2021 Annual Report — Project 2a (Goodwood) Québec

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AQ	Air quality
BOD_5	5-day biological oxygen demand
dB (L)	Decibel (measured in linear scale)
COD	Chemical oxygen demand
DO	Dissolved oxygen
DOC	Dissolved organic carbon
DSO	Direct-Shipping Ore
EDO	Environmental discharge objectives
EE-GW	Exposure site Goodwood
EEM	Environmental effects monitoring
EIA	Environmental impact assessment
ER-GW	Reference site Goodwood
g/m²	Gram per square meter
$g/m^2/30d$	Gram per square meter per 30 days
Hz	Hertz
Kg	kilogram
LQE	*Loi sur la Qualité de l'Environnement*
m	Meter
m³/day	Cubic meter per day
mg/L	Milligram per liter
mg/kg	Milligram per kilogram
mm/s	Millimeter per second
MDDEP	*Ministère du Développement Durable, Environnement et Parcs*
MDMER	Metal and Diamond Mine Environmental Regulation
MELCC	*Ministère de l'Environnement et de la Lutte contre les changements climatiques*
NL	Newfoundland and Labrador
NO_2	Nitrogen dioxide
OER	*Objectifs Environnementaux de Rejet*
PM2.5	Particulate matter (2.5 microns)

ppb	Parts per billion
SPLP	Synthetic precipitation leaching procedure
TCLP	Toxicity characteristic leaching procedure
TDS	Total dissolved solids
TKN	Total kjeldahl nitrogen
TOC	Total organic carbon
TP	Total phosphorus
TPM	Total particulate matter
TSMC	Tata Steel Minerals Canada Inc.
TSS	Total suspended solids
ug/L	Microgram per liter
$\mu g/m^3$	Microgram per cubic meter
ug/m^3/year	Microgram per cubic meter per year
QC	Québec

1 PERMITS AND AUTHORIZATION

1.1 Project 2a

Project 2a was subject to the environmental impact assessment (EIA) 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, an application for a certificate of authorization was submitted for long-term operations of the Goodwood pit. Approval was granted in April 2018.

In August 2019, TSMC filed a request for modification to the existing infrastructure with the *ministère de l'Environnement et de la Lutte contre les changements climatiques* (MELCC). This request presented the repair work required to maintain the Goodwood accumulation basin. Since this is maintenance work on existing infrastructure, the certificate of authorization does not have to be modified.

In the fall of 2019, TSMC submitted documents to get a sanitation certificate for the project: *Exploitation d'un établissement industriel d'extraction minier Fosse Goodwood à Schefferville*. In December 2020, the final draft of the sanitation certificate document was received for the project from the MELCC; the final official version was received on March 22, 2021.

A summary table detailing the monitoring type, the location, and the dates of each monitoring program was carried out is presented in Appendix I.

1.2 Waste rock extraction from Fleming 7 pit

For safety reasons, a volume of waste rock located in Quebec will have to be extracted once mining of the Fleming 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 OPERATIONS

2.1 Waste rock extraction from Fleming 7 pit

Since 2015, operations at the Fleming 7 pit have ceased and the waste rock located in Québec has yet to be extracted.

2.2 Project 2a

TSMC has decided to delay the start of the Sunny project, which is currently projected for 2037; therefore, the surface water monitoring activities associated with this project have been halted and will resume two years prior to the start of the project. PM2.5 and TPM monitoring was still performed at station AQS5 due to uncertainties about the requirements but will also be halted in 2022 after receiving confirmation of the stations to be monitored from the "*Direction de l'évaluation environnementale des projets industriels, miniers, énergétiques et nordiques*".

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

Construction of the water treatment plant was completed in October 2019. Repairs for the Goodwood basin were scheduled for the operational season of 2020 but were delayed due to difficulties in bringing materials and personnel to site because of the COVID-19 pandemic. The repairs were resumed in 2021 but logistical constraints caused by the pandemic restrictions and unplanned technical challenges slowed the operations and the repairs were not completed. A letter detailing the issues encountered, repairs which were achieved, and repairs to be completed in 2022 along with mitigation measures put in place for the spring melt period was sent to the MELCC on January 20, 2022 and is included in Appendix II.

2.3 Blasting summary

Table 1 presents the blasts conducted in Quebec in 2021. Data was collected using a microphone (UM12242 V 10-87 ISEE).

