	120%
Ambient Nitrogen Dioxide	82	NA													

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
Sample spikes and duplicates are not from the same sample.

Certified By: _____



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19C515546

PROJECT: Schefferville

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Air Quality Monitoring Ambient Nitrogen Dioxide	AQM-43-16004	Inhouse Method	ION CHROMATOGRAPH



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Sherbrooke

AGAT WORK ORDER: 19C520018

AIR QUALITY MONITORING REVIEWED BY: Carmen Andrei, AQM Lab Coordinator

DATE REPORTED: Sep 19, 2019

PAGES (INCLUDING COVER): 4

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (403) 736-5300

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19C520018

PROJECT: Sherbrooke

2420-42 AVE. NE
CALGARY, ALBERTA
CANADA T2E 7T6
TEL (403)736-5300

<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLING SITE: DSO-3-4

ATTENTION TO: Mariana Trindade

SAMPLED BY: ANY, ANY

Dry Dust Residue

DATE RECEIVED: 2019-08-06

DATE REPORTED: 2019-09-19

		SAMPLE DESCRIPTION: AQS7-Q1-2019 AQS6-Q1-2019 AQS9-Q1-2019 AQS8-Q1-2019 AQS2-Q1-2019 AQS1-Q1-2019 AQS4-Q1-2019 AQS3-Q1-2019											
		SAMPLE TYPE: Liquid		Liquid		Liquid		Liquid		Liquid		Liquid	
		DATE SAMPLED: 2019-07-28 15:55		2019-07-26 14:47		2019-07-28 15:50		2019-07-28 16:54		2019-07-27 14:06		2019-07-26 10:23	
Parameter	Unit	G / S	RDL	542009	542010	542011	542012	542013	542014	542015	542016	542016	542016
Dustfall, Total	mg/sample		20.0	30.5	22.4	21.8	22.1	<20.0	<20.0	30.9	21.2	21.2	21.2
Total Volume of sample	mL		0.5	2290	2240	2190	2210	1890	2310	2320	2120	2120	2120

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Calgary (unless marked by *)

Certified By: _____



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: Sherbrooke
SAMPLING SITE: DSO-3-4

AGAT WORK ORDER: 19C520018
ATTENTION TO: Mariana Trindade
SAMPLED BY: ANY, ANY

Air Quality Monitoring

RPT Date: Sep 19, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE		MATRIX SPIKE				
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Dry Dust Residue														
Dustfall, Total	416858		30.5	45.8	NA	< 20.0	101%	90%	110%					

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By: _____



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19C520018

PROJECT: Sherbrooke

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO-3-4

SAMPLED BY: ANY, ANY

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Air Quality Monitoring			
Dustfall, Total	AQM-43-16009	32020 Methods Manual for CAAP	GRAVIMETRIC
Total Volume of sample			N/A

Your P.O. #: 2200002147
 Your Project #: PASSIVE NO2 / DS03-4
 Site#: 2019/01/02 - 2019/02/07
 Site Location: Timmins, Newfoundland

Attention: TARA OAK

Tata Steel Mineral Canada
 1000, Sherbrooke St West
 Montreal, QC
 CANADA H3A 3G4

Report Date: 2019/03/05
 Report #: R2693426
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B914500
Received: 2019/02/28, 10:13

Sample Matrix: Air
 # Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
NO2 Passive Analysis	4	2019/02/28	2019/03/05	PTC SOP-00148	Passive NO2 in ATM

This report shall not be reproduced except in full, without the written approval of the laboratory.
 Results relate only to the items tested.

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
 Levi Manchak, Project Manager SR
 Email: LManchak@maxxam.ca
 Phone# (780)378-8542

=====

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

Maxxam Job #: B914500
Report Date: 2019/03/05

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: PS

RESULTS OF CHEMICAL ANALYSES OF AIR

Maxxam ID		VH2356	VH2361	VH2364	VH2365		
Sampling Date		2019/01/02 13:20	2019/01/02 12:00	2019/01/05 10:57	2019/01/05 09:07		
	UNITS	DS03-AQS6-NO2	DS03-AQS7-NO2	DS03-AQS8-NO2	DS03-AQS9-NO2	RDL	QC Batch
Passive Monitoring							
Calculated NO2	ppb	0.2	0.9	0.1	0.2	0.1	9335114
RDL = Reportable Detection Limit							

Maxxam Job #: B914500
Report Date: 2019/03/05

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: PS

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B914500
Report Date: 2019/03/05

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: PS

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
	9335114	YL6	Spiked Blank	Calculated NO2			98	%	90 - 110
	9335114	YL6	Method Blank	Calculated NO2		<0.1		ppb	

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

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

Maxxam Job #: B914500
Report Date: 2019/03/05

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 2200002147
Sampler Initials: PS

VALIDATION SIGNATURE PAGE

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



Linda Lin, Supervisor, Centre for Passive Sampling Technology

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



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Sherbrooke

AGAT WORK ORDER: 19C520252

AIR QUALITY MONITORING REVIEWED BY: Carmen Andrei, AQM Lab Coordinator

DATE REPORTED: Sep 20, 2019

PAGES (INCLUDING COVER): 3

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (403) 736-5300

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19C520252

PROJECT: Sherbrooke

2420-42 AVE. NE
CALGARY, ALBERTA
CANADA T2E 7T6
TEL (403)736-5300

<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLING SITE: DSO 3-4

ATTENTION TO: Mariana Trindade

SAMPLED BY:

Particulate on Filter Paper

DATE RECEIVED: 2019-09-06

DATE REPORTED: 2019-09-20

Parameter	Unit	G / S		Q-7304		Q-7316		Q-7310		Q-47-7323		Q-7318		Q-47-7321		Q-7305		Q-7313	
		RDL	543136	543137	(AQS1)	(AQS2)	(AQS2)	(AQS2)	(AQS4)	(AQS4)	(AQS4)	(AQS4)	(AQS4)	(AQS4)	(AQS6)				
SAMPLE DESCRIPTION:		FILTER		FILTER		FILTER		FILTER		FILTER		FILTER		FILTER		FILTER		FILTER	
SAMPLE TYPE:		2019-06-07		2019-06-26		2019-07-10		2019-07-25		2019-06-25		2019-07-23		2019-07-08		2019-07-13			
DATE SAMPLED:		543136		543137		543138		543139		543140		543141		543142		543143			
Total Suspended Particulate	mg	0.01	0.39	0.42	0.37	0.34	0.27	0.29	0.36	0.35									

Parameter	Unit	G / S		Q-7311		Q-7315		Q-7301		Q-47-7324	
		RDL	543144	543145	(AQS7)	(AQS8)	(AQS9)	(AQS8)			
SAMPLE DESCRIPTION:		FILTER		FILTER		FILTER		FILTER			
SAMPLE TYPE:		2019-07-03		2019-07-03		2019-05-07		2019-08-02			
DATE SAMPLED:		543144		543145		543146		543147			
Total Suspended Particulate	mg	0.01	0.44	0.38	0.47	0.30					

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
Analysis performed at AGAT Halifax (unless marked by *)

Certified By: _____



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19C520252

PROJECT: Sherbrooke

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO 3-4

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Air Quality Monitoring			
Total Suspended Particulate	INOR-121-6041	EPA Method 5	GRAVIMETRIC



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Sherbrooke

AGAT WORK ORDER: 19C520268

AIR QUALITY MONITORING REVIEWED BY: Carmen Andrei, AQM Lab Coordinator

DATE REPORTED: Sep 20, 2019

PAGES (INCLUDING COVER): 3

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (403) 736-5300

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19C520268

PROJECT: Sherbrooke

2420-42 AVE. NE
CALGARY, ALBERTA
CANADA T2E 7T6
TEL (403)736-5300

<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO-3-4

SAMPLED BY:

Particulate on Filter Paper (TSP)

DATE RECEIVED: 2019-08-09

DATE REPORTED: 2019-09-20

Parameter	Unit	Q-7303		Q-7307		Q-7308		Q-47-7326		Q-73-17		Q-7306		Q-47-7319		Q-7309	
		G / S	RDL	G / S	RDL	G / S	RDL	G / S	RDL	G / S	RDL	G / S	RDL	G / S	RDL	G / S	RDL
SAMPLE DESCRIPTION:		(AQ51)		(AQ52)		(AQ52)		(AQ54)		(AQ54)		(AQ54)		(AQ54)		(AQ57)	
SAMPLE TYPE:		FILTER		FILTER		FILTER		FILTER		FILTER		FILTER		FILTER		FILTER	
DATE SAMPLED:		2019-07-06		2019-06-29		2019-07-11		2019-07-25		2019-06-28		2019-07-08		2019-07-23		2019-07-03	
Total Suspended Particulate	mg	0.01	0.02	0.02	0.27	0.02	0.02	0.02	<0.01	0.02	0.36						

Parameter	Unit	Q-7302	
		G / S	RDL
SAMPLE DESCRIPTION:		(AQ59)	
SAMPLE TYPE:		FILTER	
DATE SAMPLED:		2019-07-05	
Total Suspended Particulate	mg	0.01	0.03

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
Analysis performed at AGAT Halifax (unless marked by *)

Certified By: _____



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19C520268

PROJECT: Sherbrooke

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO-3-4

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Air Quality Monitoring			
Total Suspended Particulate	INOR-121-6041	EPA Method 5	GRAVIMETRIC



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: TPM Air Monitoring

AGAT WORK ORDER: 19M501574

WATER ANALYSIS REVIEWED BY: Philippe Morneau, chimiste

DATE REPORTED: 2019-09-27

VERSION*: 1

PAGES (INCLUDING COVER): 7

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M501574

PROJECT: TPM Air Monitoring

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: MULTI

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO-3-4

Metals on Filters

DATE RECEIVED: 2019-08-06

DATE REPORTED: 2019-09-27

Parameter	Unit	SAMPLE DESCRIPTION:										
		Q-7303(AQ51)		Q-7307(AQ52)		Q-7308(AQ52)		Q-47-7326 (AQ54)		Q-47-7319 (AQ54)		Q-7309(AQ57)
		Air		Air		Air		Air		Air		Air
		DATE SAMPLED:	2019-07-06	2019-06-29	2019-07-11	2019-07-25	2019-06-28	2019-07-08	2019-07-23	2019-07-03		
G / S	RDL	420416	420437	420438	420439	420440	420441	420442	420443			
Aluminum	ug/Filter	10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0		
Aluminum	ug/m3	10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4		
Arsenic	ug/Filter	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Arsenic	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2		
Boron	ug/Filter	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Boron	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2		
Cadmium	ug/Filter	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Cadmium	ug/m3	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Copper	ug/Filter	0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Copper	ug/m3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Iron	ug/Filter	5.0	10.0	<5.0	5.0	<5.0	<5.0	<5.0	10.0	15.0		
Iron	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2		
Lead	ug/Filter	10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0		
Lead	ug/m3	10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4		
Lithium	ug/Filter	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Lithium	ug/m3	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Magnesium	ug/Filter	10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0		
Magnesium	ug/m3	10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4		
Manganese	ug/Filter	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5		
Manganese	ug/m3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		
Molybdenum	ug/Filter	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Molybdenum	ug/m3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Selenium	ug/Filter	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Selenium	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2		
Strontium	ug/Filter	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Strontium	ug/m3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Titanium	ug/Filter	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5		

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Certificate of Analysis

AGAT WORK ORDER: 19M501574

PROJECT: TPM Air Monitoring

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: MULTI

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO-3-4

Metals on Filters

DATE RECEIVED: 2019-08-06

DATE REPORTED: 2019-09-27

Parameter	Unit	SAMPLE DESCRIPTION:		Q-7303(AQ51)	Q-7307(AQ52)	Q-7308(AQ52)	Q-47-7326	Q-73-17(AQ54)	Q-7306(AQ54)	Q-47-7319	Q-7309(AQ57)	
		SAMPLE TYPE:		Air	Air	Air	(AQ54)	Air	Air	Air	(AQ54)	Air
		DATE SAMPLED:		2019-07-06	2019-06-29	2019-07-11	2019-07-25	2019-06-28	2019-07-08	2019-07-23	2019-07-03	2019-07-03
		G / S	RDL	420416	420437	420438	420439	420440	420441	420442	420443	
Titanium	ug/m3	2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	
Zinc	ug/Filter	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.5	<1.0	
Zinc	ug/m3	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	

Certified By: _____

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Certificate of Analysis

AGAT WORK ORDER: 19M501574

PROJECT: TPM Air Monitoring

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TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: MULTI

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO-3-4

Metals on Filters

DATE RECEIVED: 2019-08-06

DATE REPORTED: 2019-09-27

SAMPLE DESCRIPTION: Q-7302(AQ59)

SAMPLE TYPE: Air

DATE SAMPLED: 2019-07-05

Parameter	Unit	G / S	RDL	420444
Aluminum	ug/Filter		10.0	<10.0
Aluminum	ug/m3		10.4	<10.4
Arsenic	ug/Filter		5.0	<5.0
Arsenic	ug/m3		5.2	<5.2
Boron	ug/Filter		5.0	<5.0
Boron	ug/m3		5.2	<5.2
Cadmium	ug/Filter		0.2	<0.2
Cadmium	ug/m3		0.2	<0.2
Copper	ug/Filter		0.5	<0.5
Copper	ug/m3		0.5	<0.5
Iron	ug/Filter		5.0	5.0
Iron	ug/m3		5.2	<5.2
Lead	ug/Filter		10.0	<10.0
Lead	ug/m3		10.4	<10.4
Lithium	ug/Filter		1.0	<1.0
Lithium	ug/m3		1.0	<1.0
Magnesium	ug/Filter		10.0	<10.0
Magnesium	ug/m3		10.4	<10.4
Manganese	ug/Filter		0.3	<0.3
Manganese	ug/m3		0.3	<0.3
Molybdenum	ug/Filter		0.5	<0.5
Molybdenum	ug/m3		0.5	<0.5
Selenium	ug/Filter		5.0	<5.0
Selenium	ug/m3		5.2	<5.2
Strontium	ug/Filter		0.1	<0.1
Strontium	ug/m3		0.1	<0.1
Titanium	ug/Filter		2.5	<2.5
Titanium	ug/m3		2.6	<2.6

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M501574

PROJECT: TPM Air Monitoring

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ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY: MULTI

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO-3-4

Metals on Filters

DATE RECEIVED: 2019-08-06

DATE REPORTED: 2019-09-27

SAMPLE DESCRIPTION: Q-7302(AQ59)

SAMPLE TYPE: Air

DATE SAMPLED: 2019-07-05

Parameter	Unit	G / S	RDL	420444
Zinc	ug/Filter		1.0	<1.0
Zinc	ug/m3		1	<1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
420416-420444 **Non-accredited test. Inquire with lab for details.

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD
PROJECT: TPM Air Monitoring
SAMPLED BY: MULTI

AGAT WORK ORDER: 19M501574
ATTENTION TO: Mariana Trindade
SAMPLING SITE: DSO-3-4

Water Analysis															
RPT Date: 2019-09-27			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Metals on Filters															
Aluminum**			0.40	0.34	NA	< 0.1	99%	80%	120%	99%	80%	120%	85%	80%	120%
Arsenic**			0.2	0.2	NA	< 0.1	100%	80%	120%	97%	80%	120%	92%	80%	120%
Boron**			0.09	0.09	NA	< 0.05	113%	80%	120%	111%	80%	120%	108%	80%	120%
Cadmium**			0.08	0.08	0.0%	< 0.01	107%	80%	120%	99%	80%	120%	98%	80%	120%
Copper**			0.09	0.09	0.0%	< 0.01	102%	80%	120%	109%	80%	120%	110%	80%	120%
Iron**			0.4	0.4	NA	< 0.1	107%	80%	120%	110%	80%	120%	107%	80%	120%
Lead**			0.8	0.8	NA	< 0.2	106%	80%	120%	101%	80%	120%	101%	80%	120%
Lithium**			3.02	3.05	1.0%	< 0.01	102%	80%	120%	110%	80%	120%	102%	80%	120%
Magnesium**			2.4	2.5	4.1%	< 0.2	103%	80%	120%	119%	80%	120%	119%	80%	120%
Manganese**			0.094	0.092	2.2%	< 0.005	107%	80%	120%	117%	80%	120%	115%	80%	120%
Molybdenum**			0.08	0.08	0.0%	< 0.01	108%	80%	120%	101%	80%	120%	100%	80%	120%
Selenium**			0.2	<0.2	NA	< 0.2	107%	80%	120%	120%	80%	120%	98%	80%	120%
Strontium**			0.04	0.04	NA	< 0.01	103%	80%	120%	108%	80%	120%	108%	80%	120%
Titanium**			0.41	0.41	0.0%	< 0.05	114%	80%	120%	103%	80%	120%	103%	80%	120%
Zinc**			0.20	0.20	0.0%	< 0.02	109%	80%	120%	101%	80%	120%	100%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.



AGAT Laboratories
 9770 Route 138, Madeline, QC H3T 2L4
 St-Laurice, QC J5V 1V6
 Tel: 514.337.1000 Fax: 514.333.3066
 agattabs.com

Chain of Custody - Environmental Chemistry

Client Information
 Company: TSMC
 Address: _____
 Phone: _____ Fax: _____
 Project No: TPM air monitoring
 Sample Location: D50 3-4
 Sampled By: Mu(1)

Report Sent To
 1. Name: TSMC mailing list
 Email: _____
 2. Name: _____
 Email: _____

Report Format
 Portrait (sample/page) Landscape (multi-sample/page)

Invoice To
 Company: TSMC
 Contact: _____
 Email: _____
 Address: _____
 PO No: 300000296 Quote No: _____
 Comments: Appendix A P 10/12

Matrix Legend
 S Sol B Sludge EP Drinking Water
 SL Solid EU Wastewater EF Effluent ES Surface Water AF Affluent
 ST Groundwater A Air

SAMPLE IDENTIFICATION	DATE (DD/MM/YY)	TIME	NO. OF CONTAINERS	MATRIX
Q-7307 (A051)	6/7/19	13:35	1	
Q-7307 (A052)	29/6/19	15:45		
Q-7308 (A052)	11/7/19	18:00		
Q-47-7326 (A052)	25/7/19	15:40		
Q-7317 (A054)	28/6/19	13:50		
Q-7306 (A054)	8/7/19	12:00		
Q-47-7319 (A054)	23/7/19	15:30		
Q-7309 (A057)	3/7/19	13:00		
Q-7302 (A059)	5/7/19	9:40		

PARAMETER	DATE (DD/MM/YY)	TIME	NO. OF CONTAINERS	MATRIX	REMARKS
FAH					
Petroleum Hydrocarbons C10-C50					
RFA					
Chlorobenzenes					
Phthalates					
PC Congeners					
Aroclor					
Ethylene Glycol					
Glycols (Scan)					
Formaldehyde					
Mineral Oil & Grease					
Total Oil & Grease					
Pesticides (specify):					
Phenols (GC-MS)					
Phenolic Compounds (AAP)					
6 Metals (Cd, Cr, Cu, Ni, Pb, Zn)					
13 Metals TC - Soil					
17 Metals TC - Water					
Metals (specify):					
Mercury					
Selenium - Soil					
Total Hardness					
Alkalinity					
Bicarbonate					
Conductivity					
Chloride					
Fluoride					
Sulfate					
Bromide					
Cyanide					
Total					
Available					
Oxidizable					
COD					
Total					
TOC					
NH ₃					
TKN					
NO ₂ + NO ₃					
Solides					
Total					
Dissolved					
TSS					
YSR					
Suphride - Water					
Total Suphrid - Soil					
Dispersed Metals (deter by laboratory)					
PH					
NO ₂					
NO ₃					
p-P04					
Absorbance					
Colour					
Turbidity					
BOD ₅					
CBOD ₅					
Hexavalent Chromium					
Coliforms					
Total					
Fecal					
E. coli					
Microbiology (other)					
HR/MS - PCDD/PCDF					
PAHs					
PCB					
CMM 2008-47: Sanitary					
Storm					
RMD					
REMR 01					

Turn Around Time Required (Business Days)
 Environmental: Regular: 5 to 7 days Ultra Trace: 10 to 15 days
 Rush: < 12 hours Regular: < 10 days
 24 hours < 10 days
 48 hours < 10 days
 72 hours < 10 days

Guideline Criteria
 PRT/ABC RESC
 OCME Other: _____
 Eau de consommation
 Eau de nettoyage Surface
 Eau de nettoyage Salée
 CMM Sanitary Storm

Custom Seal Intact? Yes No N/A
 Turn Around Time Required (Business Days)
 Environmental: Regular: 5 to 7 days Ultra Trace: 10 to 15 days
 Rush: < 12 hours Regular: < 10 days
 24 hours < 10 days
 48 hours < 10 days
 72 hours < 10 days

DATE (DD/MM/YY)	TIME	NO. OF CONTAINERS	MATRIX	REMARKS
6/7/19	13:35	1		
29/6/19	15:45			
11/7/19	18:00			
25/7/19	15:40			
28/6/19	13:50			
8/7/19	12:00			
23/7/19	15:30			
3/7/19	13:00			
5/7/19	9:40			

Samples Released by (Print and Sign): J.F. Dion
 Date (DD/MM/YY): 05/05/19 Time: 13:00
 Samples Released by (Print and Sign): _____
 Date (DD/MM/YY): _____ Time: _____



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: Shefferville

AGAT WORK ORDER: 19C531119

AIR QUALITY MONITORING REVIEWED BY: Carmen Andrei, AQM Lab Coordinator

DATE REPORTED: Oct 25, 2019

PAGES (INCLUDING COVER): 3

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (403) 736-5300

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19C531119

PROJECT: Shefferville

2420-42 AVE. NE
CALGARY, ALBERTA
CANADA T2E 7T6
TEL (403)736-5300

<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLING SITE: DSO3-DSO4

ATTENTION TO: Mariana Trindade

SAMPLED BY: JDF, AC., JDF, AC.