Table 1. Summary of blasting done at Goodwood

Blast date	Time	Pattern	Noise Level dB (L)	Peak ground vibration (mm/s)	ZC Frequency (Hz)
12-Feb	3:45 PM	GD-743-11 Redrill B	109.90	94.11	37
19-Feb	2:20 PM	GD-743-11 Redrill A	136.88	53.05	27
22-Feb	2:45 PM	GD-743-11 Redrill C	109.59	57.33	9
28-Feb	12:10 PM	GD-743-11 Redrill D	142.13	76.82	16.5
28-Feb	12:10 PM	GD-733-27	142.13	76.82	16.5
01-Mar	12:00 PM	GD-733-21	N/A	N/A	N/A
14-Mar	12:00 PM	GD-733-28	N/A	N/A	N/A
26-Mar	12:00 PM	GD-733-22	134.40	24.15	26
30-Mar	12:00 PM	GD-733-22/29	141.68	348.8	57
06-Apr	12:00 PM	GD-733-29	131.57	17.02	10.2
10-Apr	12:00 PM	GD-733-30	98.14	13.97	5
13-Apr	2:00 PM	GD-733-31	138.62	0.259	11.5
17-Apr	12:00 PM	GD-733-18	140.27	3.926	9.5

Blast date	Time	Pattern	Noise Level dB (L)	Peak ground vibration (mm/s)	ZC Frequency (Hz)
07-May	12:00 PM	GD-733-23	112.90	15.09	12.8
12-May	3:00 PM	GD-763-12	96.38	22.06	3.5
15-May	1:09 PM	GD-763-06	133.33	1.464	11.1
19-May	4:20 PM	GD-743-35	112.73	0.442	4.1
23-May	2:30 PM	GD-763-13	N/A	N/A	N/A
29-May	12:37 PM	GD-733-30-RD	119.38	2.253	3.8
04-Jun	4:30 PM	GD-753-26	132.73	0.626	16.5
08-Jun	12:20 AM	GD-763-08	133.25	0.414	22
13-Jun	12:30 PM	GD-733-26	129.62	2.629	7.5
22-Jun	12:23 PM	GD-763-09/10	120.23	0.552	7.1
28-Jun	4:00 PM	GD-753-27	113.43	8.705	4.3
30-Jun	3:00 PM	GD-733-32	100.21	20.35	3.5
05-Jul	3:00 PM	GD-733-33	118.59	1.774	10.9
11-Jul	5:00 PM	GD-733-34	144.40	1.296	11
16-Jul	12:46 PM	GD-763-14	114.06	0.339	10.2
19-Jul	12:06 PM	GD-753-28/29	119.47	0.264	3.3
21-Jul	12:01 PM	GD-733-35	123.23	3.086	12.3
27-Jul	12:06 PM	GD-733-36+33RD	136.85	3.912	11.5
01-Aug	5:04 PM	GD-743-33	135.33	3.176	6.7
09-Aug	12:00 PM	GD-763-15	121.10	0.263	3.4
11-Aug	5:00 PM	GD-743-36	132.98	0.279	23
14-Aug	5:00 PM	GD-753-30	118.61	0.311	6.5
16-Aug	5:00 PM	GD-743-37	137.39	3.53	5.5
22-Aug	12:30 PM	GD-753-31	115.99	0.243	3.5
29-Aug	5:49 PM	GD-763-16	135.28	1.997	21
01-Sep	5:35 PM	GD-753-Toe	116.55	0.45	5.8
11-Sep	3:00 PM	GD-763-17	123.25	0.459	9.3
13-Sep	5:00 PM	GD-753-32	122.25	1.956	5
19-Sep	9:00 AM	GD-753-09 RD	118.48	0.58	8.8
25-Sep	10:38 AM	GD-743-38	131.82	4.424	2.9
02-Oct	3:59 PM	GD-743-39	129.58	0.66	8.8
13-Oct	12:00 PM	GD-753-33	127.89	13.37	5.1
18-Oct	3:00 PM	GD-753-08 RD	114.99	0.608	5.5
23-Oct	12:19 PM	GD-743-40	125.01	2.163	7.8
27-Oct	12:07 PM	GD-733-38	127.83	1.514	6.1
06-Nov	2:00 PM	GD-763-18	120.08	16	14.6
10-Nov	2:00 PM	GD-743-41	132.48	3.427	9.7
16-Nov	12:00 PM	GD-743-Toe	123.79	1.122	3.7
30-Nov	12:15 PM	GD-753-34	110.20	0.833	4.7

Notes: N/A = not applicable, GD = Goodwood

2.4 Impact of the COVID-19 pandemic on operations

The onset of the COVID-19 pandemic has continued to impact the operational season at TSMC in 2021. Some restrictions have loosened regarding interactions with neighboring Indigenous communities but, the remoteness of the TSMC site continues to severely impact logistics and personnel. Mandatory health and safety measures, and all other aspects, have been changing rapidly as the pandemic evolves and develops, resulting in continued flight disruptions and necessary internal challenges to ensure the safety of local, and TSMC employees. The onsite shift was changed to a 3-weeks-on, 3-weeks-off schedule to minimize flights, later returning to the regular 2-weeks-on, 2-weeks-off.

Local workers were allowed access to the mine site again in 2021. All employees were required to receive a negative covid test prior to their travel to site, excluding the employees coming from the neighboring communities. Workers who were able to work from home continued to do so and mine workers who were staying at accommodations in town were not permitted to enter any local businesses. The snow sampling requirements were met this spring, without the assistance of local guides.

In the fall, when flight vaccination mandates were put in place, all employees and contractors who traveled to site had to show proof of vaccination. Unfortunately, with workers traveling from different provinces, some employees had to follow provincial mandatory isolation periods when returning home.

Shipment of on-site samples to our Quebec laboratories resumed, but samples were being shipped to Montréal on the tri-weekly/bi-weekly charters because access to airport cargo was still unavailable for commercial flights. Sample holding times continued to be extended, surpassing the maximum holding times for some parameters for sample analysis. Despite the challenges, TSMC was able to partially complete the Goodwood basin repairs, with the remainder of the repairs to conclude in the summer of 2022.

3 INCIDENTS

The only incident to occur at Goodwood in the reporting year was the springtime exfiltration at the base of the dyke for which mitigation measures were already put in place. TSMC took special measures to prevent any incidents related to untreated water reaching the natural environment, which are described below. In both cases, TSMC provided regular updates (weekly, or more, as needed by the circumstance), to federal and provincial ministries on the status of the spring thaw at the Goodwood site.

3.1 Incidents in 2021

During the spring 2020 and 2021 snowmelt, groundwater exfiltration from the unlined portion of the basin was observed. In anticipation of this issue, TSMC implemented mitigation measures at this known exfiltration point in the form of flocculant blocks, filtration socks, and flocculant impregnated geojute. These appeared to have positive effects on clarification of any exfiltration water. The basin repairs were delayed due to the onset of the COVID-19 pandemic. Completion was scheduled for 2021, but the combined effect of the COVID-19 pandemic; the difficulties encountered on the field (which included logistical challenges); additional unplanned repairs that were found to be required; and inclement weather have not allowed for the successful completion of those repairs in 2021. The repairs are expected to resume in 2022. Details about issues encountered and remaining repairs are explained in the letter to the MELCC included in Appendix II. A visual of the exfiltration during spring melt is pictured in Appendix III.

Environmental technicians at TSMC performed water quality monitoring at the exfiltration point throughout the whole period where flow was present. Note that the spring melt is the only period in which any exfiltration was able flow past the containment structures built in 2018.

Table 2 presents selected results of the water analyses from the exfiltration for parameters of concern; other parameters were either below the detection limit or well below any applicable criteria. Exceedances of the MELCC criteria for both chronic and acute effects were noted for aluminum and pH. However, aluminum has been shown to be present in the natural background during the initial EIA and is also detected in all samples from the reference area. Surface water pH is naturally low in the region. Total suspended solids (TSS) were also noted to slightly exceed the criteria for chronic effects on one occasion, but other results mostly remained near or below the detection limit. Also, note that due to an error at the laboratory on analysis for the first two samples, total dissolved solids (TDS) were analyzed instead of TSS.

Iron concentrations were also followed closely and did not show any exceedance of applicable criteria, further demonstrating that contamination from mine water is very minimal at the exfiltration point.

The certificates of analysis for water exfiltration are presented in Appendix IV.