Particulate on Filter Paper

DATE RECEIVED: 2019-10-16

DATE REPORTED: 2019-10-25

Parameter	Unit	G / S	RDL	Q47-7325 (AQ54) 13:15/610152	Q47-7320 (AQ52) 10:00/610166	Q47-7327 (AQ51) 13:45/610167	Q47-7333 (AQ54) 15:33/610168	Q47-7348 (AQ55) 16:30/610169	Q47-7346 (AQ53) 17:40/610170	Q47-7331 (AQ56) 17:15/610171	Q47-7347 (AQ59) 18:00/610172
		SAMPLE DESCRIPTION:		DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4
		SAMPLE TYPE:		FILTER	FILTER	FILTER	FILTER	FILTER	FILTER	FILTER	FILTER
		DATE SAMPLED:		2019-08-04	2019-08-07	2019-08-15	2019-08-16	2019-08-17	2019-08-18	2019-08-22	2019-08-23
Total Suspended Particulate	mg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Parameter	Unit	G / S	RDL	Q47-7337 (AQ52) 09:30/610173	Q47-7357 (AQ54) 13:30/610174	Q47-7352 (AQ52) 10:30/610175	Q47-7359 (AQ58) 15:40/610176	Q47-7361 (AQ52) 08:10/610177	Q47-7350 (AQ51) 13:30/610178	Q47-7358 (AQ53) 09:00/610185	Q47-7351 (AQ55) 12:00/610186
		SAMPLE DESCRIPTION:		DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4	DSO3-DSO4
		SAMPLE TYPE:		FILTER	FILTER	FILTER	FILTER	FILTER	FILTER	FILTER	FILTER
		DATE SAMPLED:		2019-08-20	2019-08-28	2019-09-01	2019-09-02	2019-09-13	2019-09-15	2019-09-17	2019-08-18
Total Suspended Particulate	mg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Parameter	Unit	G / S	RDL	Q47-7364 (AQ54) 10:00/610187							
		SAMPLE DESCRIPTION:		DSO3-DSO4							
		SAMPLE TYPE:		FILTER							
		DATE SAMPLED:		2019-09-21							
Total Suspended Particulate	mg		0.01	<0.01							

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
 620051-620068 The condition of samples was satisfactory at the time of arrival in laboratory.
 The Reported Detection Limit RDL is based on the detection limit of the analytical balance used for filters: 0.01mg.
 Analysis performed at AGAT Calgary (unless marked by *)

Certified By: _____



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19C531119

PROJECT: Shefferville

ATTENTION TO: Mariana Trindade

SAMPLING SITE: DSO3-DSO4

SAMPLED BY: JDF,AC.,JDF,AC.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Air Quality Monitoring			
Total Suspended Particulate	AQM-43-16002	NIOSH 0500	GRAVIMETRIC

F. Sterile Quality



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT: 19M541514

AGAT WORK ORDER: 19T547621

SOLID ANALYSIS REVIEWED BY: Sherin Moussa, Senior Technician

DATE REPORTED: Nov 25, 2019

PAGES (INCLUDING COVER): 5

Should you require any information regarding this analysis please contact your client services representative at (905) 501-9998

*NOTES

All samples are stored at no charge for 90 days. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19T547621

PROJECT: 19M541514

5623 McADAM ROAD
MISSISSAUGA, ONTARIO
CANADA L4Z 1N9
TEL (905)501-9998
FAX (905)501-0589
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

(201-039) LECO (Combustion IR) - Total S

DATE SAMPLED: Nov 22, 2019	DATE RECEIVED: Nov 23, 2019	DATE REPORTED: Nov 25, 2019	SAMPLE TYPE: Other
----------------------------	-----------------------------	-----------------------------	--------------------

Analyte:	S
Unit:	%
Sample ID (AGAT ID)	RDL: 0.005
TSMC-59851 (740642)	<0.005
TSMC-70348 (740643)	<0.005
TSMC-70349 (740644)	<0.005
TSMC-70350 (740645)	<0.005

Comments: RDL - Reported Detection Limit
Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

(201-039) LECO (Combustion IR) - Total S

Parameter	REPLICATE #1				REPLICATE #2											
	Sample ID	Original	Replicate	RPD	Sample ID	Original	Replicate	RPD								
S	740642	< 0.005	<0.005	0.0%	740645	< 0.005	<0.005	0.0%								



AGAT Laboratories

Quality Assurance - Certified Reference materials
 AGAT WORK ORDER: 19T547621
 PROJECT: 19M541514

5623 McADAM ROAD
 MISSISSAUGA, ONTARIO
 CANADA L4Z 1N9
 TEL (905)501-9998
 FAX (905)501-0589
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

(201-039) LECO (Combustion IR) - Total S

Parameter	CRM #1				CRM #2											
	Expect	Actual	Recovery	Limits	Expect	Actual	Recovery	Limits								
S	0.8	0.8	100%	90% - 110%	0.8	0.795	99%	90% - 110%								



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19T547621

PROJECT: 19M541514

ATTENTION TO: Mariana Trindade

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Solid Analysis			
S	MIN-200-12000	ASTM E1915-07a	LECO



CLIENT NAME: TATA STEEL MINERALS CANADA LTD
1000 SHERBROOKE W., SUTE 1120
MONTREAL, QC H3A3G4
(514) 764-6700

ATTENTION TO: Mariana Trindade

PROJECT:

AGAT WORK ORDER: 19M541514

SOIL ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

WATER ANALYSIS REVIEWED BY: Jalel Rouissi, Chimiste

DATE REPORTED: 2019-12-20

VERSION*: 1

PAGES (INCLUDING COVER): 19

Should you require any information regarding this analysis please contact your client services representative at (514) 337-1000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 19M541514

PROJECT:

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY:

ATTENTION TO: Mariana Trindade

SAMPLING SITE: 5490 rue Raymond, Montréal

ABA Package

DATE RECEIVED: 2019-11-07

DATE REPORTED: 2019-12-20

Parameter	Unit	SAMPLE DESCRIPTION:		TSMC-70348	TSMC-70349	TSMC-70350	TSMC-59851
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		G / S	RDL	696078	696092
Sulphur - Total	%	0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
696078-696094 Total Sulphur analysis performed at AGAT Toronto.

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M541514

PROJECT:

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

SPLP Mercury

DATE RECEIVED: 2019-11-07

DATE REPORTED: 2019-12-20

		SAMPLE DESCRIPTION:		TSMC-70348	TSMC-70349	TSMC-70350	TSMC-59851
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:					
Parameter	Unit	G / S	RDL	696078	696092	696093	696094
Mercury SPLP Leachate	µg/L		0.5	<0.5	<0.5	<0.5	<0.5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M541514

PROJECT:

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

SAMPLED BY:

ATTENTION TO: Mariana Trindade

SAMPLING SITE: 5490 rue Raymond, Montréal

SPLP Metals

DATE RECEIVED: 2019-11-07

DATE REPORTED: 2019-12-20

Parameter	Unit	SAMPLE DESCRIPTION:		TSMC-70348	TSMC-70349	TSMC-70350	TSMC-59851
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		G / S	RDL	696078	696092
Aluminum, SPLP Leachate	mg/L	0.02	0.03	0.03	0.03	0.03	0.02
Antimony, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Barium, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Beryllium, SPLP Leachate	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Boron, SPLP Leachate	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium, SPLP Leachate	mg/L	0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cobalt, SPLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron, SPLP Leachate	mg/L	0.2	0.4	0.3	0.3	0.3	0.5
Lead, SPLP Leachate	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Lithium, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Manganese, SPLP Leachate	mg/L	0.02	0.08	0.04	0.15	0.15	<0.02
Molybdenum, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Selenium, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Silver, SPLP Leachate	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium, SPLP Leachate	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tin, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Uranium, SPLP Leachate	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Zinc, SPLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M541514

PROJECT:

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

TCLP Leachate Metals

DATE RECEIVED: 2019-11-07

DATE REPORTED: 2019-12-20

Parameter	Unit	SAMPLE DESCRIPTION:							
		TSMC-70348		TSMC-70349		TSMC-70350		TSMC-59851	
		Soil		Soil		Soil		Soil	
DATE SAMPLED:		696078		696092		696093		696094	
G / S	RDL	G / S	RDL	G / S	RDL	G / S	RDL	G / S	RDL
Antimony - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic - TCLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Barium - TCLP Leachate	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Beryllium - TCLP Leachate	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Boron - TCLP Leachate	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium - TCLP Leachate	mg/L	0.01	<0.01	0.03	<0.01	<0.01	0.01	<0.01	0.01
Chromium - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt - TCLP Leachate	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Copper - TCLP Leachate	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron - TCLP Leachate	mg/L	1	<1	<1	<1	<1	<1	<1	<1
Lead - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02
Mercury - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel - TCLP Leachate	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium - TCLP Leachate	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium - TCLP Leachate	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc - TCLP Leachate	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zirconium - TCLP Leachate	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
696078-696094 Analysis based on "as received"

Certified By: _____



AGAT Laboratories' procedure for signatures and signatories adheres strictly to the requirements of accreditation ISO 17025:2005 as required by CALA, SCC and MDDELCC where applicable. All electronic signatures on AGAT certificates are password protected and all signatories meet their regional and scope of accreditation requirements and are approved by CALA, SCC and MDDELCC.



Certificate of Analysis

AGAT WORK ORDER: 19M541514

PROJECT:

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

Leachate Analyses CTEU-9

DATE RECEIVED: 2019-11-07

DATE REPORTED: 2019-12-20

Parameter	Unit	SAMPLE DESCRIPTION:							
		TSMC-70348		TSMC-70349		TSMC-70350		TSMC-59851	
		Soil		Soil		Soil		Soil	
DATE SAMPLED:		696078		696092		696093		696094	
G / S	RDL								
Silver	ug/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	ug/L	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Barium	ug/L	20	<20	<20	<20	<20	<20	<20	<20
Boron	ug/L	50	<50	<50	<50	<50	<50	<50	<50
Cadmium	ug/L	1	<1	<1	<1	<1	<1	<1	<1
Chromium	ug/L	15	<15	<15	<15	<15	<15	<15	<15
Cobalt	ug/L	5	<5	<5	<5	<5	<5	<5	<5
Copper	ug/L	1	<1	<1	<1	<1	<1	<1	<1
Manganese	ug/L	2	21	6	60	3			
Mercury	ug/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/L	10	<10	<10	<10	<10	<10	<10	<10
Nickel	ug/L	10	<10	<10	<10	<10	<10	<10	<10
Lead	ug/L	1	<1	<1	<1	<1	<1	<1	<1
Selenium	ug/L	3	<3	<3	<3	<3	<3	<3	<3
Uranium	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	ug/L	3	<3	<3	<3	<3	<3	<3	<3
fluorides	mg/L	0.10	0.16	0.15	0.15	0.15			
Nitrites - Nitrates	mg/L - N	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
nitrites	mg/L - N	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

696078-696094 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Certified By: _____



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Certificate of Analysis

AGAT WORK ORDER: 19M541514

PROJECT:

9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
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<http://www.agatlabs.com>

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

Shake Flask Extraction - Dissolved Metals

DATE RECEIVED: 2019-11-07

DATE REPORTED: 2019-12-20

Parameter	Unit	SFE Method						
		SAMPLE DESCRIPTION:		Blank	TSMC-70348	TSMC-70349	TSMC-70350	TSMC-59851
		SAMPLE TYPE:		SFE	SFE	SFE	SFE	SFE
		DATE SAMPLED:		710252	710262	710263	710264	710266
		G / S	RDL					
Weight of Dry Sample	g			0	200	250	250	200
Volume of DI Water	mL			750	600	750	750	600
Silver Dissolved	mg/L		0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Arsenic Dissolved	mg/L		0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Boron Dissolved	mg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium Dissolved	mg/L		0.0002	0.0003	0.0060	0.0005	0.0040	0.0023
Cadmium Dissolved	mg/L		0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Cobalt Dissolved	mg/L		0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Chromium Dissolved	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper Dissolved	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005
Iron Dissolved	mg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury Dissolved	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese Dissolved	mg/L		0.0002	<0.0002	0.0248	0.0456	0.120	0.0164
Molybdenum Dissolved	mg/L		0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel Dissolved	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Lead Dissolved	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Selenium Dissolved	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Tin Dissolved	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Uranium Dissolved	mg/L		0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Zinc Dissolved	mg/L		0.001	<0.001	0.010	0.001	0.001	0.002
Fluoride	mg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate-N	mg/L		0.005	<0.005	0.029	0.073	0.020	0.020
Nitrite-N	mg/L		0.005	<0.005	0.034	0.034	0.012	0.017

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

Soil Analysis															
RPT Date: 2019-12-20			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
TCLP Leachate Metals															
Antimony - TCLP Leachate	696078	696078S	2.05	2.01	2.0%	< 0.01				95%	90%	110%	104%	70%	130%
Arsenic - TCLP Leachate	696078	696078S	1.72	2.10	19.5%	< 0.02	79%	50%	150%	103%	90%	110%	105%	70%	130%
Barium - TCLP Leachate	696078	696078S	1.1	1.0	NA	< 0.5	83%	50%	150%	99%	90%	110%	105%	70%	130%
Beryllium - TCLP Leachate	696078	696078S	0.99	0.97	1.6%	< 0.02				100%	90%	110%	102%	70%	130%
Boron - TCLP Leachate	696078	696078S	1.0	1.0	NA	< 0.5				106%	90%	110%	101%	70%	130%
Cadmium - TCLP Leachate	696078	696078S	0.97	0.93	5.1%	< 0.01	104%	50%	150%	97%	90%	110%	101%	70%	130%
Chromium - TCLP Leachate	696078	696078S	0.97	0.84	14.9%	< 0.01	97%	50%	150%	94%	90%	110%	97%	70%	130%
Cobalt - TCLP Leachate	696078	696078S	0.98	0.95	3.1%	< 0.05	54%	50%	150%	101%	90%	110%	103%	70%	130%
Copper - TCLP Leachate	696078	696078S	1.01	0.96	5.2%	< 0.05				101%	90%	110%	99%	70%	130%
Iron - TCLP Leachate	696078	696078S	1	1	NA	< 1				105%	90%	110%	104%	70%	130%
Lead - TCLP Leachate	696078	696078S	1.80	1.81	0.2%	< 0.01	94%	50%	150%	93%	90%	110%	91%	70%	130%
Mercury - TCLP Leachate	696078	696078S	1.41	1.43	1.4%	< 0.01	69%	50%	150%	93%	90%	110%	73%	70%	130%
Nickel - TCLP Leachate	696078	696078S	1.05	0.95	9.3%	< 0.05	55%	50%	150%	99%	90%	110%	100%	70%	130%
Selenium - TCLP Leachate	696078	696078S	1.02	1.01	1.2%	< 0.05	87%	50%	150%	100%	90%	110%	103%	70%	130%
Silver - TCLP Leachate	696078	696078S	0.24	0.24	3.4%	< 0.01	140%	50%	150%	100%	90%	110%	102%	70%	130%
Thallium - TCLP Leachate	696078	696078S	4.61	4.62	0.3%	< 0.01				96%	90%	110%	93%	70%	130%
Uranium - TCLP Leachate	696078	696078S	<0.01	<0.01	NA	< 0.01				94%	90%	110%			
Vanadium - TCLP Leachate	696078	696078S	1.02	0.91	12.1%	< 0.05				93%	90%	110%	99%	70%	130%
Zinc - TCLP Leachate	696078	696078S	1.1	1.0	7.0%	< 0.1	79%	50%	150%	101%	90%	110%	104%	70%	130%
Zirconium - TCLP Leachate	696078	696078S	<0.01	<0.01	NA	< 0.01				100%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

ABA Package

Sulphur - Total 696094 <0.005 <0.005 NA < 0.005 100% 80% 120%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

SPLP Metals

Aluminum, SPLP Leachate	696094	696094	0.02	0.03	NA	< 0.02	107%	80%	120%	104%	80%	120%	106%	70%	130%
Antimony, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	80%	80%	120%	NA	80%	120%	NA	70%	130%
Arsenic, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	100%	80%	120%	97%	80%	120%	96%	70%	130%
Barium, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	97%	80%	120%	99%	80%	120%	103%	70%	130%
Beryllium, SPLP Leachate	696094	696094	<0.05	<0.05	NA	< 0.05	107%	80%	120%	114%	80%	120%	108%	70%	130%
Bismuth, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	100%	80%	120%	110%	80%	120%	114%	70%	130%
Boron, SPLP Leachate	696094	696094	<0.05	<0.05	NA	< 0.05	108%	80%	120%	113%	80%	120%	111%	70%	130%
Cadmium, SPLP Leachate	696094	696094	<0.003	<0.003	NA	< 0.003	99%	80%	120%	99%	80%	120%	99%	70%	130%
Chromium, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	101%	80%	120%	102%	80%	120%	115%	70%	130%
Cobalt, SPLP Leachate	696094	696094	<0.01	<0.01	NA	< 0.01	104%	80%	120%	106%	80%	120%	113%	70%	130%
Copper, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	106%	80%	120%	109%	80%	120%	119%	70%	130%
Iron, SPLP Leachate	696094	696094	0.5	0.4	NA	< 0.2	102%	80%	120%	111%	80%	120%	122%	70%	130%
Lead, SPLP Leachate	696094	696094	<0.005	<0.005	NA	< 0.005	108%	80%	120%	111%	80%	120%	114%	70%	130%
Lithium, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	104%	80%	120%	113%	80%	120%	110%	70%	130%
Manganese, SPLP Leachate	696094	696094	<0.02	0.02	NA	< 0.02	109%	80%	120%	115%	80%	120%	128%	70%	130%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

Soil Analysis (Continued)

RPT Date: 2019-12-20			DUPLICATE			REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Molybdenum, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	101%	80%	120%	102%	80%	120%	109%	70%	130%
Nickel, SPLP Leachate	696094	696094	<0.02	0.03	NA	< 0.02	102%	80%	120%	107%	80%	120%	115%	70%	130%
Selenium, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	98%	80%	120%	93%	80%	120%	87%	70%	130%
Silver, SPLP Leachate	696094	696094	<0.005	<0.005	NA	< 0.005	104%	80%	120%	104%	80%	120%	100%	70%	130%
Strontium, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	115%	80%	120%	114%	80%	120%	117%	70%	130%
Thallium, SPLP Leachate	696094	696094	<0.001	<0.001	NA	< 0.001	107%	80%	120%	108%	80%	120%	109%	70%	130%
Tin, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	97%	80%	120%	104%	80%	120%	106%	70%	130%
Uranium, SPLP Leachate	696094	696094	<0.001	<0.001	NA	< 0.001	104%	80%	120%	107%	80%	120%	109%	70%	130%
Vanadium, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	100%	80%	120%	103%	80%	120%	111%	70%	130%
Zinc, SPLP Leachate	696094	696094	<0.02	<0.02	NA	< 0.02	102%	80%	120%	104%	80%	120%	103%	70%	130%

Certified By: _____



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Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

Water Analysis															
RPT Date: 2019-12-20			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Shake Flask Extraction - Dissolved Metals

Silver Dissolved	736560		<0.00008	<0.00008	NA	< 0.00008				99%	90%	110%			
Arsenic Dissolved	736560		0.0008	0.0008	NA	< 0.0002				100%	90%	110%			
Boron Dissolved	736560		0.01	0.01	NA	< 0.01				96%	90%	110%			
Barium Dissolved	736560		0.131	0.131	0.3%	< 0.0002				101%	90%	110%			
Cadmium Dissolved	736560		<0.00001	0.00001	NA	< 0.00001				98%	90%	110%			
Cobalt Dissolved	736560		0.0010	0.0012	9.5%	< 0.0001				100%	90%	110%			
Chromium Dissolved	736560		<0.0005	<0.0005	NA	< 0.0005				98%	90%	110%			
Copper Dissolved	736560		0.0016	0.0017	NA	< 0.0005				99%	90%	110%			
Iron Dissolved	736560		0.18	0.19	5.6%	< 0.02				100%	90%	110%			
Mercury Dissolved	736560		<0.0005	<0.0005	NA	< 0.0005				99%	90%	110%			
Manganese Dissolved	736560		0.406	0.396	2.5%	< 0.0002				99%	90%	110%			
Molybdenum Dissolved	736560		0.0061	0.0061	0.8%	< 0.0001				90%	90%	110%			
Nickel Dissolved	736560		0.0008	0.0007	NA	< 0.0005				98%	90%	110%			
Lead Dissolved	736560		<0.0005	<0.0005	NA	< 0.0005				106%	90%	110%			
Selenium Dissolved	736560		<0.0005	<0.0005	NA	< 0.0005				98%	90%	110%			
Tin Dissolved	736560		0.0005	<0.0005	NA	< 0.0005				101%	90%	110%			
Uranium Dissolved	736560		0.00209	0.00207	0.7%	< 0.00005				100%	90%	110%			
Zinc Dissolved	736560		0.005	0.004	NA	< 0.001				100%	90%	110%			
Fluoride	710262		<0.02	<0.02	NA	< 0.02	105%	85%	115%	105%	90%	110%			
Nitrate-N	710262		0.029	0.030	4.1%	< 0.005	103%	85%	115%	105%	90%	110%			
Nitrite-N	710262		0.034	0.034	0.0%	< 0.005				103%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Leachate Analyses CTEU-9

Silver	1	NA	NA	NA	< 0.1	NA	80%	120%	106%	80%	120%	NA	80%	120%	
Arsenic	1	NA	NA	NA	< 0.3	NA	80%	120%	111%	80%	120%	NA	80%	120%	
Barium	1	NA	NA	NA	< 20	NA	80%	120%	104%	80%	120%	NA	80%	120%	
Boron	1	NA	NA	NA	< 50	NA	80%	120%	100%	80%	120%	NA	80%	120%	
Cadmium	1	NA	NA	NA	< 1	NA	80%	120%	110%	80%	120%	NA	80%	120%	
Chromium	1	NA	NA	NA	< 15	NA	80%	120%	103%	80%	120%	NA	80%	120%	
Cobalt	1	NA	NA	NA	< 5	NA	80%	120%	112%	80%	120%	NA	80%	120%	
Copper	1	NA	NA	NA	< 1	NA	80%	120%	98%	80%	120%	NA	80%	120%	
Manganese	1	NA	NA	NA	< 2	NA	80%	120%	117%	80%	120%	NA	80%	120%	
Molybdenum	1	NA	NA	NA	< 10	NA	80%	120%	104%	80%	120%	NA	80%	120%	
Nickel	1	NA	NA	NA	< 10	NA	80%	120%	105%	80%	120%	NA	80%	120%	
Lead	1	NA	NA	NA	< 1	NA	80%	120%	109%	80%	120%	NA	80%	120%	
Selenium	1	NA	NA	NA	< 3	NA	80%	120%	112%	80%	120%	NA	80%	120%	
Uranium	1	NA	NA	NA	< 0.5	NA	80%	120%	104%	80%	120%	NA	80%	120%	
Zinc	1	NA	NA	NA	< 3	NA	80%	120%	97%	80%	120%	NA	80%	120%	
fluorides	807656		0.09	0.09	NA	< 0.10	96%	80%	120%	99%	80%	120%	100%	80%	120%
Nitrites - Nitrates	807656		< 1.0	< 1.0	0.0%	< 1.0	90%	80%	120%	94%	80%	120%	94%	80%	120%
nitrites	807656		< 0.5	< 0.5	0.0%	< 0.5	NA	80%	120%	90%	80%	120%	89%	80%	120%



Quality Assurance

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

Water Analysis (Continued)

RPT Date: 2019-12-20			DUPLICATE			REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE				
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measure d Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: NA : Non applicable

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percentage of recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spike blank or CRM indicates that it is not required by the procedure.

The percentage of recovery of the CRM may be outside of the acceptability criteria of 80-120%, if conform to the criteria provided on the Certificate of Analysis of the reference material.