No other incidents occurred in 2021 in the Goodwood area.

Table 2. Results of the water exfiltration analysis

Date	pH	Al (ug/L)	Fe (ug/L)	TSS (mg/L)
MELCC (Acute)	***6.5 - 8.5***	***1***	***1,300***	***25***
MELCC (Chronic)	***6.5 - 8.5***	***0.63***	***3,400***	***5***
April 16	6.36	52	160	N/A
April 20	6.14	38	<60	N/A
April 26	6.9	N/A.	85	2
May 03	6.01	N/A.	83	3

Date	pH	Al (ug/L)	Fe (ug/L)	TSS (mg/L)
May 10	5.96	N/A	490	<2.0
May 17	7.63	64	240	6
May 24	6.29	40	140	3

Orange: Exceeding the CALG (chronic aquatic life guideline, MELCC (2019));
Red: Exceeding the AALG (acute aquatic life guideline, MELCC (2019)) or acute toxicity.

3.1.1 Management of spring thaw

Without a functional basin and fully commissioned water treatment plant, in the fall of 2018, a management plan was developed to prevent red water from the spring 2019 thaw from being discharged into the natural environment. The plan is presented in Appendix V and consisted of the construction of three additional ditches around the basin and one temporary dike, and a system of pumps to divert water away from the area and out of the natural environment. As this plan was successful, it was repeated in spring 2021 in its same form.

The same winterization and meltwater management plan will also be implemented for the thaw in spring 2022. Additional mitigation measures to compensate the unfinished repairs have also been put in place, including removing the temporary dike to facilitate spring pumping from the whole basin and covering unrepaired areas with temporary unwelded geomembrane as a precaution to prevent water infiltration. The complete mitigation measures put in place are described in Appendix VI.

The snowmelt management plan is generally comprised of the following steps or components:

- Snow management occurs before the melt, including clearing snow from the ditches to allow for proper water circulation.
- Installation of a pumping system between the Goodwood basin and the Kivivik 1C pit.
- Water level management in the whole basin.
- Pumping system at the location of the exfiltration downstream of the basin, in case red water was released to the environment.

3.1.2 Monitoring in spring 2022

Visual monitoring will be conducted during snow melt. Should exfiltration occur, samples will be taken for analysis to ensure that any water escaping to the environment meets MELCC criteria for water quality.

Visual inspections at the exfiltration will be increased in frequency compared to previous years to ensure the temporary repairs function as planned. Additional mitigation measures will be deployed as needed if a flow increase or a degradation in water quality is observed.

3.2 Community Complaints

No community complaints were received regarding the Goodwood project in 2021.

4 SURFACE WATER QUALITY MONITORING

TSMC has monitored surface water quality for the Goodwood project since 2015. Surface water quality results around the Goodwood project generally remain below the MELCC criteria for surface water, except for aluminum, which was shown to be naturally present in the background during the EIA undertaken in 2010 (New Millennium Capital Corp., 2010) and is usually found at the reference area station at Migration Lake (which is unexposed to mining activities). The pH is also usually naturally below applicable criteria in most waterbodies in the surrounding areas.

The locations of the water quality monitoring stations are presented in Figure 1. Two stations are monitored: EE-GW, the station representing the exposure area located at the outlet of Fra Lake; and ER-GW, the reference station 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; dissolved organic carbon (DOC), total organic carbon (TOC), conductivity, chloride, BOD_5 (5-day biological oxygen demand), hardness, TSS, pH, dissolved oxygen (DO), phenols, sulfides, bicarbonates, carbonate, and TDS.
- Ions and nutrients: ammonium nitrate, total kjeldahl nitrogen (TKN), cyanide, fluoride, nitrates, nitrites, reactive silica, hydrogen sulfur, and sulfates.
- Hydrocarbons: C_{10}-C_{50}.
- 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, TI, and Tl.
- Microbiological: total and fecal coliforms.

Once annually, sampling includes the following trace metals: Al, Sb, Ag, As, Ba, Bo, Cd, Cr, Co, Cu, Sn, Fe, Mn, Mo, Ni, PT, Pb, Se, Th, U, V, and Zn.

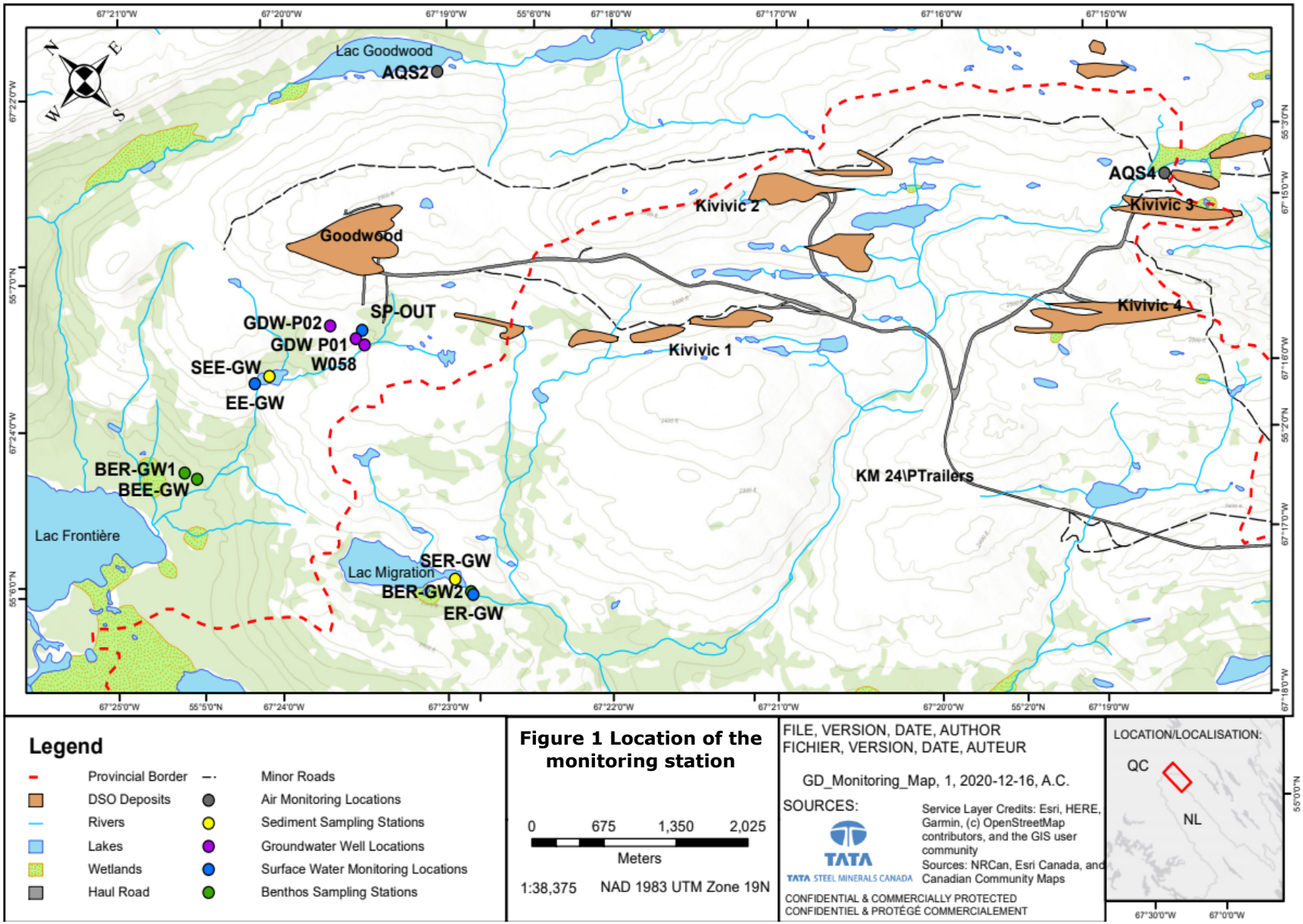

Figure 1 Location of the monitoring station

4.1 Sampling Schedule

Monthly sampling was conducted in the natural environment (EE and ER) during the ice-free period for conventional parameters, ions, nutrients, hydrocarbons, metals, and metalloids; all 2021 samples were analyzed for trace metals.

All the parameters for both stations were sampled during the same days. The sampling schedule in 2021 was as follows:

- Quarter 1 – June 26;
- Quarter 2 – July 26;
- Quarter 3 – September 5; and
- Quarter 4 – October 10.

4.2 Sampling results

Certificates of analysis for water sampling 2021 results are presented in Appendix VII.