Certified By: _____



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Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis					
Sulphur - Total			INOR-181-6027	Modified from ASTM E1915-11	COMBUSTION
Mercury SPLP Leachate	2019-11-29	2019-11-29	MET-121-6107 & INOR-121-6036	modified from EPA 1312, EPA 245.1, SM 3112 B	CVAAS
Aluminum, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Antimony, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Arsenic, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Barium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Beryllium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Bismuth, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Boron, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Cadmium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Chromium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Cobalt, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Copper, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Iron, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Lead, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Lithium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Manganese, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Molybdenum, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Nickel, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Selenium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Silver, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Strontium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Thallium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Tin, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Uranium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Vanadium, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Zinc, SPLP Leachate	2019-11-28	2019-11-28	INOR-121-6036 and MET-121-6105	modified from EPA SW-846 1312 and SM 3125 and SM 3	ICP-MS
Antimony - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Arsenic - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Barium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Beryllium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Boron - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Cadmium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Chromium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Cobalt - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Copper - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Iron - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Lead - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Mercury - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP/MS
Nickel - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Selenium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Silver - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Thallium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Uranium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Vanadium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS
Zinc - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS



Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Zirconium - TCLP Leachate	2019-11-14	2019-11-14	MET-181-6102, LAB-181-4001	EPA 1311 and EPA 6020A	ICP-MS

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis					
Silver	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Arsenic	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Barium	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Boron	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Cadmium	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Chromium	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Cobalt	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Copper	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Manganese	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Mercury	2019-12-20	2019-12-20	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	VAPEUR FROIDE/AA
Molybdenum	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Nickel	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Lead	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Selenium	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Uranium	2019-12-16	2019-12-18	MET-101-6105F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
Zinc	2019-12-16	2019-12-18	INOR-101-6001F	MA.100-Lix.com.1.1, CTEU-9	ICP/MS
fluorides	2019-12-18	2019-12-18	INOR-101-6004F	SM 4500C 21ed 2005	CHROMATO IONIQUE
Nitrites - Nitrates	2019-12-18	2019-12-18	INOR-101-6004F	MA. 300 - Ions 1.3	CHROMATO IONIQUE
nitrites	2019-12-18	2019-12-18	INOR-101-6004F	MA. 300 - Ions 1.3	CHROMATO IONIQUE
Weight of Dry Sample	2019-11-20				ICP-MS
Volume of DI Water	2019-11-20				PH METER
Silver Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Boron Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Barium Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Chromium Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS

Method Summary

CLIENT NAME: TATA STEEL MINERALS CANADA LTD

AGAT WORK ORDER: 19M541514

PROJECT:

ATTENTION TO: Mariana Trindade

SAMPLED BY:

SAMPLING SITE: 5490 rue Raymond, Montréal

PARAMETER	DATE PREPARED	DATE ANALYZED	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Copper Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Iron Dissolved	2019-11-27	2019-11-27	ARD-181-18006, MET-181-6108	MEND Report 1.20.1 (2009), Modified from SM 3120 B	ICP/OES
Mercury Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Manganese Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Molybdenum Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Nickel Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Lead Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Selenium Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Tin Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Uranium Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Zinc Dissolved	2019-11-26	2019-11-26	ARD-181-18006, MET-181-6107	MEND Report 1.20.1 (2009), Modified from SM 3125 B	ICP-MS
Fluoride	2019-11-21	2019-11-21	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate-N	2019-11-21	2019-11-21	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite-N	2019-11-21	2019-11-21	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH



AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
webearth.agatlabs.com

Laboratory Use Only

Arrival Condition: Good Poor (complete notes)

AGAT WO#: _____

Received: _____

Notes:
19M 541514

Chain of Custody Record - ARD - Solids Extracts and Leachates

P: 778.452.4000 - F: 778.452.4074

Report To

Company: Tata Steel Minerals Canada

Contact: Mariana Trindade

Address: 1000 Rue Sherbrooke Ouest,
Montreal QC H3A 3G4

Phone: 514-764-6700 x795

Project Name: _____

Project #: _____

ARD Quote #: _____

ARD Project #: _____

Report Information

Name: Mariana Trindade Name: _____

Email: mariana.trindade@tatasteel.com Email: _____

Name: TSMC Environment Name: _____

Email: TSMCenvironment@tatasteel.com Email: _____

Storage Policy

Samples are stored for 60 days at no cost and then discarded. If longer storage is required, clients must inform AGAT Laboratories. Storage fees will apply.

TAT Required (Turnaround Time)

Regular Rush*

*Rush surcharges may apply

Report Format

Excel Format
 PDF Format
 Both

Invoice To

Same Yes / No

Company: _____

Contact: _____

Address: _____

Phone: _____ Fax: _____

PO#: 3000000296

SAMPLE ID	SAMPLE TYPE AND CONDITION	Modified ABA Package (Paste pH, Fizz test, NP & Total S)	Standard Sabek ABA Package (Paste pH, Fizz test, NP & Total S)	Siderite Corrected NP	Sulphate Sulphur- HCl Leach (sulphide sulphur by difference)	Sulphate Sulphur- Na ₂ CO ₃ Leach	Sulphate Sulphur- Gravimetric Method	Sulphur Spec. (Sulphate-S, Sulphide-S & Non-Extractable-S; ASTM 2492-02 method)	Total Carbon	Total Organic Carbon	Carbonate Carbon (CO ₂ , HCl method)	Surface Rinse pH on <2mm fraction (MEND method)	Crushed pH: <input type="checkbox"/> on Pulp (MEND method) <input type="checkbox"/> <1/4" fraction	Single Addition NAG: <input type="checkbox"/> Egi method <input type="checkbox"/> MEND method	NAG Extract Analysis	Trace Metals by Aqua Regia Digestion: <input type="checkbox"/> ICP-OES (201073) <input type="checkbox"/> ICP-MS (201074)	Total Metals by 4 Acid Digestion: <input type="checkbox"/> ICP-OES (201070) <input type="checkbox"/> ICP-MS (201071)	Whole Rock Analysis: <input type="checkbox"/> XRF (201676) <input type="checkbox"/> ICP-OES (201076)	Shakeflask Extraction (SFE, MEND method; water extraction)	Synthetic Precipitation Leaching Procedure (SPLP; US-EPA 1312 method; water extr.)	Meteoric Water Mobility Procedure (MWMP; EP 1990/STD Method; water extr.)	Mineralogy: Optical Microscopy on polished thin sections	Mineralogy: Rietveld XRD	Humidity Cell Testing by MEND Method	Humidity Cell Testing by ASTM Method	Particle Size Analysis (Dry Sieve Method using RO-TAP)	Particle Size Distribution (Wet Sieve Method using Hydrometer)	Custom Column Testing	Custom Sub-Aqueous Disposal (SAD) Column Testing				
<u>TSMC-70348</u>																																	
<u>TSMC-70349</u>																																	
<u>TSMC-70350</u>																																	
<u>TSMC-59851</u>																																	
<u>SEE INCLUDED ANALYSIS SHEET</u>																																	

Samples Relinquished by (print name & sign): Adam Cabot / [Signature]

Date/Time: 11/06/2019 13:00

Samples Received by (print name & sign): _____

Date/Time: _____

Special Instructions

For leachate analysis packages, please refer to page 2 for parameter selection

ACR 1645 7019

Courier

Print Name: 1-10.4

Date: _____

Page 1 of 1



AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
webearth.agatlabs.com

Laboratory Use Only

Arrival Condition: Good Poor (complete notes)

AGAT WO#: _____

Received: _____

Notes: _____

Chain of Custody Record - ARD - Solids Extracts and Leachates

P: 778.452.4000 - F: 778.452.4074

Report To
 Company: _____
 Contact: _____
 Address: _____
 Phone: _____ Fax: _____
 Project Name: _____
 Project #: _____
 ARD Quote #: _____
 ARD Project #: _____

Report Information
 Name: _____ Name: _____
 Email: _____ Email: _____
 Name: _____ Name: _____
 Email: _____ Email: _____

Storage Policy

Samples are stored for 60 days at no cost and then discarded. If longer storage is required, clients must inform AGAT Laboratories. Storage fees will apply.

TAT Required (Turnaround Time)

Regular Rush*

*Rush surcharges may apply

Report Format

Excel Format
 PDF Format
 Both

Invoice To Same Yes / No
 Company: _____
 Contact: _____
 Address: _____
 Phone: _____ Fax: _____
 PO#: _____

AGAT Analysis Method - Solid Samples

	pH	EC	ORP	Acidity	Alkalinity (total/speciation)	Sulphate	Turbidity	Chemical Oxygen Demand (COD)	Biochemical Oxygen Demand (BOD)	TDS	TSS	Nitrate	Nitrite	Nitrate + Nitrite as N (one result)	TKN	Nitrogen, Total	Ammonia, Total	Flouride	Chloride	Total Organic Carbon (TOC)	Total Cyanide (SAD)	WAD Cyanide	Oil and Grease (Total)	Oil and Grease (Mineral)	Total Metals by ICP-MS/ICP-OES Scans	Dissolved Metals by ICP-MS/ICP-OES Scan	Hg by CVAA method: <input type="checkbox"/> Total <input type="checkbox"/> Dissolved	Dissolved Oxygen		
On SFE extract (MEND method; water extraction)																														
On SPLP extract (US-EPA 1312 method; water extraction)																														
On MWMP extract (EP 1990/STD Method; water extraction)																														
On NAG extract (Egi/MEND Method; H ₂ O ₂ extraction)																														
On HCT leachates																														
On Column leachates (specific port)																														
On SAD Column leachates (surface top port)																														
On SAD Column leachates (solids bottom port)																														

EXTRACT AND LEACHATE ANALYSES REQUIRED

Notes: Total S, Total C and Total Organic C is done by combustion IR.

Samples Received by (print name & sign): _____	Date/Time: _____
Containers Received by (print name & sign): _____	Date/Time: _____

Special Instruction

Courier

Print Name: _____

Date: _____

Page of

TSMC ARD Analyses

Sample IDs TSMC-70348, TSMC-70349, TSMC 70350 and TSMC-59851

- % sulfur
- Essais statiques MABA (Modified Acid Base Accounting)
- Essai de lixiviation TCLP (Must be done following MA.100-Lix.com.1.1 method),
- Essai de lixiviation SPLP
- Essai de lixiviation CTEU-9
- metals: (Ag, As, Ba, Cd, Co, Cr, Cu, Fe, Sn, Mn, Hg, Mo, Ni, Pb, Se, Zn)
- Additional parameters : (B, U, total fluorides, Nitrites and Nitrates)

G. Letter from AGAT Laboratory



AGAT Laboratoires

9770, route Transcanadienne
St-Laurent, Québec
Canada H4S 1V9
T 514.337.1000
F 517.333.3046
www.agatlabs.com

Le 20-03-2020

Cher Client,

Avec la présente nous vous confirmons que nous n'arrivons pas à retracer les résultats faits en sous-traitance reliés au bon de travail 19M530388 reçu le 11 Octobre 2019.

Cette demande a été gérée par notre succursale d'Halifax et la personne en charge ne fait plus partie d'AGAT.

Nous avons tenté de trouver l'information chez notre sous-traitant mais il lui est impossible de retracer cette demande également.

Nous sommes donc navrés de vous informer que nous n'avons les résultats demandés.

Nous sommes désolés pour les inconvénients.

Merci pour votre compréhension et au plaisir de faire affaire avec vous.

David Ohayon

Ph.D Chemistry

Director – Laboratory Services – Quebec



July 18, 2019

Mariana Trindade, PhD
Corporate Environmental Manager
Tata Steel Minerals Canada Ltd
1000 Sherbrooke West, Suite 1120
Montreal, QC H3A 3G4

RE: Service Issues and Delayed Laboratory Results, May to July 2019

Ms. Trindade,

AGAT Laboratories Ltd (AGAT) was retained in May 2019 by Tata Steel Minerals Canada Ltd (TSMC) to perform analytical chemistry services related to compliance and operational monitoring in Schefferville, Quebec.

The scope of services included analysis of air, effluent, surface water, groundwater, and potable water for various organic and inorganic parameters related to compliance and operational requirements at the mine site. TSMC submitted samples to AGAT for 22 separate monitoring events dating back to May, of which, 17 remained outstanding as of July 18, 2019. TSMC has expressed concern that AGAT's service level and laboratory turnaround time are not meeting expectations. These issues have impacted TSMC's monitoring program schedules and regulatory obligations.

The intent of this letter is to provide TSMC an acknowledgement / explanation for the issues encountered over the last two months, as well as a description of the actions being taken to resolve the outstanding files and to ensure future files are serviced and reported in-line with expectations. Service-level issues include:

- 1) Delays in shipment of properly prepared bottle orders;
- 2) Delays in supply of required materials to facilitate monitoring programs;
- 3) Delays in response on various queries from TSMC;
- 4) Inadequate communication from AGAT to TSMC;
- 5) Delayed / missed results; and
- 6) No regulatory reporting of XML files to Newfoundland and Labrador regulator.

The issues are associated primarily with workload management and resource allocation in our Quebec operations. An unusually high volume of projects (significantly high) is ongoing during a time that is typically a reasonably slow period for the industry. It has resulted in a misalignment of capable resources relative to the demands and training levels on front-line staff, in particular, project management staff. Despite AGAT's best efforts to increase staff compliment, train new staff, and parachute senior resources into Quebec, the project management team is not yet fully equipped to manage the extensive backlog. As a result, there are significant delays in logging samples, preparing confirmations, reviewing confirmations, and issuing work orders to the laboratory and logistics staff (e.g., bottle orders). Furthermore, the support staff for project management are being trained and mentored during peak-season levels of backlog, but they are not proficient as of yet.



Effective immediately, AGAT has assigned Ms. Janetta Fraser, Client Services Manager in Atlantic Canada, to act as the project manager for all activities between TSMC and AGAT, from bottle orders through to reporting. Ms. Fraser will act as the liaison between TSMC and the laboratories in Quebec. She has extensive experience managing projects of this nature for mine operations in remote (fly-in) geographies such as northern Labrador and central Newfoundland. Ms. Fraser is well-versed on the regulatory requirements and routinely works with the regulators in Newfoundland and Labrador.

Ms. Fraser will be supported by Mr. Phil Morneau, Chief Science Director (resides in Quebec), to complete a detailed review of the current status of TSMC, while facilitating improved service levels moving forward, including but not limited to:

- All outstanding files will be expedited
- XML reports will be issued
- Chain of custody documentation will be customized to TSMC's specific monitoring programs
- TSMC parameter packages will be customized within AGAT's Laboratory Information Management System (LIMS) and Environmental Reporting System (ERS) to reflect the requirements of the monitoring programs, including regulatory detection limits
- And more...

We trust that the information presented herein is of sufficient detail to explain the issues and the impact to TSMC, while demonstrating that we have taken the necessary actions to address the deficiencies such that our delivery of services will meet your expectations as we approach the end of July.

If you have any questions regarding the information herein, please do not hesitate to contact me at any time.

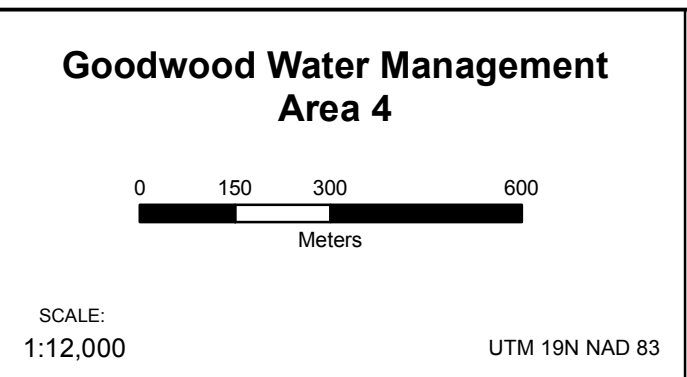
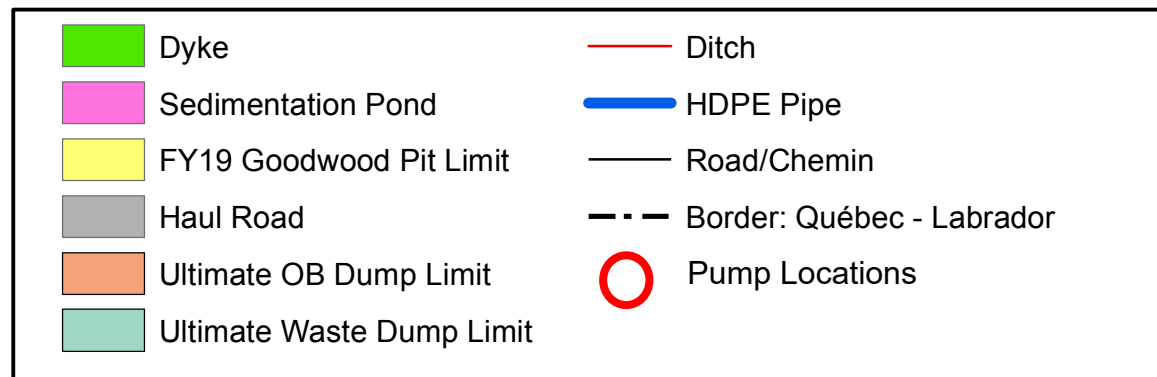
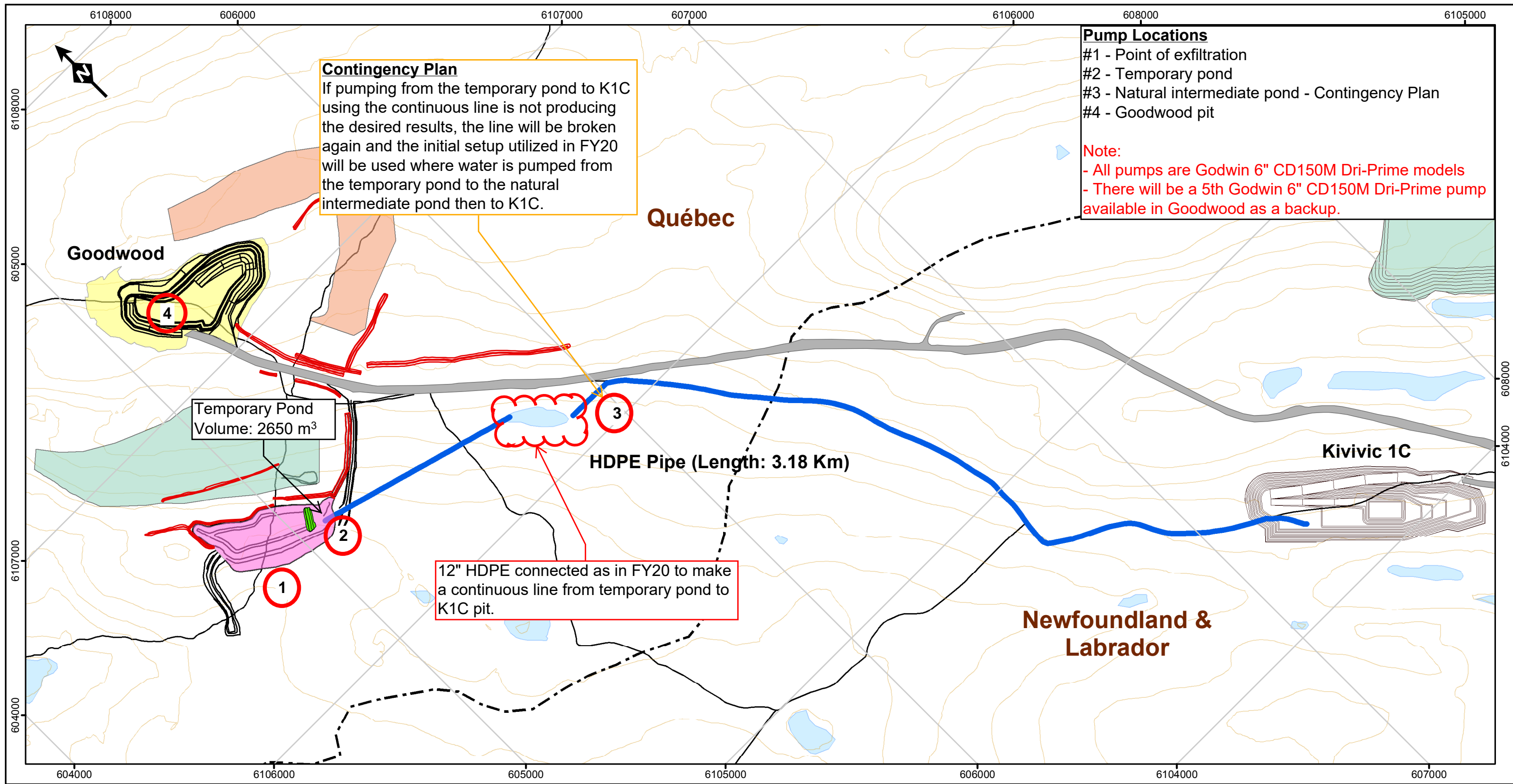
Sincerely,

A handwritten signature in blue ink, appearing to read 'S. Preston'.

Scott Preston
Vice President
Office: 902.468.8744
Mobile: 902.830.4635

Appendix III. Goodwood Basin

A. 2020 Wintering Plan



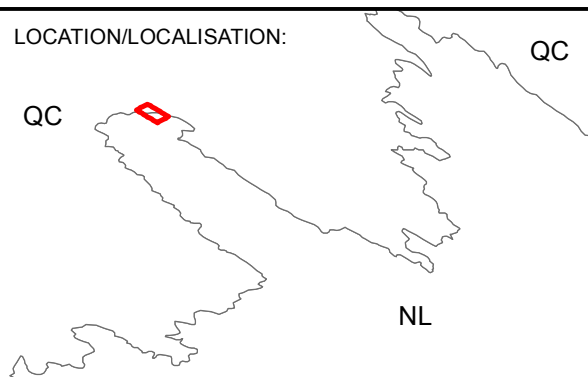
FILE, VERSION, DATE, AUTHOR/
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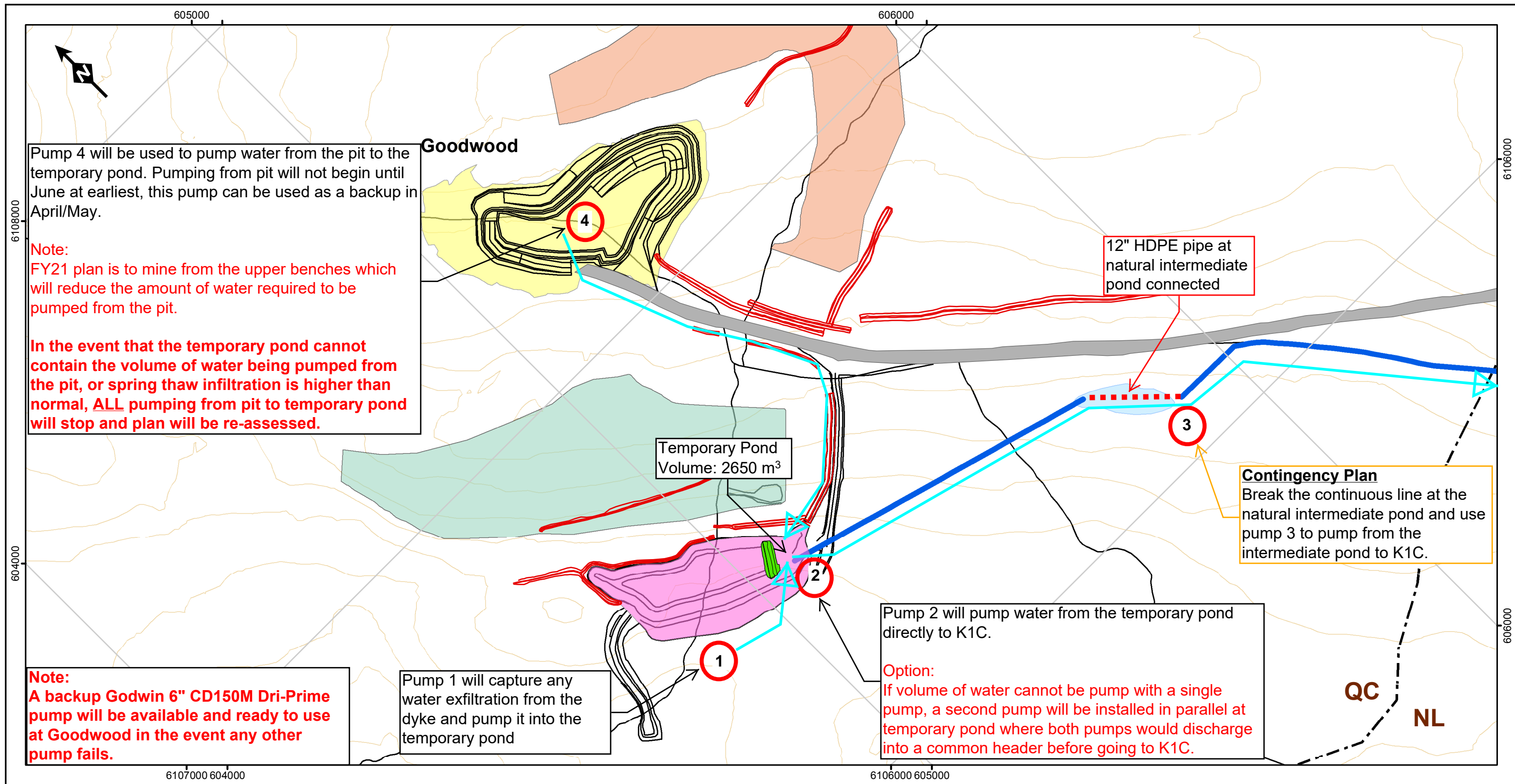
GIS-DEV-83 , 2019-03-18, E.F.