Results of the 2021 surface water monitoring campaign did not show any exceedance of the MELCC criteria for acute and chronic effects on aquatic life related to mining activities.

Aluminum concentrations were found to exceed these criteria on most samples from both the exposure and reference points. However, aluminum is naturally present in the area as shown in the EIA completed before the start of the project (New Millennium Capital Corp., 2010). Also, the highest concentration detected in 2021 (73 ug/L) was found at the reference point. Therefore, aluminum concentrations found in Fra Lake are most likely from the natural background. Also note that since the criterion for aluminum varies in relation to pH, hardness, and DOC and that the hardness concentrations found in the Goodwood area are well below those for which an aluminum criterion was established, the lowest concentrations listed were used (1 ug/L for acute effects; 0.63 ug/L for chronic effects).

The pH was again lower than the MELCC's aquatic life guidelines, excluding the second quarter sample collected at the reference point at Migration Lake (ER-GW). Surface water pH is naturally low in the Goodwood area, as well as in surrounding areas, therefore this situation is a natural occurrence.

Table 3. MELCC criteria exceedance for aquatic life – annual monitoring

Date	pH	Al (ug/L)
	EE-GW	
MELCC (Acute)	***6.5 - 8.5***	***1***
MELCC (Chronic)	***6.5 – 8.5***	***0.63***
June 26	5.62	27
July 26	6.02	25
September 05	5.96	9
October 10	5.91	<5
	ER-GW	
June 26	5.59	14
July 26	7.8	11
September 05	5.38	33

Date	pH	Al (ug/L)
October 10	5.51	73

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 (LOD) does not allow a ruling on the level on toxicity of the contaminant (LOD > CALG)

4.3 Surface water quality monitoring update

There was no update for this program in 2021.

5 SEDIMENT AND BENTHOS QUALITY MONITORING

Benthos community monitoring was carried out in 2021. Sediment monitoring was not done in 2021, as it was completed in 2019 and is not scheduled to be done again until 2024.

5.1 Sediment quality

Sediment monitoring is conducted once every 5 years at the lakes associated with the water quality monitoring stations, and for the following parameters:

- Metals (Al, As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, Zn);
- Phosphorous;
- Nitrogen ammonia;
- Petroleum hydrocarbons C_{10}-C_{50};
- Total organic carbon; and
- Sulfur.

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

5.2 Benthic community

The 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 at the end of summer. The descriptors that are assessed are:

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

The benthic community was monitored at two sampling stations on September 2 downstream of the exposed station (Fra Lake), and on September 5 at the reference station (Migration Lake).

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

5.3 Sediment quality monitoring program update

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

6 MINING EFFLUENT 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 quality control, TSMC mandated WSP to conduct construction surveillance.

The construction of the Goodwood water treatment plant was completed in fall 2019 and commissioning was planned for spring 2020. Unfortunately, the onset of the COVID-19 pandemic halted the transportation of materials and technical personnel to the mine site, thus delaying the commissioning of the water treatment plant. TSMC intended to carry out the commissioning in spring of 2021, but repairs of the Goodwood basin were not completed due to onsite challenges.

Due to the availability of K1C pit, where runoff resulting from the spring melt and rain as well as water from dewatering operations is pumped, Goodwood has not had any effluent outflow thus far during its operations. Therefore, no effluent sampling was conducted in 2021.

No effluent is expected until the Goodwood basin repairs are completed, and the water treatment plant is fully commissioned in 2023.

6.1 Metal and Diamond Mining Effluent Regulations Monitoring (MDMER)

Since the treatment plant was not commissioned in 2021, there was no effluent discharged to the environment, therefore, no effluent sampling occurred. The planned monitoring program is nonetheless described in the following sections.

6.1.1 Effluent Components

Table 4 shows sampling frequency and the parameters used for effluent monitoring. The monitoring program will be implemented as soon as the plant is operational.

Table 4. Future effluent monitoring parameters and sampling frequencies

Frequency	Parameters
Continuous	Conductivity, pH
Weekly	TSS, As, Cu, Fe, Ni, Pb and Zn, pH
Monthly	Acute Toxicity (*O. mykiss* and *D. magna*)
Quarterly	Alkalinity, hardness, Al, Cd, Fe, Hg, Mo, NH_3, NO_3, DO, 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%, using the following:

- *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 physical-chemical 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 MDMER).

6.1.2 Environmental effects monitoring

The Goodwood project will be subjected to environmental effects monitoring (EEM) studies once the effluent volume output reaches 50 m^3/day. There was no effluent output in 2021.

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 present 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 in addition to the weekly analyses are:

- Conventional: hardness, alkalinity, conductivity, and temperature;
- Metals and nitrogen compounds: Al, Cd, Fe, Mo, Se, NH_4, NO_3, and Hg.

6.1.2.2 Sublethal toxicity testing

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

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

6.1.3 Biological monitoring

Pursuant to Section 9(1) (a) of Schedule 5 of the MDMER, a study on the fish population will be conducted if the effluent concentration in the exposed zone is superior to 1% at less than 250 m downstream of the final discharge point. It will therefore be required to measure effluent concentration 250 m downstream of the final discharge point as soon as effluent is produced by the water treatment plant. In addition, a study on fish tissue (mercury) will be conducted if a mercury concentration equal or more than 0.10 µg/L is noted during the characterization. Additionally, a study on fish tissue (selenium) shall be carried out if an arsenic concentration of 10 µg/Lor more is measured during the effluent 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 the directive, by virtue of article 22 of the *Loi sur la qualité de l'environnement* (LQE) and according to the *Objectifs environnementaux de rejet* (OER; EDO herein). The latter were calculated by the MELCC specifically for the Project 2a. Once the project is subject to the Directive 019 for effluent monitoring, sampling shall be carried out according to the frequencies indicated in Table 5.

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 5. These frequencies must be maintained until the final cessation of mining activities.

Table 5. Directive 019 Monitoring

Frequency	Parameters
Continuous	pH, flow rate
3 x week	TSS
Weekly	As, Cu, Fe, Ni, Pb, Zn
Monthly	Acute toxicity (*O. mykiss* and *D. magna*)
Quarterly	Alkalinity, Cl^-, conductivity, BOD_5, chemical oxygen demand (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-}, $S_2O_3^{2-}$

The annual monitoring is conducted once a year, during the summer period. It includes the analysis and measurement of several parameters (Table 5). 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.

To evaluate the global toxicity of the mining effluents according to Directive 019, this monitoring also includes lethal toxicity tests, which were developed by the MDDEP, 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 discharge objectives (EDO) monitoring

Monitoring of the contaminants to which EDO were determined is required for the mining effluent 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 EDO for Project 2a. This document outlines the concentrations and loading towards which the final effluent at Goodwood must trend.

Additional requested parameters (barium, chromium, manganese, selenium, nitrites, and hydrogen sulfide) will be analyzed under the quarterly monitoring plan. 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 6 presents the overall monitoring that will be conducted in relation to the mining effluent at Goodwood. The monitoring required under Directive 019 will be in place as soon as the treatment plant is operational, while the monitoring required under the MDMER will begin when the volume of effluent reaches 50 m^3/day.

Table 6. Future effluent monitoring parameters and sampling frequencies

Frequency	Parameters
Continuous	pH, flow rate, conductivity
3 x week	TSS
Weekly	As, Cu, Fe, Ni, Pb, Zn
Monthly	Acute toxicity (*O. mykiss* and *D. magna*)
Quarterly	Alkalinity, total hardness, Al, Ba, Cd, Cr, Fe, Hg, Mn, Mo, Se, H_2S NH_3, NO_2, NO_3, DO, temperature
Annually	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-}, $S_2O_3^{2-}$

7 GROUNDWATER MONITORING

Drilling work was done in fall of 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 65 m and 80 m respectively), did not detect any groundwater.

7.1 Water table monitoring

Well water levels must be measured twice annually: in spring and in summer. In 2021, measurements were conducted twice, on July 12 and September 20. Water was not present on either occasion.

7.2 Groundwater sampling

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

- C_{10}-C_{50};
- pH, oxidation-reduction potential;
- 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.

No groundwater was detected in the monitoring wells on both occasions where it was verified.

7.3 Groundwater monitoring program update

No updates are planned. The wells will be monitored in 2022 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. Locations of the monitoring stations are shown on Figure 2 and Figure 3.