SOURCES:

TATA STEEL MINERALS CANADA

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Pump 4 will be used to pump water from the pit to the temporary pond. Pumping from pit will not begin until June at earliest, this pump can be used as a backup in April/May.

Note:
FY21 plan is to mine from the upper benches which will reduce the amount of water required to be pumped from the pit.

In the event that the temporary pond cannot contain the volume of water being pumped from the pit, or spring thaw infiltration is higher than normal, ALL pumping from pit to temporary pond will stop and plan will be re-assessed.

Note:
A backup Godwin 6" CD150M Dri-Prime pump will be available and ready to use at Goodwood in the event any other pump fails.

Pump 1 will capture any water exfiltration from the dyke and pump it into the temporary pond

Temporary Pond
Volume: 2650 m³

Pump 2 will pump water from the temporary pond directly to K1C.

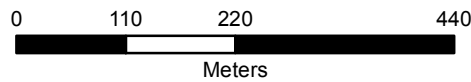
Option:
If volume of water cannot be pump with a single pump, a second pump will be installed in parallel at temporary pond where both pumps would discharge into a common header before going to K1C.

12" HDPE pipe at natural intermediate pond connected

Contingency Plan
Break the continuous line at the natural intermediate pond and use pump 3 to pump from the intermediate pond to K1C.

- Dyke
- Sedimentation Pond
- FY19 Goodwood Pit Limit
- Haul Road
- Ultimate OB Dump Limit
- Ultimate Waste Dump Limit
- Ditch
- HDPE Pipe
- Road/Chemin
- Border: Québec - Labrador

Goodwood Water Management Area 4



SCALE:
1:7,500

UTM 19N NAD 83

FILE, VERSION, DATE, AUTHOR/
FICHER, VERSION, DATE, AUTEUR:

GIS-DEV-83-01 , 2019-03-18, E.F.

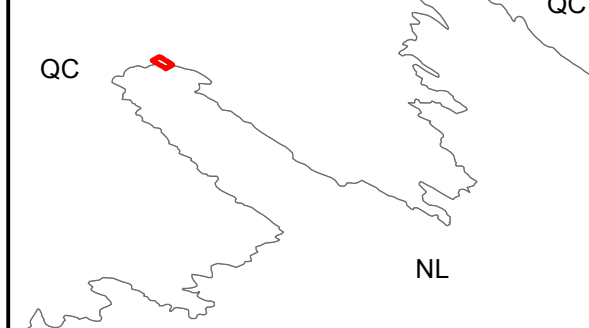
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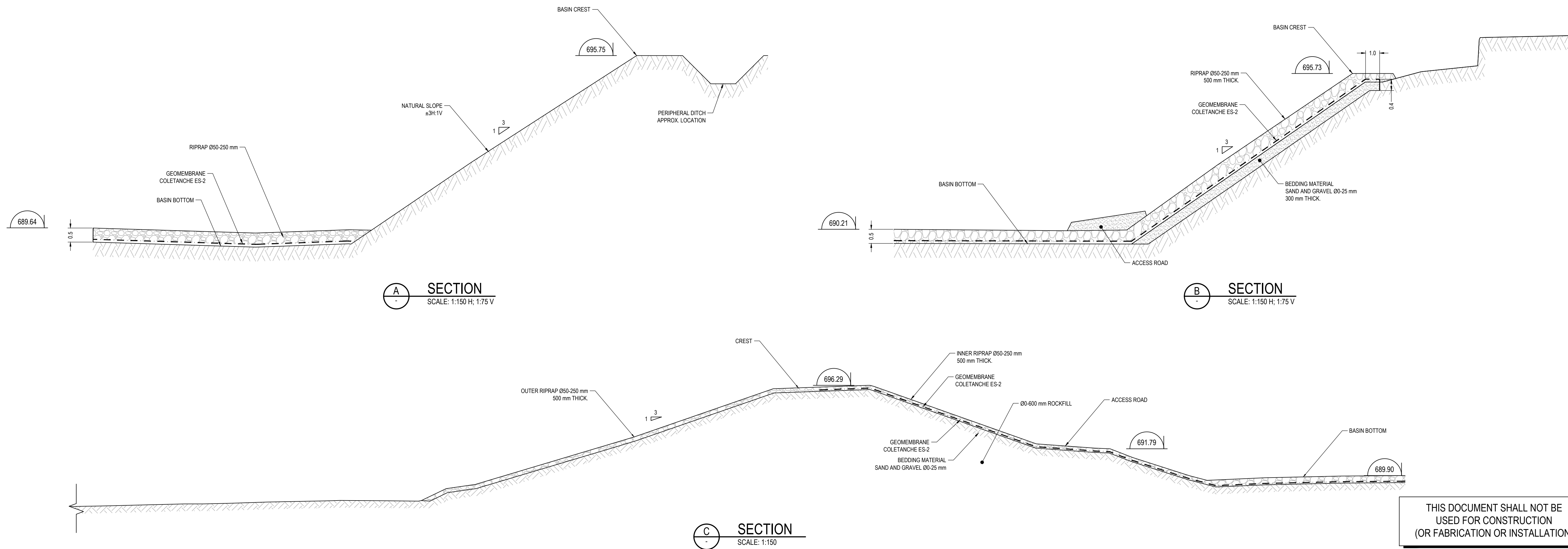
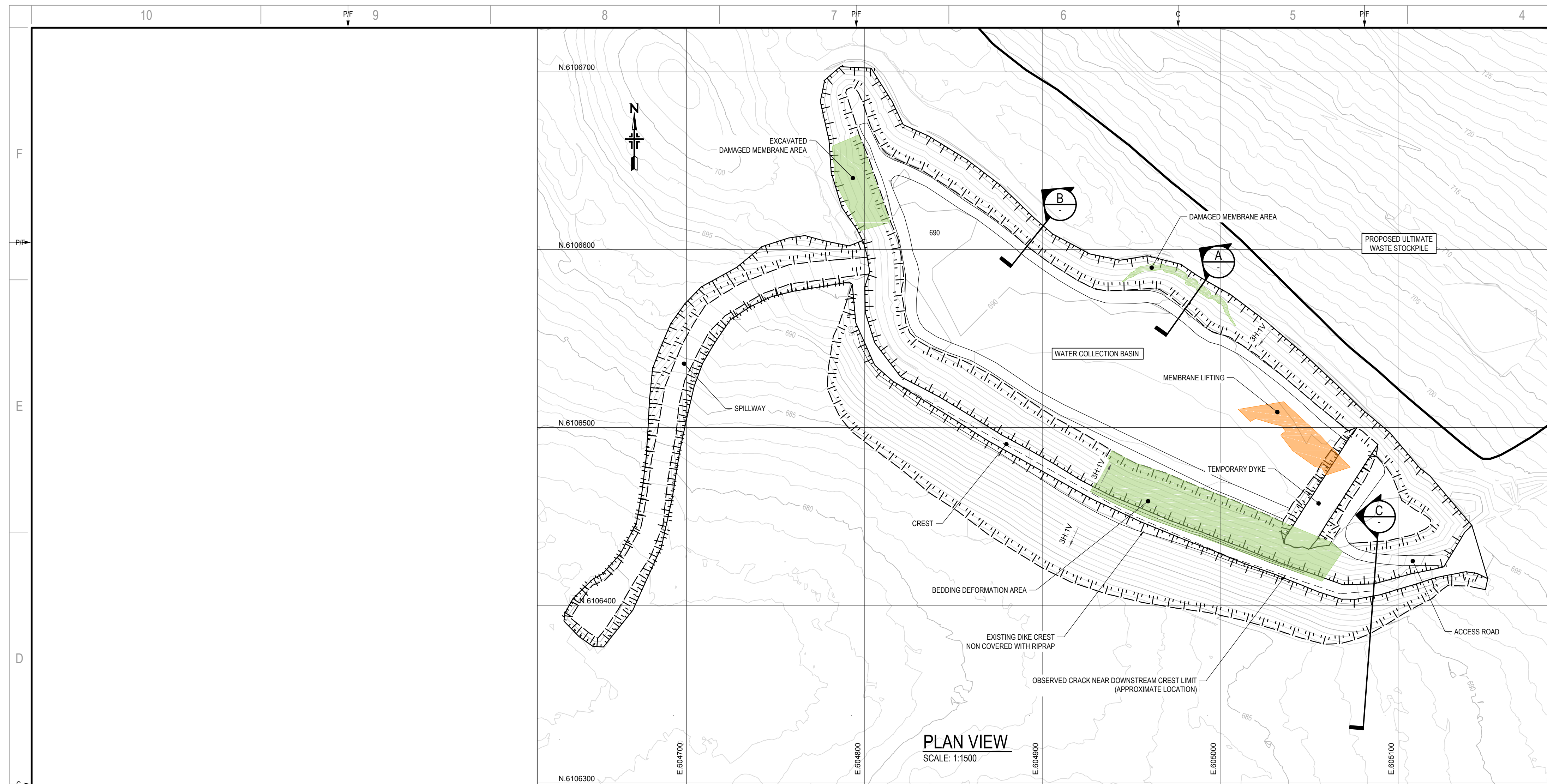
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LOCATION/LOCALISATION:



B. Basin Reparation Plans and Specifications



THIS DOCUMENT SHALL NOT BE USED FOR CONSTRUCTION (OR FABRICATION OR INSTALLATION)

REFERENCE: TERRAIN BASE EXTRACTED FROM MET-CHEM PROJECT, 2013. PRESENTED CONTOUR LINES ARE COMPOSED OF 2015 LIDAR DATA AND 1:20,000 TOPOGRAPHIC DATA EXTRACTION.

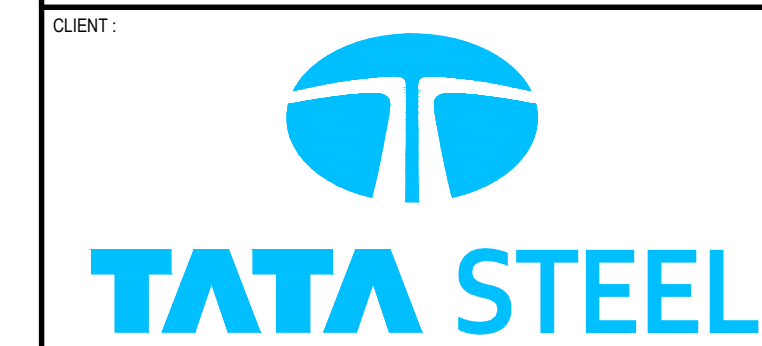


1135, BOULEVARD LEBOURGNEUF
QUEBEC (QUEBEC) CANADA G2K 0M5
TEL : 418 623-2254 | TELEG : 418 624-1657 | WWW.WSPGROUP.COM

CONSULTANT - SUB-CONSULTANT

SEAL:

CLIENT:



CLIENT REF. #

PROJECT:

**WATER MANAGEMENT
GOODWOOD AREA**

NOTES:
UNLESS SPECIFIED OTHERWISE, MEASURING UNITS ARE IN METERS.
QUEBEC PLANE COORDINATE SYSTEM (QPCS), GEODETIC REFERENCE SYSTEM NAD 83, CARTOGRAPHIC PROJECTION UNIVERSAL TRANSVERSE MERCATOR (UTM) ZONE 19, VERTICAL DATUM CGVD28.
PLAN ORDER IS NOT LINKED TO CONSTRUCTION SEQUENCE.

WARNING: THIS DRAWING IS THE INTELLECTUAL PROPERTY OF WSP. NO REVISION, REPRODUCTION OR ANY OTHER USE IS ALLOWED WITHOUT WRITTEN AUTHORIZATION FROM WSP. SURVEYS HAVE BEEN REALIZED BY CONTRACTOR (GREY ROCK MINING). WSP CANNOT GUARANTEE THE VALIDITY OR PRECISION OF THE SURVEYS.
DRAWING SCALE IS NOT TO BE MODIFIED.

ISSUED FOR - REVISION

IS.	RV.	DATE	INFORMATION	DESCRIPTION
A		2019-07-16	INFORMATION	

PROJECT NO.: 181-04013-03
ORIGINAL SCALE: As indicated
DESIGNED BY: Pierre-Olivier Maltais, ing. M. Sc.
DRAWN BY: Étienne Bilodeau
CHECKED BY: Louise Chaput, ing.

DATE: 2019-07-16

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

DISCIPLINE: **ENVIRONMENT**

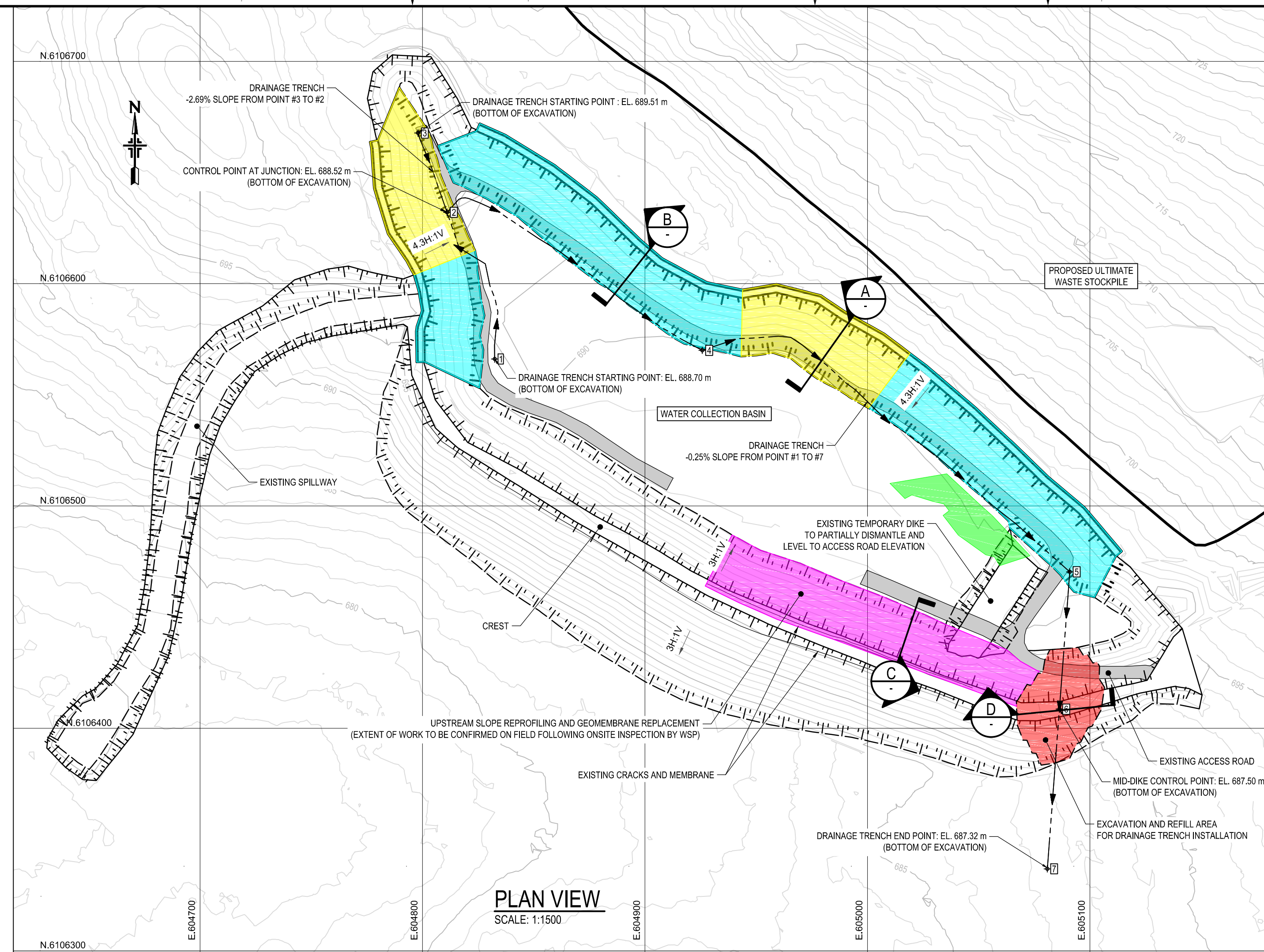
TITLE: **ACCUMULATION BASIN PERMANENT REPAIRS EXISTING CONDITIONS**

SHEET NUMBER: **181-04013-03-C-001**

SHEET # 01 OF 01

ISSUE: **INFORMATION**

DATE OF: 2019-07-16



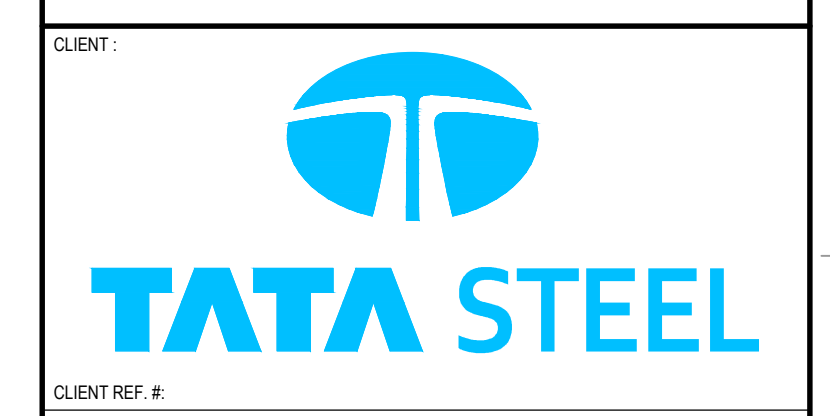
- LEGEND:**
- ZONE A - DAMAGED AREA
 - ZONE B - UNDAMAGED AREA TO BE REPAIRED
 - ZONE C - UPSTREAM DIKE REPROFILING AREA
 - MEMBRANE LIFTING AREA
 - EXCAVATION AND REFILL AREA
 - UNDAMAGED AREA

DRAINAGE EXCAVATION CONTROL POINTS			
NUMBER	X	Y	Z
1	604832.433±	6106566.119±	688.700±
2	604811.000±	6106632.097±	688.517±
3	604797.940±	6106667.764±	689.513±
4	604925.748±	6106570.005±	688.109±
5	605090.962±	6106470.392±	687.922±
6	605096.295±	6106408.629±	687.497±
7	605080.878±	6106336.799±	687.317±



CONSULTANT - SUB-CONSULTANT

SEAL:



CLIENT REF. #
PROJECT:
WATER MANAGEMENT GOODWOOD AREA

NOTES:
UNLESS SPECIFIED OTHERWISE, MEASURING UNITS ARE IN METERS.
QUEBEC PLANE COORDINATE SYSTEM (QPCS), GEODETIC REFERENCE SYSTEM NAD 83, CARTOGRAPHIC PROJECTION UNIVERSAL TRANSVERSE MERCATOR (UTM) ZONE 19, VERTICAL DATUM CGVD28.
PLAN ORDER IS NOT LINKED TO CONSTRUCTION SEQUENCE.

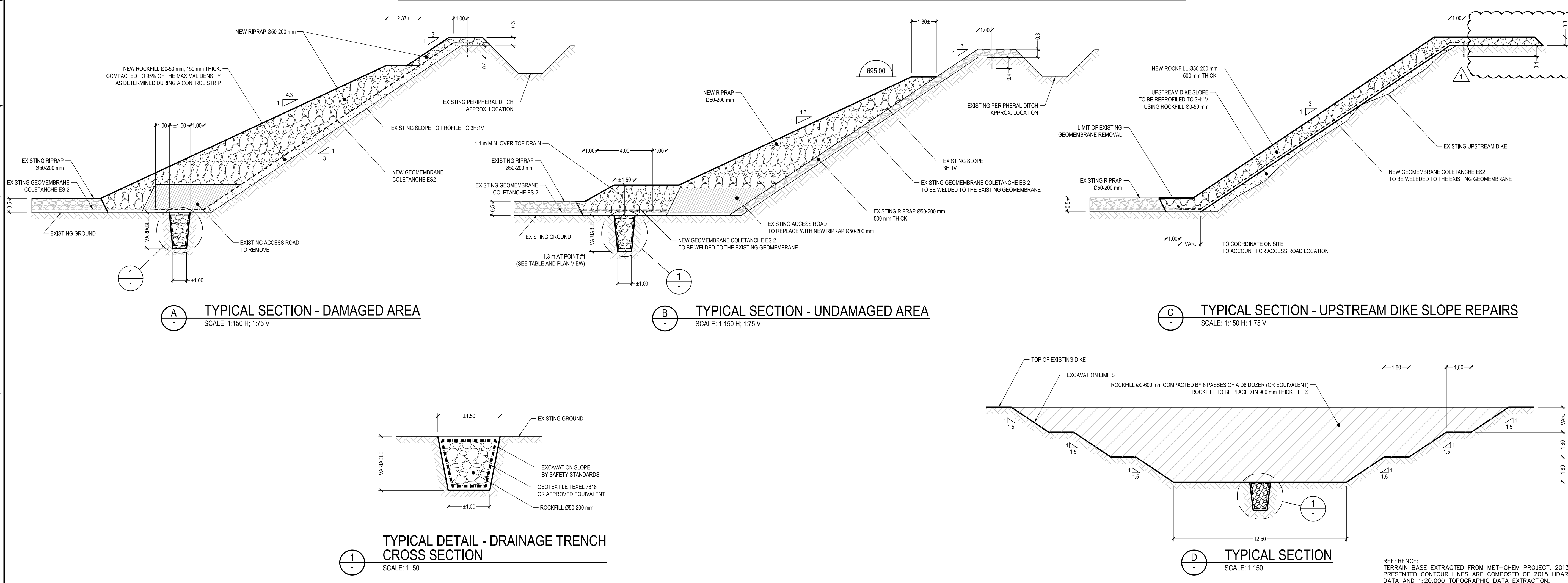
WARNING: THIS DRAWING IS THE INTELLECTUAL PROPERTY OF WSP. NO REVISION, REPRODUCTION OR ANY OTHER USE ARE ALLOWED WITHOUT WRITTEN AUTHORIZATION FROM WSP. SURVEYS HAVE BEEN REALIZED BY CONTRACTOR (GEO ROCK MINING). WSP CANNOT GUARANTEE THE VALIDITY OR PRECISION OF THE SURVEY'S DRAWING SCALE IS NOT TO BE MODIFIED.

ISSUED FOR - REVISION:


NO.	DATE	DESCRIPTION
1	2019-10-31	CONSTRUCTION
B	2019-09-13	CONSTRUCTION
A	2019-07-17	INFORMATION

PROJECT NO.: 181-04013-03
ORIGINAL SCALE: AS SHOWN
DESIGNED BY: PIERRE-OLIVIER MALTAIS, ing. M.Sc.
DRAWN BY: ETIENNE BILODEAU
CHECKED BY: LOUISE CHAPUT, ing.
DATE: 2019-07-17

DISCIPLINE: **ENVIRONMENT**
TITLE: **ACCUMULATION BASIN PERMANENT REPAIRS PROPOSED CONDITIONS**
SHEET NUMBER: **181-04013-03-C-002**
SHEET # 01 OF 01
ISSUE: **CONSTRUCTION**
DATE OF: 2019-10-31



REFERENCE: TERRAIN BASE EXTRACTED FROM MET-CHEM PROJECT, 2013. PRESENTED CONTOUR LINES ARE COMPOSED OF 2015 LIDAR DATA AND 1:20,000 TOPOGRAPHIC DATA EXTRACTION.

10	9	8	7	6	5	4	3	2	1																
<p>1. GENERAL NOTES</p> <p>1.1 THE PROPOSED DESIGN FOR THE ACCUMULATION BASIN REPAIRS SHALL BE APPROVED BY THE MINISTÈRE DE L'ENVIRONNEMENT ET DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES (MELCO), PRIOR TO CONSTRUCTION. TSMC IS RESPONSIBLE FOR THE REQUIRED STEP TO OBTAIN SUCH AUTHORIZATION AND SHALL PROVIDE THE CERTIFICATE TO THE ENGINEERS PRIOR TO CONSTRUCTION.</p> <p>1.2 WATER AT THE END OF THE DRAINAGE TRENCH SHALL BE MONITORED TO ENSURE IT MEETS ALL MELCC REQUIREMENTS FOR DISCHARGE INTO THE ENVIRONMENT. TSMC IS RESPONSIBLE FOR THIS MONITORING.</p> <p>1.3 ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH LOCAL MUNICIPAL STANDARDS AND SPECIFICATIONS, WITH THE LATEST EDITION OF THE MUNICIPAL CONSTRUCTION DOCUMENTS AND PROJECT SPECIFICATIONS. IN CASE OF DISCREPANCIES, THE MORE STRINGENT SHALL APPLY.</p> <p>1.4 ALL WORKS SHALL BE PERFORMED IN ACCORDANCE WITH REGIONAL ENVIRONMENTAL LAWS AND REGULATIONS.</p> <p>1.5 CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS REQUIRED TO PERFORM THE WORKS AND COMPLYING WITH ALL PERMIT REQUIREMENTS AND CONDITIONS.</p> <p>1.6 ALL ELEVATIONS ARE IN METRIC AND GEODETIC UNITS.</p> <p>1.7 DO NOT SUBSTITUTE MATERIALS UNLESS PRIOR WRITTEN APPROVAL IS GIVEN BY THE ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH REVIEWING ANY PROPOSED MATERIAL SUBSTITUTION.</p> <p>1.8 CONTRACTOR SHALL DESIGN, INSTALL AND MAINTAIN ADEQUATE TEMPORARY BRACING AND SHORING OF ALL STRUCTURAL ELEMENTS FOR STABILITY AND SAFETY WHERE REQUIRED DURING CONSTRUCTION.</p> <p>1.9 CONTRACTOR SHALL BE RESPONSIBLE FOR TRAFFIC CONTROL AND SAFETY MEASURES DURING THE WORKS. CONTRACTOR SHALL PROPOSE SAFE METHOD (SUCH AS TRENCH BOX) TO ENSURE SAFETY OF THE WORKERS DURING THE DRAINAGE TRENCH CONSTRUCTION.</p> <p>1.10 IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BECOME FAMILIAR WITH AND UNDERSTAND THE NATURE AND EXTENT OF THE WORKS TO BE EXECUTED, THE NATURE OF THE SOIL, SURFACE WATER DRAINAGE, THE GENERAL FORM OF THE SURFACE OF THE GROUND, AND ALL MATTERS WHICH CAN IN ANY WAY INFLUENCE THE WORKS.</p> <p>1.11 CONTRACTOR IS RESPONSIBLE FOR REINSTATING ALL DISTURBED AREAS OUTSIDE OF THE LIMITS OF CONSTRUCTION TO PRE-CONSTRUCTION OR BETTER CONDITIONS.</p> <p>1.12 ALL EXISTING SURFICIAL TOPSOIL, DELETERIOUS FILL MATERIALS AND WEAKENED OR/AND DISTURBED SOIL WITHIN THE LIMITS OF THE CONSTRUCTION SITE SHALL BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH LOCAL, PROVINCIAL (QUEBEC), AND FEDERAL REGULATIONS.</p> <p>1.13 ALL SPECIFICATIONS SHOWN IN THE CONTRACT DOCUMENTS AND SPECIFICATIONS BOOK FOR THIS PROJECT SHALL BE CONSIDERED SUPPLEMENTAL TO THE SPECIFICATIONS SHOWN ON THE ENGINEERING DRAWINGS. IN CASE OF DISCREPANCIES, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.</p> <p>1.14 THE SCALE SHOWN ON THE DRAWINGS APPLIES ONLY TO THE FULL-SIZE PLANS AND NOT REDUCED-SIZE PLANS. DO NOT SCALE PLANS FOR CONSTRUCTION DIMENSIONS.</p> <p>1.15 ALL ITEMS SHALL INCLUDE ALL THE NECESSARY MATERIALS AND LABOUR TO COMPLETE THE ITEM IN PLACE. MATERIALS AND LABOUR NOT SPECIFICALLY IDENTIFIED SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING HIS ACTIVITIES WITH OTHERS WHO WILL BE WORKING IN THE SAME AREA.</p> <p>1.16 A COPY OF THE PROJECT'S ENVIRONMENTAL PROTECTION PLAN SHALL ALWAYS BE KEPT ON-SITE BY THE CONTRACTOR.</p> <p>2. PRODUCTS</p> <p>2.1 ROCKFILL PRODUCTS</p> <p>2.1.1 PRODUCTS SHALL COME FROM BLASTED HIGH STRENGTH ROCK, SOURCE TO BE APPROVED BY THE ENGINEER.</p> <p>2.1.2 ROCKFILL & RIPRAP SHALL CONSIST OF UNWEATHERED ROCK, AND SHALL BE STRONG, HARD, DENSE, DURABLE, FREE FROM CRACKS AND SEAMS, RESISTANT TO ABRASION, NOT SUBJECT TO FREEZE-THAW DEGRADATION, FREE OR ORGANIC, SNOW, ICE, FROZEN PARTICLES OR OTHER DELETERIOUS MATERIAL.</p> <p>2.1.3 THE ROCK USED TO PRODUCE THE ROCKFILL & RIPRAP SHALL MEET THE FOLLOWING REQUIREMENTS:</p> <ol style="list-style-type: none"> MINIMUM DENSITY: 2.6 g/cm³ MAXIMUM ABSORPTION: 1.5% ARTIFICIAL GELATION (5-CYCLE MGS04): MAXIMUM LOSS OF 20% DURABILITY OF MATERIALS MUST MEET THE LATEST VERSION OF BNQ 2560-114 STANDARD <p>2.1.4 ROCK NATURE AND QUALITATIVE DESCRIPTION, PERFORMED BY A SPECIALIZED GEOLOGIST, SHALL BE GIVEN TO THE ENGINEER PRIOR TO CONSTRUCTION IN ORDER TO APPROVE THE SOURCE OF THE ROCKFILL.</p> <p>2.1.5 ROCKFILL SHALL COME FROM AN AUTHORIZED AGGREGATE SOURCE. CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER, PRIOR TO THE WORK, THAT THE SOURCE PRODUCE ROCKFILL THAT MEETS THE REQUIREMENTS IS LISTED IN THESE SPECIFICATIONS.</p> <p>2.1.6 ROCKFILL Ø50-200 mm</p> <p>2.1.6.1 ROCKFILL Ø50-200 mm SHALL CONSIST OF WELL-GRADED MATERIAL WITH A MINIMAL PARTICLE DIMENSION (DMIN) OF 50 mm, A MAXIMAL PARTICLE DIMENSION (DMAX) OF 200 mm, AND A PARTICLE SIZE AT 50% PASSING (D50) OF 75 mm</p> <p>2.1.6.2 ROCKFILL Ø50-200 mm SHALL GENERALLY BE CUBIC IN SHAPE. THE LARGEST DIMENSION OF INDIVIDUAL PIECES SHALL NOT BE GREATER THAN TWICE THE SHORTEST DIMENSIONS. LONG AND FLAT STONES SHALL NOT BE USED.</p> <p>2.1.7 ROCKFILL Ø0-50 mm</p> <p>2.1.7.1 ROCKFILL Ø0-50 mm SHALL CONSIST OF COMPACTABLE AND WELL-GRADED MATERIAL, WITH MAXIMUM PARTICLE SIZE OF 50 mm AND PARTICLE SIZE AT 50% PASSING (D50) OF 25 mm.</p> <p>2.1.7.2 ROCKFILL Ø0-50 mm SHALL BE NON-SUSCEPTIBLE TO FREEZING EFFECT AND HAVE NO MORE THAN 5% PASSING THE 0.075 mm SIEVE.</p> <p>2.1.8 ROCKFILL Ø0-600 mm</p> <p>2.1.8.1 ROCKFILL Ø0-600 mm SHALL CONSIST OF COMPACTABLE AND WELL-GRADED MATERIAL, WITH MAXIMUM PARTICLE SIZE OF 600 mm AND PARTICLE SIZE AT 50% PASSING (D50) OF 300 mm.</p> <p>2.1.8.2 ROCKFILL Ø0-600 mm SHALL BE NON-SUSCEPTIBLE TO FREEZING EFFECT AND HAVE NO MORE THAN 5% PASSING THE 0.075 mm SIEVE.</p> <p>2.1.8.3 THE Ø0-600 mm ROCKFILL SHALL BE A GRANULAR MATERIAL COMPOSED OF NATURALLY FORMED DEPOSITS OF SAND, GRAVEL AND COBBLES. THE MATERIAL SHALL BE FREE OF ICE, SNOW, DEBRIS ROOTS, ETC.</p> <p>2.1.9 ANY SIGNIFICANT CONCENTRATION OF MATERIAL THAT DOES NOT MEET THE SPECIFIC REQUIREMENTS OF THESE SPECIFICATIONS MUST BE REMOVED AND TRANSPORTED TO DISPOSAL AREAS OR MIXED WITH OTHER MATERIALS TO PRODUCE A MATERIAL THAT MEETS THE SPECIFICATIONS.</p> <p>2.2 GEOSYNTHETICS</p> <p>2.2.1 GEOTEXTILE FIBER OR YARN SHALL, AT LEAST, BE COMPOSED OF 100% BY MASS OF POLYPROPYLENE, POLYETHYLENE, OR OTHER SYNTHETIC POLYMERS, EXCLUDING POLYAMIDES.</p> <p>2.2.2 GEOTEXTILES SHALL CONTAIN STABILIZERS OR INHIBITORS TO ENSURE THE FILAMENTS' RESISTANCE TO DETERIORATION BY EXCESSIVE ULTRAVIOLET (UV) LIGHT AND HEAT EXPOSURE. GEOTEXTILES SHALL BE RESISTANT TO ACID AND ALKALI ACTION AND SHALL BE UNAFFECTED BY MICRO-ORGANISMS AND INSECTS.</p> <p>2.2.3 THE FOLLOWING PRODUCTS ARE REQUIRED FOR THE PROJECT AND SHALL MEET THE FOLLOWING REQUIREMENTS:</p> <ol style="list-style-type: none"> COLETANÇHE ES-2 BITUMINOUS GEOMEMBRANE OR EQUIVALENT APPROVED BY THE ENGINEER. TEXEL 7618 GEOTEXTILE OR EQUIVALENT APPROVED BY THE ENGINEER. <p>3. EXECUTION</p> <p>3.1 GENERAL</p> <p>3.1.1 IF GEOLOGICAL OR GEOTECHNICAL CONDITIONS ON-SITE SHOW A DIFFERENT MATERIAL THAN CAN BE FOUND ON THE DRAWINGS UNDER THE PROPOSED AND PLANNED WORKS, THE ENGINEER MUST BE CONTACTED TO VALIDATE THE DESIGN.</p> <p>3.1.2 THE CONTRACTOR IS FULLY RESPONSIBLE FOR HIS CONSTRUCTION METHODS AND WORK SEQUENCES. THE CONSTRUCTION METHODS AND SEQUENCES SHALL ENSURE THE EXCAVATED SLOPE AND FILL MATERIALS' STABILITY AND SAFETY OF ALL WORKERS.</p> <p>3.1.3 THE FOUNDATION SHALL BE APPROVED BY THE ENGINEER OR AN ACCREDITED LABORATORY.</p> <p>3.1.4 REMOVE ANY DELETERIOUS MATERIALS FROM EXCAVATION. ENSURE FROST PROTECTION OF FOUNDATION SOILS PRIOR TO FILLING WORKS. ACCEPTABLE NATIVE SOILS SHALL BE FREE OF ICE, SNOW, DEBRIS ROOTS, ETC. PRIOR TO FILLING OPERATIONS.</p> <p>3.1.5 50-200 mm DIAMETER RIPRAP SHALL BE PLACED FROM THE BOTTOM OF THE SLOPE TO THE TOP.</p> <p>3.2 PROPOSED CONSTRUCTION SEQUENCE</p> <p>3.2.1 THE FOLLOWING CONSTRUCTION SEQUENCE IS FOR COORDINATION PURPOSES ONLY. THE CONTRACTOR REMAINS RESPONSIBLE FOR THE METHODOLOGY, CONSTRUCTION SEQUENCE AND SAFETY OF WORKERS ON SITE. CONSTRUCTION SEQUENCE AND DETAILED METHODOLOGY TO PROVIDE TO THE ENGINEER FOR APPROVAL, PRIOR TO WORK.</p> <ol style="list-style-type: none"> TOE DRAIN CONSTRUCTION <ol style="list-style-type: none"> ALIGN THE CENTRE OF THE PROPOSED TOE DRAIN WITH RESPECT TO 'UNDAMAGED' AREAS AND 'DAMAGED' AREAS TYPICAL SECTION. SPECIAL ATTENTION SHALL BE PAID TO THE TOE DRAIN POSITION AT 'UNDAMAGED' AREAS TO ENSURE A LENGTH OF 1 m OF EXISTING GEOMEMBRANE CAN BE EXPOSED, ON BOTH SIDES OF THE PROPOSED 4 m WIDE PANEL OF GEOMEMBRANE TO BE REMOVED. THE TOE DRAIN SHOULD BE CENTERED ON THIS 4 m WIDE SECTION TO EASE THE TOE DRAIN EXCAVATION. REMOVE THE EXISTING RIPRAP TO EXPOSE THE EXISTING GEOMEMBRANE, ACCORDING TO THE TOE DRAIN ALIGNMENT. CUT AND REMOVE THE GEOMEMBRANE TO EXPOSE A 4 m WIDE STRIP OF NATURAL SOIL WITH THE TOE DRAIN CENTERED ON IT. PROCEED TO THE DIKE EXCAVATION, AS PER DRAWINGS AND SPECIFICATIONS. PROCEED TO THE TOE DRAIN EXCAVATION BY LIMITING THE LENGTH OF OPEN TRENCH TO 5 m. THE PROPOSED STEPS ARE: <ol style="list-style-type: none"> PROCEED TO TOE DRAIN EXCAVATION STARTING FROM THE WEST PART OF THE BASIN (HIGHEST POINT OF THE TOE DRAIN). MAKE SURE TO SLOPE THE BOTTOM OF THE EXCAVATION TO COMPLY WITH THE DESIGNED SLOPE AND FLOW DIRECTION. TRUCK TRAFFIC TO BE LIMITED TO EXISTING ACCESS ROAD. PLACE THE GEOTEXTILE ABOVE THE EXCAVATION. GENTLY PLACE THE DRAINAGE STONE ON THE GEOTEXTILE TO FILL THE TOE DRAIN. MAKE SURE THE GEOTEXTILE OVERLAP LENGTH REQUIREMENTS ARE ALWAYS COMPLIED WITH. CLOSE THE GEOTEXTILE ON TOP ACCORDING TO THE OVERLAP SPECIFIED IN SECTION 3.5.5. FINISH LEVELING THE GROUND BY USING DRAINAGE STONES. PROCEED TO THE RECONSTRUCTION OF THE EXCAVATED PART OF THE DIKE, INCLUDING THE ACCESS RAMP TO THE BOTTOM OF THE BASIN AS PER DRAWINGS & SPECIFICATIONS. UPSTREAM SLOPE OF THE DIKE REHABILITATION <ol style="list-style-type: none"> INSPECTION AND DETERMINATION, WITH THE ENGINEER, OF THE LIMIT FOR THE REPAIRATION OF THE DIKE UPSTREAM SLOPE REPAIRATION. REMOVAL OF THE EXISTING RIPRAP ALONG UNTIL THE LIMIT OF WORK DETERMINED DURING THE INSPECTION. REMOVAL OF THE EXPOSED GEOMEMBRANE, INCLUDING A 1.5 m WIDTH AT THE BOTTOM OF THE SLOPE TO AVOID A SEAM AT THE BOTTOM OF THE SLOPE. REPAIRING OF THE EXISTING SLOPE TO 30° WITH THE BEDDING MATERIAL (CONTRACTOR SHALL ALSO REPROFILE THE BEDDING (AS NEEDED) USING A RAKE OR OTHER TOOL, UNDER THE EXISTING GEOMEMBRANE TO BE OVERLAPPED WITH THE NEW ONE TO ENSURE A SMOOTH SURFACE UNDER THE PANELS TO BE WELDED. <p>3.3 GEOMEMBRANE REPAIRS</p> <ol style="list-style-type: none"> AT EVERY PLACE TO BE REPAIRED, CAREFULLY REMOVE THE RIPRAP TO EXPOSE 1 m OF THE EXISTING GEOMEMBRANE. PREPARE THE BEDDING SURFACE OF 'DAMAGED' AREAS AS PER DRAWINGS AND SPECIFICATIONS REQUIREMENTS. CONTRACTOR SHALL ALSO REPROFILE THE BEDDING (AS NEEDED) USING A RAKE OR OTHER TOOL UNDER THE EXISTING GEOMEMBRANE TO BE OVERLAPPED WITH THE NEW ONE TO ENSURE A SMOOTH SURFACE UNDER THE PANELS TO BE WELDED. ON THE EXISTING GEOMEMBRANE, PERFORM THE CUTS AND REPAIRS AS PER DRAWINGS AND SPECIFICATIONS. PROCEED TO THE GEOMEMBRANE REPAIRS AS PER THE DRAWINGS AND GEOMEMBRANE MANUFACTURER'S RECOMMENDATIONS. FOLLOW THE QUALITY INSURANCE PROGRAM OF THE GEOMEMBRANE MANUFACTURER/INSTALLER. <p>4. RIPRAP PROTECTION AND STABILIZATION</p> <ol style="list-style-type: none"> PROCEED TO THE RIPRAP PLACEMENT, AS PER DRAWINGS AND SPECIFICATIONS. <p>3.3 EXCAVATION</p> <p>3.3.1 ALL NECESSARY EXCAVATIONS SHALL BE KEPT Dewatered DURING CONSTRUCTION OPERATIONS UNTIL BACKFILL IS IN PLACE. CONTRACTOR SHALL PROVIDE THE Dewatering METHOD TO THE ENGINEER FOR APPROVAL.</p> <p>3.3.2 DISPOSE OF EARTH REMOVED IN SHAPING THE SUBGRADE. GRUBBING STOCKPILE AREAS SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE BEGINNING OF THE WORK.</p> <p>3.3.3 ALL THE PROPERTY SHALL BE RESTORED TO EQUAL OR BETTER CONDITIONS THAN THE EXISTING CONDITIONS BEFORE THE CONSTRUCTION BEGAN.</p> <p>3.4 ROCKFILL MATERIAL</p> <p>3.4.1 FILL MATERIALS SHALL BE OBTAINED FROM SOURCES APPROVED BY THE ENGINEER.</p> <p>3.4.2 THE Ø50-200 mm RIPRAP SHALL BE PLACED FROM BOTTOM TO TOP. NO COMPACTION IS REQUIRED, BUT THE CONTRACTOR SHALL PLACE THE MATERIAL IN A WAY THAT IS STABLE AND WELL-IMBRICATED, ONE ROCK INTO ANOTHER.</p> <p>3.4.3 THE Ø0-50 mm BEDDING MATERIAL WILL REQUIRE A HIGH LEVEL OF COMPACTION, UP TO 95% OF THE MAXIMAL MATERIAL DENSITY, HAS DETERMINED DURING A FIELD CONTROL STRIP. THIS CONTROL STRIP SHALL BE REALIZED AS SOON AS THE MATERIAL AND COMPACTION MACHINERY ARE IDENTIFIED. THE CONTROL STRIP WILL ALLOW TO DETERMINE THE NUMBER OF PASSES REQUIRED BY A SPECIFIC MACHINERY TO OBTAIN THE REQUIRED COMPACTION LEVEL. THE NATURAL WATER CONTENT OF THE MATERIAL DURING THE CONTROL STRIP SHALL BE AROUND 4% (± 1%) (WETTING OF THE MATERIAL MAY BE REQUIRED).</p> <p>3.4.4 THE Ø0-600 mm MATERIAL USED FOR DAM RECONSTRUCTION WILL REQUIRE A HIGH LEVEL OF COMPACTION, UP TO 95% OF THE MAXIMAL MATERIAL DENSITY, AS DETERMINED DURING A FIELD CONTROL STRIP. THIS CONTROL STRIP SHALL BE REALIZED AS SOON AS THE MATERIAL AND COMPACTION MACHINERY ARE IDENTIFIED. THE CONTROL STRIP WILL ALLOW TO DETERMINE THE NUMBER OF PASSES REQUIRED BY A SPECIFIC MACHINERY TO OBTAIN THE REQUIRED COMPACTION LEVEL. THE NATURAL WATER CONTENT OF THE MATERIAL DURING THE CONTROL STRIP SHALL BE AROUND 4% (± 1%) (WETTING OF THE MATERIAL MAY BE REQUIRED). Ø0-600 mm TO BE PLACED BY 900 mm LIFT THICKNESS.</p> <p>3.5 GEOSYNTHETICS</p> <p>3.5.1 GEOSYNTHETICS REQUIRED FOR THE ACCUMULATION BASIN REPAIRS SHALL BE APPROVED BY THE ENGINEER BEFORE THEIR INSTALLATION.</p> <p>3.5.2 BEDDING PREPARATION OF GEOMEMBRANE SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE GEOMEMBRANE INSTALLATION.</p> <p>3.5.3 THE GEOSYNTHETICS SHALL BE VISUALLY INSPECTED FOR IMPERFECTIONS DURING DEPLOYMENT AND FAULTY OR DUBIOUS AREAS SHALL BE MARKED.</p> <p>3.5.4 DEPLOYMENT OF GEOSYNTHETICS PANELS SHALL BE PERFORMED IN A MANNER THAT COMPLIES WITH SITE-SPECIFIC CONSTRAINTS.</p> <p>3.5.5 IN THE TOE DRAIN, 1000 mm OVERLAPS BETWEEN GEOTEXTILE PANELS ARE REQUIRED FOR THE PROJECT. THE OVERLAP MUST BE IN THE DIRECTION OF THE FLOW (THE DOWNSTREAM PANEL BELOW THE UPSTREAM PANEL).</p> <p>3.5.6 THE GEOSYNTHETICS MANUFACTURER'S SPECIFICATIONS (FOR STORAGE, TRANSPORTATION AND INSTALLATION) AND QUALITY CONTROL PROGRAM SHALL BE FOLLOWED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEERS FOR APPROVAL, PRIOR TO THE WORKS.</p> <p>3.5.7 NO TRANSVERSAL JOINT TO A SLOPE IS ALLOWED AS PART OF THE PROJECT.</p> <p>3.5.8 REPAIR PROCEDURES</p> <p>3.5.8.1 REMOVE DAMAGED GEOTEXTILE AND REPLACE WITH ACCEPTABLE GEOSYNTHETICS MATERIALS IF DAMAGE CANNOT BE SATISFACTORILY REPAIRED BY USING A PIECE OF GEOTEXTILE EXCEEDING 500 mm IN ANY DIRECTION OF DAMAGED AREA.</p> <p>3.5.8.2 THE INSTALLER SHALL BE RESPONSIBLE FOR THE REPAIR OF DEFECTIVE AREAS.</p> <p>3.5.9 THE QUALITY CONTROL PROGRAM, FILLED BY THE CONTRACTOR, SHALL BE GIVEN TO THE ENGINEER AFTER THE WORK.</p> <p>4. TEMPORARY WORKS</p> <p>4.1 TRENCHING</p> <p>4.1.1 THE CONTRACTOR IS RESPONSIBLE FOR PROPOSING A TRENCHING TECHNIQUE AND METHODOLOGY THAT WILL ENSURE SAFETY OF ALL WORKERS. THE CONTRACTOR SHALL PRESENT TO THE ENGINEER, FOR APPROVAL, THE CONSTRUCTION SEQUENCE AND DETAILED METHODOLOGY.</p> <p>4.2 TEMPORARY ACCESS ROAD</p> <p>4.2.1 THE CONTRACTOR SHALL ENSURE THE INTEGRITY OF THE EXISTING GEOMEMBRANE. THEREFORE, TEMPORARY ACCESS ROADS MAY BE REQUIRED TO ALLOW TRAFFIC OF MACHINERY. ANY TRAFFIC SHALL BE REALIZED WHERE THERE IS AT LEAST 1.5 m OF MATERIAL ON THE GEOMEMBRANE. A 150 mm LAYER OF BEDDING MATERIAL (Ø0-50 mm ROCKFILL) SHALL BE PLACED DIRECTLY ON THE GEOMEMBRANE WHERE THE CONTRACTOR PLANS ON BUILDING A 1.5 m THICK TEMPORARY ACCESS USING RIPRAP MATERIAL TO AVOID GEOMEMBRANE PUNCTURE. THE CONTRACTOR SHALL PRESENT TO THE ENGINEER, FOR APPROVAL, THE CONSTRUCTION SEQUENCE AND DETAILED METHODOLOGY.</p> <p>4.3 TEMPORARY CONTROL OF DRAINAGE WATER FROM DITCH #2</p> <p>4.3.1 THE CONTRACTOR IS RESPONSIBLE FOR PROPOSING A METHOD TO CONTROL THE DRAINAGE WATER THAT MAY COME FROM GOODWOOD SITE USING DITCH #2. THIS METHOD WILL HAVE TO BE IN PLACE PRIOR TO THE DIKE EXCAVATION TO AVOID ANY SPILL OF CONTAMINATED WATER IN THE ENVIRONMENT. THE METHOD SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.</p> <p>5. GENERAL CONDITIONS</p> <p>5.1 BULK STORAGE OF HAZARDOUS MATERIALS SHALL BE AT LEAST 30 METERS AWAY FROM ANY WATERCOURSE OR WETLAND AND CLEARLY MARKED. THE CONTRACTOR SHALL CONTACT THE OWNER OR THE ENGINEER FOR SETBACK REQUIREMENTS FROM SENSITIVE AREAS (WELLS, WETLANDS, WATERCOURSES ETC.).</p> <p>5.2 PRIOR TO CONSTRUCTION COMMENCEMENT, THE CONTRACTOR IS TO DEVELOP A CONTINGENCY PLAN WHICH OUTLINES BASIC RESPONSE MEASURES AND KEY CONTACTS, AS WELL AS THE LOCATION OF SPILL RESPONSE EQUIPMENT AND RESOURCES AND HOW IT CAN QUICKLY BE ACCESSED, PARTICULARLY AFTER HOURS. ALSO, ABSORBENT PADS AND CONTAINMENT BOOMS SHALL BE KEPT ON-SITE.</p> <p>5.3 AT THE END OF WORK, THE CONTRACTOR MUST PROVIDE A GEODETIC SURVEY (X, Y, Z) OF THE WORK IN DWG FORMAT.</p> <p>5.4 THE PROJECTED WASTE PILE, NORTH OF THE ACCUMULATION BASIN, SHALL BE DESIGNED AS NOT TO IMPAIR THE CURRENT SLOPE STABILITY OF THE BASIN. WASTE PILE DESIGN IS OUTSIDE OF THE SCOPE OF WORK REGARDING THE ACCUMULATION BASIN REPAIRS.</p> <p>5.5 MAINTENANCE OF THE PERIPHERAL DITCH SHALL BE PERIODICALLY PERFORMED BY THE OWNER.</p> <p>5.6 THE OWNER SHALL NOT STOCKPILE MATERIALS OR SNOW IN THE VICINITY OF THE ACCUMULATION BASIN SLOPES. THE OWNER SHALL ENSURE THAT ANY ACTIVITIES TO BE REALIZED NEAR THE BASIN, FOLLOWING ITS REPAIRS, DO NOT IMPAIR THE STABILITY OF THE SLOPE AND THE INTEGRITY OF THE WORKS. THE OWNER SHALL ESPECIALLY AVOID ACTIVITY THAT INVOLVES INCREASE OF STRESS ON TOP OF SLOPE, EXCAVATION ON TOP OF THE SLOPE, AND INCREASE IN WATER RUNOFF IN THE DIRECTION OF THE BASIN.</p>																									
<p>1135, BOULEVARD LEBOURGNEUF QUÉBEC (QUÉBEC) CANADA G2K 0M5 TEL. : 418 623-2254 TÉLÉC. : 418 624-1857 WWW.WSPGROUP.COM</p> <p>CONSULTANT - SUB-CONSULTANT</p> <p>SEAL:</p> <p>CLIENT:</p>  <p>CLIENT REF. # PROJECT:</p> <p>WATER MANAGEMENT GOODWOOD AREA</p> <p>NOTES: UNLESS SPECIFIED OTHERWISE, MEASURING UNITS ARE IN METERS. QUEBEC PLANE COORDINATE SYSTEM (QPCS), GEODETIC REFERENCE SYSTEM NAD 83, CARTOGRAPHIC PROJECTION UNIVERSAL TRANSVERSE MERCATOR (UTM) ZONE 19, VERTICAL DATUM CGVD28. PLAN ORDER IS NOT LINKED TO CONSTRUCTION SEQUENCE.</p> <p>WARNING: COPYRIGHT: THIS DRAWING IS THE INTELLECTUAL PROPERTY OF WSP. NO REVISION, REPRODUCTION OR ANY OTHER USE ARE ALLOWED WITHOUT WRITTEN AUTHORIZATION FROM WSP. SURVEYS HAVE BEEN REALIZED BY CONTRACTOR (GREAT ROCK MINING). WSP CANNOT GUARANTEE THE VALIDITY OR PRECISION OF THE SURVEYS. DRAWING SCALE IS NOT TO BE MODIFIED.</p> <table border="1"> <thead> <tr> <th>ISSUED FOR - REVISION</th> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td></td> <td>1</td> <td>2019-10-31</td> <td>CONSTRUCTION</td> </tr> <tr> <td></td> <td>B</td> <td>2019-10-30</td> <td>CONSTRUCTION</td> </tr> <tr> <td></td> <td>A</td> <td>2019-07-17</td> <td>INFORMATION</td> </tr> </tbody> </table> <p>PROJECT NO.: 181-04013-03 DATE: 2019-07-17 ORIGINAL SCALE: NONE DESIGNED BY: PIERRE-OLIVIER MALTAIS, ing. M.Sc. DRAWN BY: ETIENNE BILODEAU CHECKED BY: LOUISE CHAPUT, ing. DISCIPLINE: ENVIRONMENT TITLE: ACCUMULATION BASIN PERMANENT REPAIRS TECHNICAL SPECIFICATIONS</p> <p>SHEET NUMBER: 181-04013-03-C-003 SHEET # 01 OF 01 ISSUE: CONSTRUCTION DATE OF: 2019-10-31</p>										ISSUED FOR - REVISION	NO.	DATE	DESCRIPTION		1	2019-10-31	CONSTRUCTION		B	2019-10-30	CONSTRUCTION		A	2019-07-17	INFORMATION
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Appendix IV. Benthos Monitoring Report

Montréal, March 1 2020

Mariana Trindade
Director environment and permitting
Tata Steel Minerals Canada Limited
1000 Sherbrooke West, Suite 1120
Montreal, Qc, H3A 3G4

Subject : Annual benthic community monitoring at the Goodwood site.

N/D : PR185-42-19

Mrs Trindade,

We are pleased to submit the technical report on the above-mentioned project. We hope that it meets your expectations.

1 Introduction

The sediment monitoring program also includes annual sampling for benthic invertebrate communities (BICs) monitoring. The sampling stations are in permanent streams, as close as possible to the sediment sampling stations. The descriptors are:

- Total density of invertebrates
- Richness (number of taxa)
- Simpson's diversity index
- Evenness (Pielou's index)
- Density of each taxon
- Relative taxa abundance
- Absence/presence of taxa
- Dissimilarity (Bray-Curtis coefficient)

TSMC has experienced difficulties is developing a BIC sampling/monitoring program at the Goodwood site due, in part, to the fact that there are no permanent streams in the vicinity. To date, there has been no benthic sampling at the Goodwood site. The outlet of Lake Fra is an intermittent stream along the majority of its path. Eventually it reaches another water course, which then flows into a wetland.

Monitoring of benthic communities was therefore conducted upstream of this junction, which could offer little representativeness of the conditions of Lake Fra’s outlet.

2 Methodology

2.1 Benthic community sampling

Two sampling areas were located along the permanent stream connected to Lake Fra’s discharge. The first one, located upstream of the junction, was considered as a reference site (BER1) whereas the one downstream of the junction was considered as an exposed site (BEE). A second reference area, located at the discharge point of Lake Migration (BER2), was also sampled and compared to the exposed site.

Benthic community samples were taken on July 31, 2019. At each site, three samples were taken using a Hess sampler of 0.086 m² with a mesh size of 500 µm. The method consists of cleaning the entire substrate within the sampler for 1 minute with a soft brush or by hand to allow the material to flow downstream into the sampler net. The content of the net is transferred into an airtight plastic jar and preserved with a 70% alcohol solution for subsequent identification.

Invertebrates within the samples were then identified to the family level using the MDDEP guide (Moisan, 2010).

2.2 Habitat characterization

The habitat of each sampled area was characterized. In order to do so, data on hydrology, chemistry, morphology and habitat were collected in the field (Table 1).

Table 1. Data collected in the field

Hydrology	Chemistry	Habitat	Morphology
Width, depth	Temperature	Substrate cover	Perturbations
Current	pH	Embeddedness	Pattern
Slope	Conductivity	Debris	Islands
Flow facies	Apparent turbidity	Macrophytes cover	Bars
Perrenity		Riparian vegetation	Confinement

2.3 Statistical analyses

All statistical analysis, box plots and ordinations were made using the R software (R Core Team, 2015).

2.3.1 Data preparation

Data distribution was observed to assess normality. Prior to performing data analysis, total density was transformed using the natural logarithm and Simpson’s diversity as well as evenness were transformed using the exponential. Finally, a Hellinger transformation was used on the macroinvertebrate family abundance (Legendre & Gallagher, 2001) prior to performing a principal component analysis (PCA).

2.3.2 ANOVAs

To analyze the effect of the effluent, a one-way ANOVA was performed to assess the difference between exposed and reference areas.

Statistical significance was obtained when $p < 0.1$.

2.3.3 Power Analysis

To assess if a significant result is biologically relevant, the critical effect size (CES) is used. A minimum of two times the standard deviation of the reference area is required for an effect to be considered as biologically relevant (Environment Canada, 2012).

To assess if a non-significant result is due to a weak sample size, a power analysis using Cohen's effect size (d) is made, where d is the difference of index means (μ) divided by the reference area index standard deviation (σ_{ref}), as shown in the Equation 1 (Cohen, 1988).

Equation 1. Cohen's effect size

$$d = \frac{|\mu_{exposed} - \mu_{ref.}|}{\sigma_{ref}}$$

2.3.4 Effect Endpoints

Four indices were used to analyze the complex BIC: total density, Simpson's evenness, family richness, and Bray-Curtis coefficient. The indicators were then subjected to calculations to determine the mean, median, standard deviation, standard error, minimum and maximum values for each indicator in exposed and reference areas.

2.3.4.1 Total Density of Invertebrates

The total density is the sum of all invertebrates in an area divided by the sampled area. In this case, all abundances were transformed into a number of individuals per square metre (m²).

2.3.4.2 Taxa richness

The richness is the total number of identified families in the community of the area.

2.3.4.3 Evenness Index

The Simpson evenness index (E) is the ratio of the Simpson diversity index (D) on the mathematical maximum of D in a given area (D_{max}), as shown in the Equation 2. To calculate D , the proportions (p) of species (i) in a community of richness S are squared, summed and then divided from 1 (Simpson, 1949).

Equation 2. Simpson's evenness

$$E = \frac{D}{D_{max}} = \left(\sum_{i=1}^S p_i^2 \right)^{-1} \times S^{-1}$$

2.3.4.4 Similarity index

Bray-Curtis dissimilarity index (BC) was used to represent the difference between all sampled communities (Bray and Curtis, 1957). The dissimilarity between area a and b is calculated using the Equation 3. where y_i is the abundance of taxa i in common between both sites. The area b , in this case is a theoretical reference BIC composed of the median abundance of all taxa in both reference areas (BER1 and BER2).

Equation 3. Bray-Curtis dissimilarity index

$$BC = \frac{\sum_{i=1}^n |y_{ia} - y_{ib}|}{\sum_{i=1}^n (y_{ia} + y_{ib})}$$

Ordinations are useful tools to represent complex data (Legendre and Legendre, 2012). The PCA convert multidimensional (m) data frame, in this case multi-family community, to a simpler n dimensions representation, the principal components (PCs), where $n < m$. In this case, a two dimensions ($n = 2$) approach was chosen.

2.3.4.5 Diversity Index

The Simpson Diversity index (D) represents both the proportion of species (p) in a community and the number of species (S) in it (Krebs, 1985). As with any endpoint, area mean, median, standard deviation, standard error, minimum and maximum were calculated for exposed and reference areas. D is calculated using the Equation 4.

Equation 4. Simpson's diversity

$$D = 1 - \sum_{i=1}^S p_i^2$$

2.3.4.6 Taxa density

Taxa density represents the number of individuals of each taxon (family) in each area per m^2 .

3 Results

3.1 Habitat Description

This section summarizes the habitat characteristics of the three sampled areas. Raw field data can be consulted in Appendix I. Photographs of each area can also be seen in Appendix II.

3.1.1 Exposed Area

The BEE area is a 3.0 m wide intermittent stream. At the time of sampling, the wetted width was 2.0 m and the water 0.31 m deep. This stream is a cascade with a slope of $> 5\%$ (Table 2). The substrate is dominated by boulders and rubble, with a significant proportion of slightly embedded gravel and cobble. The BEE water chemistry was normal for the region (Table 3). The pH was neutral, the conductivity low and the water not turbid.

Table 2. Hydrology and morphology

Area	Perrenity	Channel width		Wet Width		Water Depth		Facies	Slope (%)
		(m)	(m)	(m)	(m)	(m)	(m)		
BEE	Intermittent	3.0	2.0	0.31	Cascade	>5			
BER1	Intermittent	8.0	3.0	0.20	Rapid	5			
BER2	Permanent	2.0	1.0	0.75	Riffle	2			
	Substrate Cover (%)						Embeddedness	Islands	Bars
	Silt	Sand	Gravel	Cobble	Rubble	Boulder			
BEE	-	-	10	20	40	30	Some	None	None
BER1	-	-	10	20	40	30	-	None	None
BER2	-	10	15	30	30	15	-	None	None

The habitat cover is low and mainly composed of large woody debris, overhanging vegetation and overhanging banks. The riparian vegetation is composed of a mature coniferous forest with a somewhat thick canopy for the region (Table 5).

3.1.2 Reference Area 1

The BER1 area is located upstream of the exposed area and the junction with Lake Fra's discharge. It is an 8.0 m wide intermittent stream. At the time of sampling, the wetted width was 3.0 m and the water 0.20 m deep. This stream is a rapid with a slope of 5% (Table 2). The substrate is similar to BEE and is dominated by boulders and rubble, with a significant proportion of gravel and cobble. However, no embeddedness was observed. The BER1 water chemistry was normal for the region and similar to BEE (Table 3). The pH was neutral, the conductivity low and the water not turbid.

The habitat cover is low and mainly composed of large woody debris, overhanging vegetation and overhanging banks. The riparian vegetation is a mature coniferous forest with a scarce canopy (Table 5).

Table 3. Water Chemistry

Area	Water Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity
BEE	6.0	6.8	30	None
BER1	5.0	6.8	30	None
BER2	8.0	6.8	0	None

3.1.3 Reference area 2

The BER2 area is located at the discharge point of Lake Migration. It is a 2.0 m wide permanent stream. At the time of sampling, the wetted width was 1.0 m and the water 0.75 m deep. This stream is a riffle with a slope of 2% (Table 2). The substrate is dominated by rubble and cobble, with a significant proportion of boulders, gravel and sand. No embeddedness was observed. The BER2 water chemistry was normal for the region and also similar to BEE (Table 3). The pH was neutral, the conductivity low and the water not turbid.

The habitat cover is medium and mainly composed of overhanging vegetation. The riparian vegetation is composed of a mature coniferous forest and a wetland with a scarce canopy (Table 5).

Table 4. Habitat characterization

Area	Habitat Cover	Canopy	Woody debris	Aquatic Vegetation	Riparian vegetation	
					Type	Stage
BEE	15%	21-40%	Present, not functional	None	Shrubs & coniferous	Mature
BER1	10%	1-20%	Present, not functional	Moss & thick periphyton	Shrubs & coniferous	Mature
BER2	20%	1-20%	Not present	None	Coniferous & wetland	Mature

3.2 Benthic community

3.2.1 Total density

The total density of sampled areas was highest in BER1 with 3438 ± 1441 ind./m², and lowest in BEE with 186 ± 121 ind./m². High standard deviations suggest that both sites possess heterogeneous habitats, with some zones supporting a more abundant community than others (Table 2).

Results of the one-way ANOVA present a statistically significant difference between exposed and reference areas, with the exposed area having a reduced total density in comparison to the reference areas. The effect on the environment is also considered as strong since the measured effect is above the CES (exposed mean = 186 ind./m², reference mean = 1909 ind./m²).

Table 5. Total density of benthic invertebrates

	Area	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum
Ind./m ²	BEE	186	128	121	70	105	326
	BER1	3438	4151	1441	832	1779	4384
	BER2	380	326	169	98	244	570
1 - Way ANOVA	<i>P</i>	Effluent	0.005				
	CES	Effluent	± 1610				
	Power		2.14 (huge)				

3.2.2 Density of each taxon

Higher density was observed for the Chironomidae family at the BER1 and BER2 stations. The density of this family, although much lower than in the reference areas, remains the highest in BEE are (Table 7).

Table 6. Density of each taxon

Taxa	BEE		BRE1		BRE2	
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
Simuliidae	15.5	13.4	166.7	191.2	31.0	35.5
Chironomidae	158.9	96.8	2992.2	1140.5	282.9	158.7
Hydracarina	11.6	20.1	182.2	124.3	15.5	17.8
Nematoda	-	-	42.6	64.0	0.0	0.0
Tipulidae	-	-	11.6	20.1	7.8	6.7
Perlodidae	-	-	42.6	26.9	0.0	0.0
Oligochaeta	-	-	-	-	19.4	24.2
Ceratopogonidae	-	-	-	-	3.9	6.7
Plecoptera	-	-	-	-	3.9	6.7
Copepoda	-	-	-	-	11.6	20.1
Ostracoda	-	-	-	-	3.9	6.7

3.2.3 Richness

BIC richness is at its maximum in both reference areas (BER1 and BER2), with 4 to 6 families observed, and at its minimum in the exposed area (BEE), with 1 to 3 families observed (Table 3).

The one-way ANOVA indicates that exposed stations possess a significantly lower richness than reference stations. In addition, the magnitude of effect is above the CES suggesting a high risk to the environment.

Table 7. Family richness

	Area	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum
Number of families	BEE	2	2	1	1	1	3
	BER1	5	5	1	1	4	6
	BER2	5	5	1	1	4	6
1 - Way ANOVA	<i>P</i>	Effluent	0.016				
	CES	Effluent	± 2				
	Power		3 (huge)				

3.2.4 Evenness

The sampled BICs were not even with BEE presenting the highest evenness (0.39 ± 0.15) and BER1 the lowest (0.13 ± 0.07) (Table 4). Standard deviation and error were very variable from one site to another.

The one-way ANOVA indicates a significant difference in BIC evenness between exposed and reference areas. In addition, the magnitude of effect is above the CES suggesting a high risk to the environment.

Table 8. Evenness

	Area	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum
Values	BEE	0.39	0.39	0.15	0.11	0.28	0.50
	BER1	0.13	0.14	0.07	0.04	0.06	0.20
	BER2	0.28	0.30	0.07	0.04	0.20	0.33
1 - Way ANOVA	<i>P</i>	Effluent	0.08				
	CES	Effluent	± 0.14				
		Power	2.64 (huge)				

3.2.5 Similarity

Table 10 present dissimilarities between areas and a median reference BIC. This index ranges from 0 (two identical areas) and 1 (two totally different areas). The analysis indicates that the exposed area possesses the highest dissimilarity, whereas the two reference areas contain relatively similar communities. However, the difference is not statistically significant.

Table 9. Bray-Curtis dissimilarities

	Area	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum
Values	BEE	0.74	0.80	0.15	0.09	0.57	0.84
	BER1	0.47	0.56	0.22	0.13	0.22	0.64
	BER2	0.59	0.64	0.11	0.07	0.46	0.67
1 - Way ANOVA	<i>P</i>	Effluent	0.20				
	CES	Effluent	± 0.192				
		Power	1.22 (very large)				

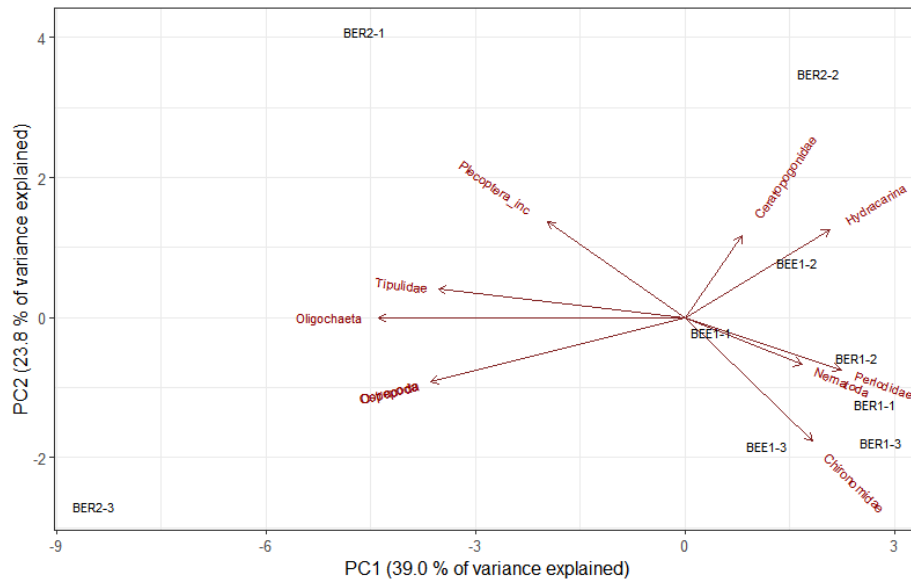


Figure 1. Principal Component Analysis of families

The PCA of the BIC explains 62.8 % of the variance (strong relationship) between nine samples using two principal components (PC1 = 39.0 %; PC2 = 23.8 %).

The reference area BER2, which is located in Lake Migration, presents a BIC more diverse than all other areas. In addition, the community in this area varies greatly among the three samples. That is why these stations are dispersed on the opposite side of BEE and BER1 stations even though Chironomidae is the most abundant family present at all stations. In general, the other two taxa of importance are Simuliidae and Hydracarina. The latter two are the only other taxa present in BEE area. BER1's community is the closest to the BEE area but contains three other taxa (Nematoda, Tipulidae and Perlodidae).

3.2.6 Diversity Index

Simpson's diversity index incorporates richness and evenness to create an index estimating the chance that two individuals picked randomly belong to different species. Higher values indicate that there is a low probability that two individuals are from the same species. Among the three sampled areas, the reference site BER2 possesses the highest score. Therefore, the probability that two individuals sampled randomly belong to the same species is lower in this area than in BEE and BER1 areas (Table 6).

The one-way ANOVA, on the other hand, does not show any significant difference between areas.

Table 10. Simpson's diversity

	Area	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum
Values	BEE	0.22	0.31	0.19	0.11	0.00	0.35
	BER1	0.21	0.25	0.09	0.05	0.10	0.28
	BER2	0.44	0.46	0.11	0.06	0.32	0.54
1 - Way ANOVA	P	Effluent	0.11				
	CES	Effluent	± 0.20				
		Power	0.53 (Medium)				

4 Conclusion

Significant differences in three of the four effect endpoints, namely total density, richness and evenness, were observed between exposed and reference areas. The exposed BIC (BEE) comprises 1,723 fewer individuals per square metre than reference BICs (BER1 and BER2). This reduction of 90.3 % from the mean total density is larger than the CES value, indicating a considerable effect to the environment. This very high CES also indicates that the variation in density between reference areas is important. Similarly, BIC richness also drops significantly in the exposed area (by 60 %). Furthermore, the magnitude is above the CES, suggesting, here again, that several ecological functions of the community might be reduced in this area. A gain in evenness, most likely attributed to the reduction in abundance of otherwise-dominating taxa (Groupe Hémisphères, 2015), was observed in BIC exposed area. In fact, only three families were observed in this area in comparison to the reference areas which comprised up to 11 different families (Table 12).

Table 11. Overview of BIC Response Endpoints to mining

Endpoint	Mining		
	p-value	Magnitude	CES
Total Density	<0.01	-1723	± 1610
Richness	<0.05	-0.105	± 2
Evenness	<0.1	0.185	± 0.14
Bray-Curtis dissimilarity	0.20	0.21	± 0.192

The exposed BIC possessed the lowest diversity which caused it to be the most dissimilar of all sampling areas. However, this change in dissimilarity was not considered as being statistically significant.

The link between the loss of density and diversity of BICs pertaining to mining activities is yet to be determined. While efforts were deployed to find sites that would allow to assess the impacts of mining effluents on BICs, several confounding factors exist that could explain this loss.

The presence of macrophytes and periphyton in BER1 only could be a major confounding factor explaining BIC density and diversity. Indeed, vegetation and periphyton are both essential resources for many species and can be linked to a more productive BIC. Furthermore, the high BIC density could favour a more diverse assemblage of species. For instance, predators, like Trichoptera and Plecoptera require a large density of prey to compensate for their low motility.

5 Quality assurance

Groupe Hémisphères possesses an internal quality control program which is derived from ISO 9001 standards. This is based on a review and approval of all concepts and document production by a senior professional. The program considers the management, the control of documentation, the personnel's continuous training, as well as the quality assurance of the deliverables. The system also includes a tight control of the field work and the prevention and safety measures specific to the project.

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Annexe I

Raw field data

Identificateur	Échantillon	Simuliidae	Chironomidae	Hydracarina	Nematoda	Tipulidae
VT, LF	BEE1-GW1	2	7	0	0	0
VT, LF	BEE1-GW2	2	23	3	0	0
VT, LF	BEE1-GW3	0	11	0	0	0
VT, LF	BER1-GW1	8	326	25	10	3
VT, LF	BER1-GW2	33	301	18	0	0
VT, LF	BER1-GW3	2	145	4	1	0
VT, LF	BER2-GW1	6	18	1	0	1
VT, LF	BER2-GW2	2	15	3	0	0
VT, LF	BER2-GW3	0	40	0	0	1

Perlodidae	Oligochaeta	Ceratopogonidae	Plecoptera_inc	Copepoda	Ostracoda
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
5	0	0	0	0	0
5	0	0	0	0	0
1	0	0	0	0	0
0	1	0	1	0	0
0	0	1	0	0	0
0	4	0	0	3	1

Annexe II

Photographs



BEE area



Junction with the intermittent stream (lake Fra's outlet)



Downstream view of BEE area



Sampling of BEE stations



Upstream view of BEE area



Water in BEE area



Road fording



Upstream view of BER1 area



Downstream view of BER1 area



Wetland surrounding BER1 area



Upstream view of BER2 area



Downstream view of BER2 area



Water in BER2 area

Appendix V. Air Quality Tables

Calcul de la concentration en NO₂

Station	Date in	Date out	Calculated NO2 (ppbv)	NO2 (µg/m3)	Annual value (µg/m3)
AQS2-Q1	2019-06-26 16:43	2019-07-27 14:50	<0.4	0.752	9.024
AQS4-Q1	2019-06-26 16:54	2019-07-26 16:55	<0.4	0.752	9.024
AQS6-Q1	2019-06-24 10:03	2019-07-26 14:06	0.8	1.504	18.048
AQS7-Q1	2019-06-28 08:11	2019-07-28 10:14	<0.4	0.752	9.024
AQS8-Q1	2019-06-28 07:23	2019-07-28 09:54	<0.4	0.752	9.024
AQS9-Q1	2019-06-27 18:42	2019-07-28 08:58	<0.4	0.752	9.024
AQS2-Q2	2019-07-27 14:50	2019-08-26 09:30	0.9	1.692	20.304
AQS4-Q2	2019-07-26 16:56	2019-08-26 10:20	0.5	0.94	11.28
AQS6-Q2	2019-07-26 14:06	2019-08-25 17:31	1.2	2.256	27.072
AQS7-Q2	2019-07-28 10:14	2019-08-31 16:59	0.7	1.316	15.792
AQS8-Q2	2019-07-28 09:54	2019-08-31 14:33	0.8	1.504	18.048
AQS9-Q2	2019-07-28 08:58	2019-08-31 11:34	1.6	3.008	36.096

Retombées de poussières

Période hivernale – poussières et métaux

Sampling Date		2019-04-06 11:50	2019-04-06 10:22	2019-03-31 15:00	2019-03-31 16:00	2019-04-06 09:25	
COC Number		157354-13-01	157354-13-01	157354-13-01	157354-13-01	157354-13-01	
	Units	DS04-AQS1-SN-2019	DS04-AQS2-SN-2019	DS04-AQS3-SN-2019	DS04-AQS4-SN-2019	DS04-AQS5-SN-2019	RDL
METALS							
Antimony (Sb) †	ug	<0.1	<0.1	0.3	<0.1	0.1	0.1
Silver (Ag) †	ug	<0.5	<0.5	<0.5	<0.5	<0.5	0.5
Arsenic (As) †	ug	<0.1	<0.1	0.6	0.1	<0.1	0.1
Barium (Ba) †	ug	1.75	0.38	5.28	1.36	2.02	0.05
Beryllium (Be) †	ug	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Cadmium (Cd) †	ug	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Calcium (Ca) †	ug	421	46	1140	409	297	5
Chromium (Cr) †	ug	0.3	0.1	1.0	0.6	0.3	0.1
Mercury (Hg) †	ug	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Nickel (Ni) †	ug	0.9	0.2	1.7	1.2	0.2	0.1
Lead (Pb) †	ug	0.6	<0.5	0.6	<0.5	<0.5	0.5
Thallium (Tl) †	ug	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Vanadium (V) †	ug	<0.2	<0.2	0.4	<0.2	<0.2	0.2
Zinc (Zn) †	ug	15.5	4.4	13.1	5.3	7.0	0.1
CONVENTIONALS							
Weight of particles	g	0.030	0.0022	0.063	0.011	0.014	0.0010
METALS							
Antimony (Sb) †	ug/m2/month	0.96	0.96	2.98	0.99	0.96	
Silver (Ag) †	ug/m2/month	4.80	4.81	4.97	4.97	4.81	
Arsenic (As) †	ug/m2/month	0.96	0.96	5.97	0.99	0.96	
Barium (Ba) †	ug/m2/month	16.81	3.65	52.50	13.52	19.42	
Beryllium (Be) †	ug/m2/month	0.48	0.48	0.50	0.50	0.48	
Cadmium (Cd) †	ug/m2/month	0.48	0.48	0.50	0.50	0.48	
Calcium (Ca) †	ug/m2/month	4044.64	442.09	11335.65	4065.90	2855.00	
Chromium (Cr) †	ug/m2/month	2.88	0.96	9.94	5.96	2.88	
Mercury (Hg) †	ug/m2/month	0.48	0.48	0.50	0.50	0.48	
Nickel (Ni) †	ug/m2/month	8.65	1.92	16.90	11.93	1.92	
Lead (Pb) †	ug/m2/month	5.76	4.81	5.97	4.97	4.81	
Thallium (Tl) †	ug/m2/month	0.96	0.96	0.99	0.99	0.96	
Vanadium (V) †	ug/m2/month	1.92	1.92	3.98	1.99	1.92	
Zinc (Zn) †	ug/m2/month	148.91	42.29	130.26	52.69	67.29	
CONVENTIONALS							
Weight of particles	g/m2/month	0.29	0.02	0.63	0.11	0.13	

Période estivale – Poussières

Sample ID	start time	end time	# of days sampled	Area sampled (m ²)	dust weight (g)	Dust deposition rate (g/m ² /30d)
AQS1-Q1-2019	6-26-19 5:30 PM	7-26-19 3:55 PM	29.93402778	0.017672	<0.02	<1.13422
AQS2-Q1-2019	6-26-19 4:40 PM	7-27-19 2:47 PM	30.92152778	0.017672	<0.02	<1.09800
AQS3-Q1-2019	6-27-19 3:40 PM	7-27-19 3:50 PM	30.00694444	0.017672	0.0212	1.19936
AQS4-Q1-2019	6-26-19 3:06 PM	7-27-19 4:54 PM	31.075	0.017672	0.0309	1.68804
AQS1-Q2-2019	7-26-19 3:55 PM	8-25-19 1:55 PM	29.91666667	0.017672	0.028	1.58884
AQS2-Q2-2019	7-27-19 2:47 PM	8-26-19 9:45 AM	29.79027778	0.017672	0.0412	2.34778
AQS3-Q2-2019	7-27-19 3:50 PM	8-26-19 9:00 AM	29.71527778	0.017672	0.0144	0.82266
AQS4-Q2-2019	7-27-19 4:54 PM	8-26-19 10:30 AM	29.73333333	0.017672	0.0266	1.51871

Période estivale – Métaux

Metals deposition rate (g/m²/30d)

	AQS1-Q1-2019	AQS2-Q1-2019	AQS3-Q1-2019	AQS4-Q1-2019
Mercury (Hg)	< 0.00001	< 0.00001	< 0.00001	< 0.000011
Total Antimony (Sb)	< 0.00006	< 0.00006	< 0.00006	< 0.000060
Total Arsenic (As)	< 0.00013	< 0.00012	< 0.00012	< 0.000120
Total Barium (Ba)	0.00043	0.00071	0.00164	0.002404
Total Beryllium (Be)	< 0.00006	< 0.00006	< 0.00006	< 0.000060
Total Cadmium (Cd)	< 0.00001	< 0.00001	< 0.00001	< 0.000011
Total Chromium (Cr)	< 0.00062	< 0.00060	< 0.00062	< 0.000601
Total Copper (Cu)	0.00013	< 0.00012	0.00020	0.000339
Total Lead (Pb)	< 0.00006	0.00010	0.00018	0.000060
Total Manganese (Mn)	0.00062	0.00099	0.00147	0.000929
Total Nickel (Ni)	< 0.00013	< 0.00012	< 0.00012	< 0.000120
Total Silver (Ag)	< 0.00001	< 0.00001	< 0.00001	< 0.000011
Total Thallium (Tl)	< 0.00001	< 0.00001	< 0.00001	< 0.000005
Total Vanadium (V)	< 0.00006	< 0.00006	< 0.00006	< 0.000060
Total Zinc (Zn)	< 0.00062	0.00088	0.00102	0.000874

	AQS1-Q2-2019	AQS2-Q2-2019	AQS3-Q2-2019	AQS4-Q2-2019
Mercury (Hg)	< 0.00002	< 0.00002	< 0.00001	< 0.00002
Total Antimony (Sb)	< 0.00011	< 0.00009	< 0.00007	< 0.00009
Total Arsenic (As)	< 0.00022	< 0.00017	< 0.00013	< 0.00018
Total Barium (Ba)	< 0.00044	0.00039	0.00130	0.00219
Total Beryllium (Be)	< 0.00011	< 0.00009	< 0.00007	< 0.00009
Total Cadmium (Cd)	< 0.00002	< 0.00002	< 0.00001	< 0.00002
Total Chromium (Cr)	< 0.00111	< 0.00088	< 0.00068	< 0.00093
Total Copper (Cu)	< 0.00022	< 0.00017	< 0.00013	0.00023
Total Lead (Pb)	< 0.00011	0.00022	0.00025	0.00023
Total Manganese (Mn)		0.00041	0.00044	0.00060
Total Nickel (Ni)	< 0.00022	< 0.00017	< 0.00013	< 0.00018
Total Silver (Ag)	< 0.00002	< 0.00002	< 0.00001	< 0.00002
Total Thallium (Tl)	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Total Vanadium (V)	< 0.00011	< 0.00009	< 0.00007	< 0.00009
Total Zinc (Zn)	< 0.00111	0.00121	< 0.00068	< 0.00093

Particules

PM2.5

	Date	dust weigh		average conc./24hrs	
		mg		mg/M3	µg/m3
AQS1	2019-07-06	0.39		0.0162176	16.217565
AQS2	2019-06-26	0.42		0.0174651	17.46507
AQS2	2019-07-10	0.37		0.0153859	15.385895
AQS2	2019-07-25	0.34		0.0141384	14.13839
AQS4	2019-06-25	0.27		0.0112275	11.227545
AQS4	2019-07-23	0.29		0.0120592	12.059215
AQS4	2019-07-08	0.36		0.0149701	14.97006
AQS6	2019-07-13	0.35		0.0145542	14.554225
AQS7	2019-07-03	0.44		0.0182967	18.29674
AQS8	2019-06-30	0.38		0.0158017	15.80173
AQS8	2019-08-02	0.3		0.012475	12.47505
AQS9	2019-07-05	0.47		0.0195442	19.544245

Date improperly reported by AGAT

PMT

Station	Unit	RDL	Q-7303(AQS1)	Q-7307(AQS2)	Q-7308(AQS2)	Q-47-7326 (AQS4)	Q-73-17(AQS4)	Q-7306(AQS4)	Q-47-7319(AQS4)	Q-7309(AQ57)	Q-7302(AQ59)
Date			06/07/2019	06/29/2019	07/11/2019	07/25/2019	06/28/2019	08/07/2019	07/23/2019	07/03/2019	07/05/2019
dust weight	mg	0.01	0.02	0.02	0.027	0.02	0.02	0.01	0.02	0.36	0.03
average conc./24hrs	mg/M3		0.00083167	0.00083167	0.001122754	0.00083167	0.00083167	0.000415835	0.00083167	0.01497006	0.001247505
Sample Description	Unit	RDL	Q-7303(AQS1)	Q-7307(AQS2)	Q-7308(AQS2)	Q-47-7326 (AQS4)	Q-73-17(AQS4)	Q-7306(AQS4)	Q-47-7319(AQS4)	Q-7309(AQ57)	Q-7302(AQ59)
Date Sampled			06/07/2019	06/29/2019	07/11/2019	07/25/2019	06/28/2019	08/07/2019	07/23/2019	07/03/2019	07/05/2019
Parameter	Unit	RDL	420416	420437	420438	420439	420440	420441	420442	420443	420444
Arsenic	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2
Magnesium	ug/Filter	10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Copper	ug/Filter	0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Lithium	ug/m3	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium	ug/Filter	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Selenium	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2
Titanium	ug/m3	2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
Cadmium	ug/Filter	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Strontium	ug/Filter	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	ug/Filter	10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Molybdenum	ug/m3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	ug/m3	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Iron	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2
Manganese	ug/m3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Strontium	ug/m3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	ug/m3	5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2
Lead	ug/m3	10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4
Zinc	ug/Filter	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.5	<1.0	<1.0
Aluminum	ug/Filter	10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Arsenic	ug/Filter	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/Filter	5.0	10.0	<5.0	5.0	<5.0	<5.0	<5.0	10.0	15.0	5.0
Lithium	ug/Filter	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Magnesium	ug/m3	10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4
Manganese	ug/Filter	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5	<0.3
Molybdenum	ug/Filter	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Titanium	ug/Filter	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Aluminum	ug/m3	10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4
Cadmium	ug/m3	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Copper	ug/m3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	ug/Filter	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Date improperly reported by AGAT

Cells with reported value



Appendix VI. Geotechnical Monitoring Report

EXECUTIVE SUMMARY

TSMC mandated WSP Canada Inc. (WSP) in September 2019 to perform the geotechnical inspection. The objective of this inspection was to observe the geotechnical integrity of the settling Pond, Waste rock dump, Overburden stock piles, Area for the water treatment plan, Open pit, Runoff water ditches (clean water) and Access and hauling road and site culverts.

This mandate is not a review of the geotechnical practices of the operations of this site, nor a verification between previous recommendations and / or design criteria. The mandate is not a due diligence or an audit. The mandate is to note and record everything in an inspection report.

INSPECTION

The inspection was carried out by Jean-Sébastien Houle, engineer (OIQ 129263), on October 16, 2019. He was accompanied by MM. Martin Simon and Adam Calvert, respectively foreman and junior environmental technician. During the visit, the sky was cloudy, it was lightly snowing and with strong winds, with a temperature varying from 0 ° C to 4 ° C. The weather conditions (snow and wind) slightly reduced the visibility and there was approximately 1-2 centimetres of snow on the ground at the time of the inspection.

CONCLUSIONS AND DISCUSSION

The main active and potential instabilities are as follows:

- **Settling pond:**
 - The pond was empty at the time of the visit
 - There are no signs of instability apart from the crack in the south ditch (observed by others) where a completed geotechnical assessment including geotechnical investigation was planned at the time of the visit
 - The areas of damaged geomembranes are planned to be repaired in 2020
- **Waste Rock Dump:**
 - Although no signs of instability have been observed, the face angle of the lifts and the inter-ramp angle are steeper than the proposed design.
 - The foundation (footprint) of the Waste Rock Dump was not stripped to the bedrock as stated in its design (WSP 2017).
- **Overburden stockpile:**
 - Although no signs of instability have been observed, the face angle of the lifts and the inter-ramp angle, if any, are steeper than the original design.
 - The foundation (footprint) of the Waste Rock Dump was not stripped to the bedrock as stated in its design (WSP 2017).
- **Open pit:**
 - Signs of bench scale instability (material collected on catch benches)
 - Breakback is excessive impacting the catch berm sizing;
 - No sign of overall wall instability was observed.
 - Some overburden material is left close to the crest and could eventually fall into the pit
- **Run-off water ditch:**
 - No observable damage of risk to its integrity
- **Access road and culvert:**

- Minor damages to one culvert under the access/haulage road at the entrance to the site by backfill pebble. A failure of the culvert could affect the water flow and eventually damage the road and even cause it to fail completely (washout)
- The weather during the visit did not significantly affect the observations made during the current inspection. However, it is preferable to carry out inspections when the slope and ground surfaces are not covered with snow.

RECOMMENDATIONS

Following the observations made and instabilities and risks identified, WSP recommends that TSMC take the following actions:

- Carry out the annual geotechnical inspection by a geotechnical expert scheduled towards the end of the summer period before the snow begins to fall, typically before mid-September.
- **Settling pond:**
 - Complete the ongoing geotechnical assessment of the south dyke crack
 - Proceed with the repairs of the damaged geomembrane areas and the recommend reprofiling presented by WSP in October 2019
 - Due to its proximity, the waste rock dump should be integrated into the stability assessments
- **Waste rock dump:**
 - As the foundation is not as the design stated, a review of the geotechnical data of this area must be conducted to identify if additional geotechnical investigations are required and if stability assessment should be revisited. The geotechnical investigation would typically be aimed at characterizing the properties of the foundation (potentially natural overburden). Due to its proximity, the settling pond should be integrated into the stability assessments. The existing plan for the waste dump should be considered, including proposed height and required storage requirements. The assessment should also consider the current geometry as it was observed that the inter-ramp angle and slope face are steeper than the original design.
 - Decrease the overall slope angle by widening the berms and / or by reduction of the face slope angle (WSP 2018).
 - Always keep the top of the waste rock pile leveled and sloped so as to prevent water accumulation on the surface and direct the flow towards the access ramp or the lowest part of the waste pile in question and away from the embankments.
- **Overburden stockpiles:**
 - Decrease overall slope angle by decreasing the face angle and adding / keeping large berms.
 - Drain out or channel out the accumulated water north of the access ramp to the North sector.
 - Always keep the top of the surfaces leveled and sloped to prevent water accumulation on the surface and direct the flow towards the access ramp or the lowest part of the dump in question, far from the slope edges.
- **Open pit:**
 - Implement a controlled blasting program (e.g. pre-splitting) for the final walls, to minimize blast damage and microfracturing of the rock mass and minimize back break at the edge of the bench width. This program should be coupled with performance monitoring of the controlled blasting program to adjust practices as needed.
 - Decrease the inter-ramp angle of the pit by cleaning and / or widening the berms (catch bench) (WSP 2018).
 - Remove material accumulated on catch bench
 - Remove the overhanging rock masses generally located at height at the crest of the pit slopes.

- Regularly assess the rock mass quality by a qualified engineer or geologist and revisit the geotechnical design should the rock mass conditions change during mining. The assessment of the rock mass quality and validation of the geotechnical design should be supervised and signed-off by a qualified engineer.
- **Access / haulage road and culverts**
 - Monitor the integrity of the culverts by regular measurements and photos and keep records.

In addition to the recommendations presented above, WSP has identified several opportunities for business improvement at the Goodwood site. Thus, it is recommended that TSMC takes the following actions by the end of next season (i.e.: September 31, 2020):

- Set up a geotechnical inspection and monitoring program to detect movement, tension cracks and other potential instabilities and document it. Conduct such inspection regularly (i.e. monthly) while the site is active. This would provide better operational security for both staff and equipment. Monitoring program should at least include regular survey of prism of targets and photos. Monitoring systems and triggers should be design by an engineer or geologist specialized in geotechnics. The geotechnical expert should also receive, review and interpret the data regularly and propose mitigation measures in lights of his/her assessment.
- Install instruments for measuring permafrost in the bedrock and this, in the immediate periphery of the pit as well as further, in areas little or not affected by extraction. This would also complete the information about the hydrogeological regime and reduce the uncertainties about the available water level data. This would allow better knowledge of the recharge of the water table, its seasonal fluctuation and the permafrost profile.

Jean-Sébastien Houle, ing.

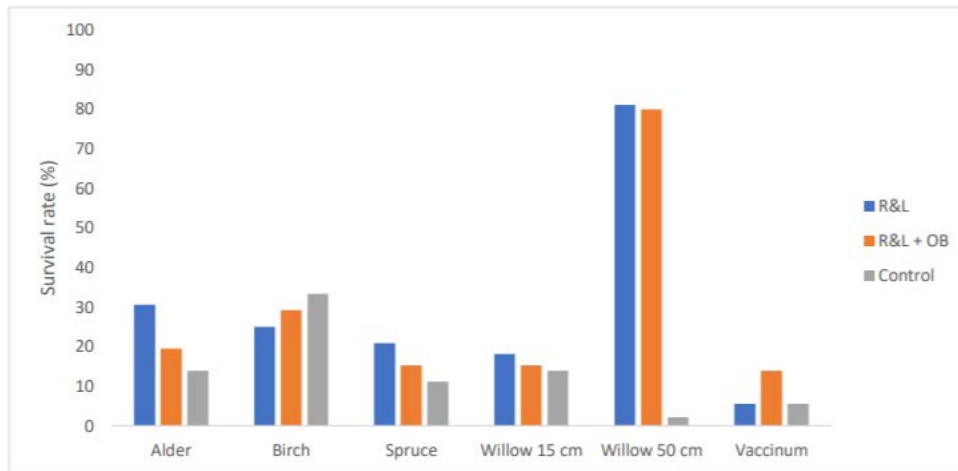
Chef d'équipe, Mécanique des roches



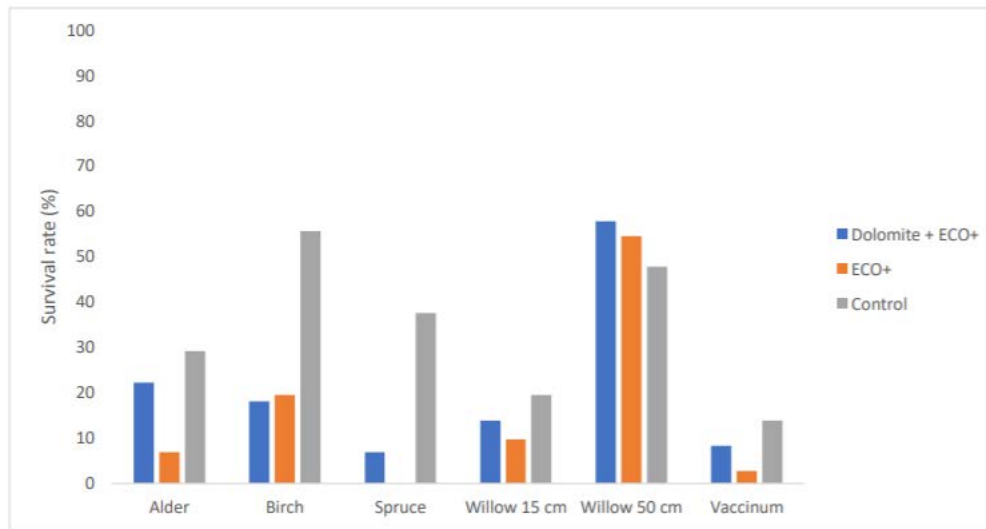
171, rue Léger
Sherbrooke (Québec)
J1L 1M2 Canada

Appendix VII. Results for the Research Project in restoration

Survival Rate of Species Planted at T4 – Two Years Growth, One Wintering

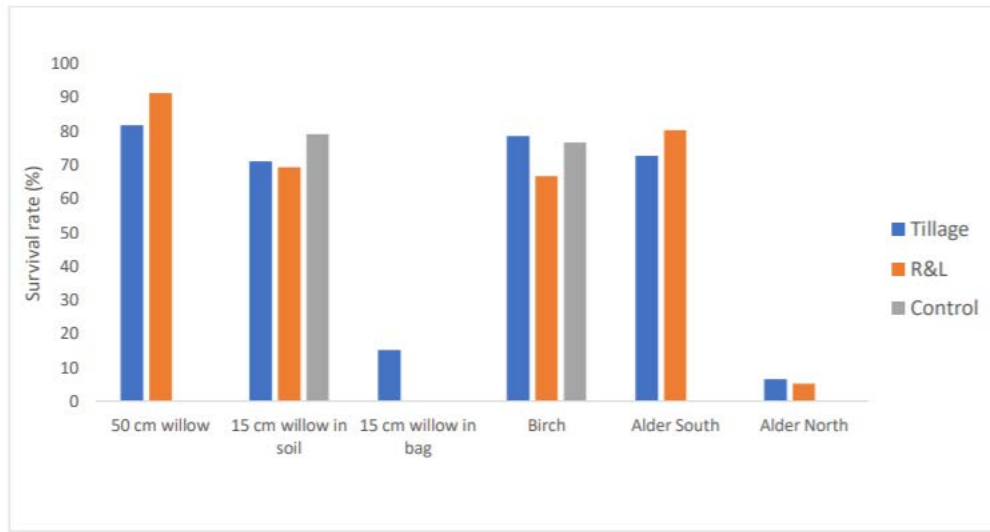


Survival rates of the different species on T4 according to site preparation

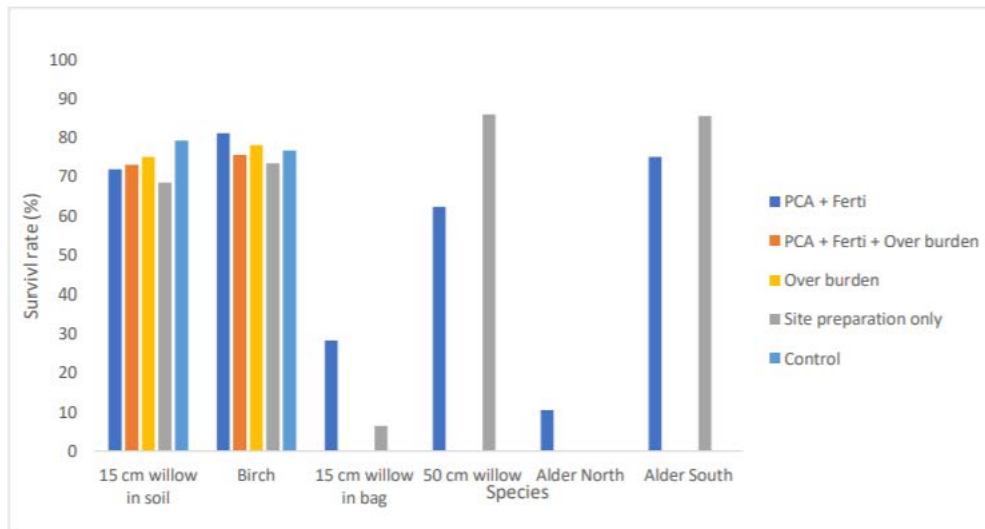


Survival rates of the different species planted on T4 according to the soil amendments

Survival Rate of Species Planted at T6 – One Year Growth, No Wintering

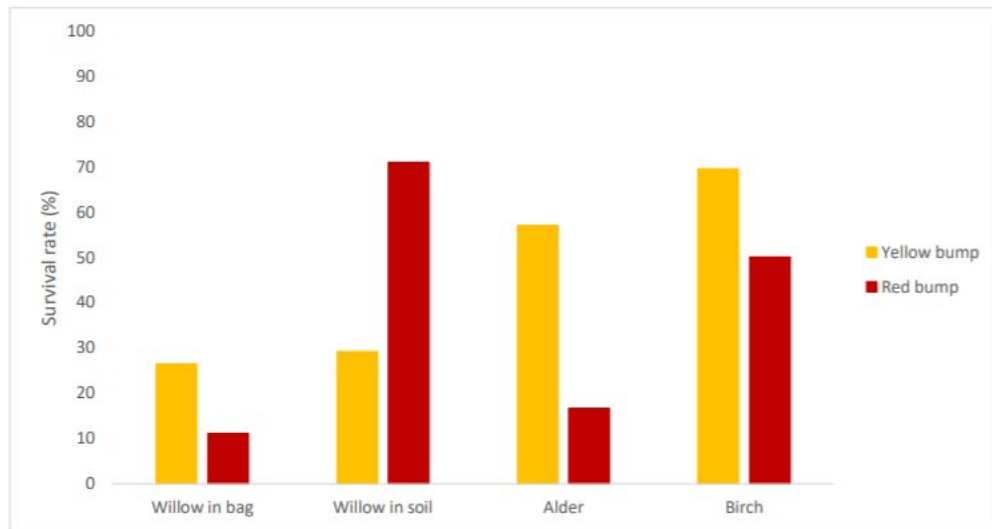


Survival rates of the different species planted on T6 according to site preparation



Survival rates of the different species planted on T6 according to the soil amendments

Survival Rate of Species Planted at Elross Creek – One Year Growth, No Wintering:



Survival rates of the different species planted on bumps according to the colour of the mound

Table 1. Soil Physico-chemical Analyses of Goodwood

Ecoregion/Site				Goodwood Overburden			Goodwood HS T03 ²		Goodwood HS T01 ²	
GPS ³				GH6			GW-HS T1-9		GW-HS T03-10	
Samples ³				GW-TS O-6	GW-TS O-7	GW-TS O-8	GW-HS T1-9	GW-HS T1-10	GW-HS T03-11	GW-HS T03-12
Analyte ¹		Unit	RDL ⁴							
Granulometry	Sand	%	2.0	42	45	44	46	44	46	44
	Silt	%	2.0	17	20	18	25	23	23	23
	Clay	%	2.0	18	15	16	13	13	15	18
	Gravel	%	2.0	23	21	22	16	20	17	16
Total	C	%	0.050	0.16	0.13	2.3	2.3	0.82	2.5	1.6
	N	%	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	P	mg/kg		320	270	290	350	240	460	350
Soluble	Na	mg/kg	1.4 to 3.0	4.5	2.2	4.8	<2.5	2.9	3.1	<2.4
	Ca	mg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Non Soluble	Mg	mg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	K	mg/L	20	<20	<20	<20	<20	<20	<20	<20
	NA	mg/L	5.0	12.6	7.0	13.2	<5.0	6.7	5.1	<5.0
	S	mg/L	30	<30	<30	<30	<30	<30	<30	<30
		%	N/A	35.8	30.8	36.0	50.2	43.4	60.2	48.0
Saturation		%	N/A	10	10	10	17	16	22	19
Moisture		%	N/A	5.45	5.38	5.21	4.17	4.42	3.89	4.25
pH		pH	N/A	5.45	5.38	5.21	4.17	4.42	3.89	4.25
Total Extractable Metals by ICP-MS	Al	mg/kg	20	7 800	7 600	8 500	9 800	9 500	9 000	12 000
	Ag	mg/kg	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	As ⁵	mg/kg	2.0	9.1	9.1	10	9.1	7.6	11	11
	Ba	mg/kg	4.0	67	74	65	53	60	61	90
	Be	mg/kg	0.10	0.61	0.63	0.74	0.68	0.59	0.44	0.64
	Cd	mg/kg	0.10	0.50	0.58	0.53	0.31	0.28	0.21	0.20
	Ca	mg/kg	20	700	600	590	120	82	440	110
	Cr	mg/kg	1.0	25	27	31	24	25	23	30
	Cu	mg/kg	1.0	24	25	28	23	17	12	21
	Co	mg/kg	1.0	10	13	11	12	10	9.0	14
	Fe	mg/kg	10	54 000	58 000	63 000	60 000	55 000	69 000	64 000
	Mg	mg/kg	5.0	3 500	3 500	3 400	2 500	2 500	2 200	3 600
	Mn ⁵	mg/kg	2.0	2 600	3 400	2 900	3 200	2 600	2 700	3 500
	Mo	mg/kg	0.50	1.4	1.6	1.7	1.5	1.2	1.7	1.7
	Ni	mg/kg	0.50	22	26	24	18	16	12	20
	Hg	mg/kg	0.010	0.084	0.071	0.099	0.097	0.067	0.064	0.091
	P	mg/kg	20	290	290	330	290	260	660	340
	K	mg/kg	20	710	740	740	540	510	480	660
	Pb	mg/kg	1.0	9.5	9.7	10	14	10	14	12
	Se	mg/kg	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	<0.50
Na	mg/kg	20	31	29	27	21	17	23	22	
Zn	mg/kg	5.0	72	68	74	55	46	41	62	

1. Soil physico-chemical analyses were conducted in September and October 2018 by MAXXAM ANALYTIQUE, Quebec, Canada;
2. HST = High Subarctic Tundra Ecoregion;
3. Samples numbers and GPS number do not represent the ecoregion or the site;
4. Reportable Detection Limit;
5. The highlighted numbers mean the parameter is over the soil criteria of the appendix 2 of the " Guide d'intervention-Protection des sols et réhabilitation des terrains contaminés. Beaulieu (2019)." entitled " Grille des critères génériques pour les sols". Blue is criteria A, yellow is criteria B and green is criteria C.

Table 2. Soil Mineral composition of Goodwood

Ecoregion/Site	GPS ³	Samples ³	Goodwood Overburden			Goodwood HST03 ²		Goodwood HST01 ²	
			GH6			GW-HST01-9		GW-HST03-10	
Analyte ¹	Unit	RDL	GW-TS O-6	GW-TS O-7	GW-TS O-8	GW-HS T1-9	GW-HS T1-10	GW-HS T03-11	HW-HS T03-11
Mb	ppm	0.05	2.54	2.36	2.72	2.06	1.84	2.77	2.37
Cu	ppm	0.1	24.1	26.8	25.7	21.0	18.5	15.4	25.3
Pb	ppm	0.02	13.22	14.33	13.63	15.19	13.69	16.89	16.37
Zn	ppm	0.2	78.4	79.8	80.1	67.2	59.9	54.2	80.0
Ag	ppm	20	205	189	237	164	173	182	210
Ni	ppm	0.1	24.6	25.2	25.2	20.7	21.4	16.9	25.6
Co	ppm	0.2	12.1	13.8	11.7	10.8	10.7	10.5	14.4
Mn	ppm	1	3 631	4 431	3 960	3 082	2 743	2 541	3 409
Fe	%	0.01	16.84	17.13	17.17	21.71	15.93	16.82	12.41
As	ppm	0.2	20.3	20.0	20.6	18.7	18.2	16.4	17.9
U	ppm	0.1	3.1	2.8	3.1	2.4	2.4	2.5	2.8
Th	ppm	0.1	5.9	5.9	5.8	5.8	6.3	7.2	7.9
Sr	ppm	1	97	109	100	80	98	83	100
Cd	ppm	0.02	0.43	0.46	0.45	0.28	0.31	0.12	0.20
Sb	ppm	0.02	1.08	1.08	1.06	0.89	0.83	0.95	1.09
Bi	ppm	0.04	0.10	0.09	0.09	0.07	0.09	0.13	0.12
V	ppm	1	86	81	83	69	68	80	88
Ca	%	0.01	0.30	0.31	0.30	0.20	0.26	0.20	0.26
P	%	0.001	0.038	0.042	0.042	0.041	0.045	0.069	0.056
La	ppm	0.1	22.1	23.0	22.4	19.3	20.0	21.4	21.6
Cr	ppm	1	42	45	43	39	42	47	53
Mg	%	0.01	0.56	0.61	0.57	0.47	0.60	0.48	0.66
Ba	ppm	1	447	483	440	358	421	440	494
Ti	%	0.001	0.155	0.169	0.161	0.153	0.160	0.188	0.193
Al	%	0.01	3.86	3.97	3.74	3.46	4.02	4.07	4.78
Na	%	0.001	0.685	0.806	0.701	0.535	0.762	0.547	0.690
K	%	0.01	1.45	1.51	1.37	1.21	1.38	1.63	1.81
W	ppm	0.1	1.0	1.1	1.0	0.9	0.9	1.0	0.9
Zr	ppm	0.2	89.4	87.1	92.2	76.9	83.2	103.5	99.7
Sn	ppm	0.1	1.1	0.9	0.8	0.8	0.9	1.4	1.1
Be	ppm	1	1	2	2	2	2	2	2
Sc	ppm	0.1	6.1	6.5	6.2	5.8	6.2	6.3	7.1
S	%	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Y	ppm	0.1	14.3	13.8	14.9	11.6	11.1	10.6	11.4
Ce	ppm	0.02	44.23	46.62	44.88	45.56	43.87	43.85	49.69
Pr	ppm	0.1	4.8	5.2	5.2	4.3	4.1	4.6	4.8
Nd	ppm	0.1	18.1	19.5	19.1	15.3	15.5	17.0	17.6
Sm	ppm	0.1	3.4	3.3	3.5	2.9	2.7	3.0	3.0
Eu	ppm	0.1	0.7	0.7	0.7	0.6	0.6	0.5	0.7
Gd	ppm	0.1	3.2	2.6	2.7	2.6	2.5	2.5	2.2
Tb	ppm	0.1	0.4	0.4	0.4	0.3	0.3	0.3	0.3
Dy	ppm	0.1	2.6	2.4	2.4	1.9	2.0	1.7	1.8
Ho	ppm	0.1	0.5	0.5	0.5	0.4	0.4	0.4	0.4
Er	ppm	0.1	1.4	1.4	1.6	1.3	1.2	1.2	1.2
Tm	ppm	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2
Yb	ppm	0.1	1.4	1.4	1.4	1.1	1.1	1.3	1.3
Lu	ppm	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2
Hf	ppm	0.02	2.26	2.37	2.36	1.98	2.25	2.71	2.71
Li	ppm	0.1	20.3	21.4	20.3	17.0	19.9	18.5	24.4
Rb	ppm	0.1	57.7	56.2	53.4	45.5	52.9	64.0	67.5
Ta	ppm	0.1	0.4	0.4	0.4	0.4	0.4	0.5	0.5
Nb	ppm	0.04	6.81	7.24	7.48	6.75	6.60	8.21	7.91
Cs	ppm	0.1	2.4	2.2	2.3	1.7	1.9	2.5	2.8
Ga	ppm	0.02	10.13	10.49	10.05	8.70	10.44	12.41	13.16
In	ppm	0.01	0.04	0.03	0.03	0.02	0.05	0.03	0.03
Re	ppm	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se	ppm	0.3	0.4	<0.3	<0.3	0.4	0.7	0.5	0.7
Te	ppm	0.05	0.09	0.08	0.12	0.09	0.11	0.09	0.07
Tl	ppm	0.05	0.40	0.39	0.38	0.32	0.37	0.43	0.45

1. Soil physico-chemical analyses were conducted in September and October 2018 by MAXXAM ANALYTIQUE, Quebec, Canada;
2. HST = High Subarctic Tundra Ecoregion;
3. Samples numbers and GPS number do not represent the ecoregion or the site;
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5. The highlighted numbers mean the parameter is over the soil criteria of the appendix 2 of the " Guide d'intervention-Protection des sols et réhabilitation des terrains contaminés. MDDELCC, 2016." entitled " Grille des critères génériques pour les sols". Blue is criteria A, yellow is criteria B and green is criteria C.