As in previous years, TSMC encountered several difficulties preventing the completion of all required air quality monitoring activities. Notably, the PQ-200 units used for PM2.5 and total particulate matter (TPM) concentrations monitoring continued to underperform and suffered breakages that shortened the monitoring season. Snow conditions also continued to impact the start of the air monitoring campaigns, with sporadic residual snow patches making both pickups and snowmobiles useless for accessing the stations located around Goodwood. Consequently, air quality monitoring could not be started until the second half of June.

Results and difficulties encountered with the different components of the air quality program are discussed in their respective sections.

8.1 Sampling

The sampling results are presented in the following sections. The certificates of analysis are presented in Appendices IX, X and XI, including the calculation tables for comparison with the standards (24h, 30 days, annual according to the criteria).

8.1.1 NO_2

Monitoring of NO_2 concentrations took place during every operational month in 2021 at all stations. Sampling periods (when access was restricted due to snow conditions in the fall and the spring) were extended beyond the usual approximate 30-day period. Winter access was only possible when meteorological conditions were acceptable.

Results are shown in Table 7 below. No exceedances of provincial standards (QC and NL) were recorded in 2021. The highest value was measured at AQS9 station for the period from September 9 to November 11, with a value of 1.316 µg/m^3 (value measured from 0.5 ppb converted by considering that 1 ppb NO_2=1.88 µg/m^3), well below the provincial standard of 103 µ/m^3. Certificates of analysis are included in Appendix IX.

Table 7. NO_2 results

Station	Start date (mm-dd)	End date (mm-dd)	NO_2 (ppb)	NO_2 (µg/m^3)
AQS2	01-10	02-14	<0.1	N/A
AQS4	01-04	02-15	--	N/A
AQS6	01-12	04-06	<0.1	N/A
AQS9	01-12	04-07	<0.1	N/A
AQS2	02-14	04-16	<0.1	N/A
AQS4	02-15	04-10	<0.1	N/A
AQS2	04-16	05-25	<0.1	N/A
AQS4	04-10	05-25	<0.1	N/A
AQS6	04-06	05-25	<0.1	N/A
AQS9	04-07	05-25	<0.1	N/A
AQS2	05-25	06-28	<0.1	N/A

Station	Start date (mm-dd)	End date (mm-dd)	NO_2 (ppb)	NO_2 ($\mu g/m^3$)
AQS4	05-25	06-28	<0.1	N/A
AQS6	05-25	06-30	0.2	0.376
AQS9	05-25	06-28	0.4	0.752
AQS2	06-28	08-01	0.1	0.188
AQS4	06-28	08-01	0.2	0.376
AQS6	06-30	08-01	0.4	0.752
AQS9	06-28	08-02	0.3	0.564
AQS2	08-01	09-09	0.3	0.564
AQS4	08-01	09-09	0.1	0.188
AQS6	08-01	09-09	0.2	0.376
AQS9	08-02	09-09	0.4	0.752
AQS2	09-09	11-20	0.3	0.564
AQS4	09-09	11-24	<0.1	N/A
AQS6	09-09	11-15	0.4	0.752
AQS9	09-09	11-24	0.7	1.316
AQS2	11-20	12-27	0.2	0.376
AQS4	11-24	11-24	0.1	0.188
AQS6	11-15	12-22	0.4	0.752
AQS9	11-24	12-28	0.5	0.94

Notes: -- missing information; N/A: not available data; ppb = parts per billion

8.1.2 Dustfall

Dustfall sampling occurred throughout the summer and a portion of fall in 2021. Sampling jars were put in place as soon as access to all monitoring stations became possible. As in previous years, road access conditions did not allow to start dustfall monitoring in May; it was instead started in the latter half of June.

Snow conditions also posed issues with the last sampling period. Due to unexpected early snow fall, it was impossible to access the jars that were put in place in September. Jars had to be left in place longer than the planned sampling period and could only be collected once snow conditions allowed snowshoe access. The jars at stations AQS1 and AQS5 had to be left in place since they cannot be accessed safely until much later in winter.

Winter sampling using snow cores was conducted in April, before the onset of the spring melt, without encountering any issues.

There is no standard in Québec for dust deposition. The Newfoundland and Labrador standard is 7.0 $g/m^2/30$ days. The results obtained at the various stations during both summer and winter sampling are well below this standard. Appendix X presents the calculations for dust deposition. The certificates of analysis are presented in Appendix X.

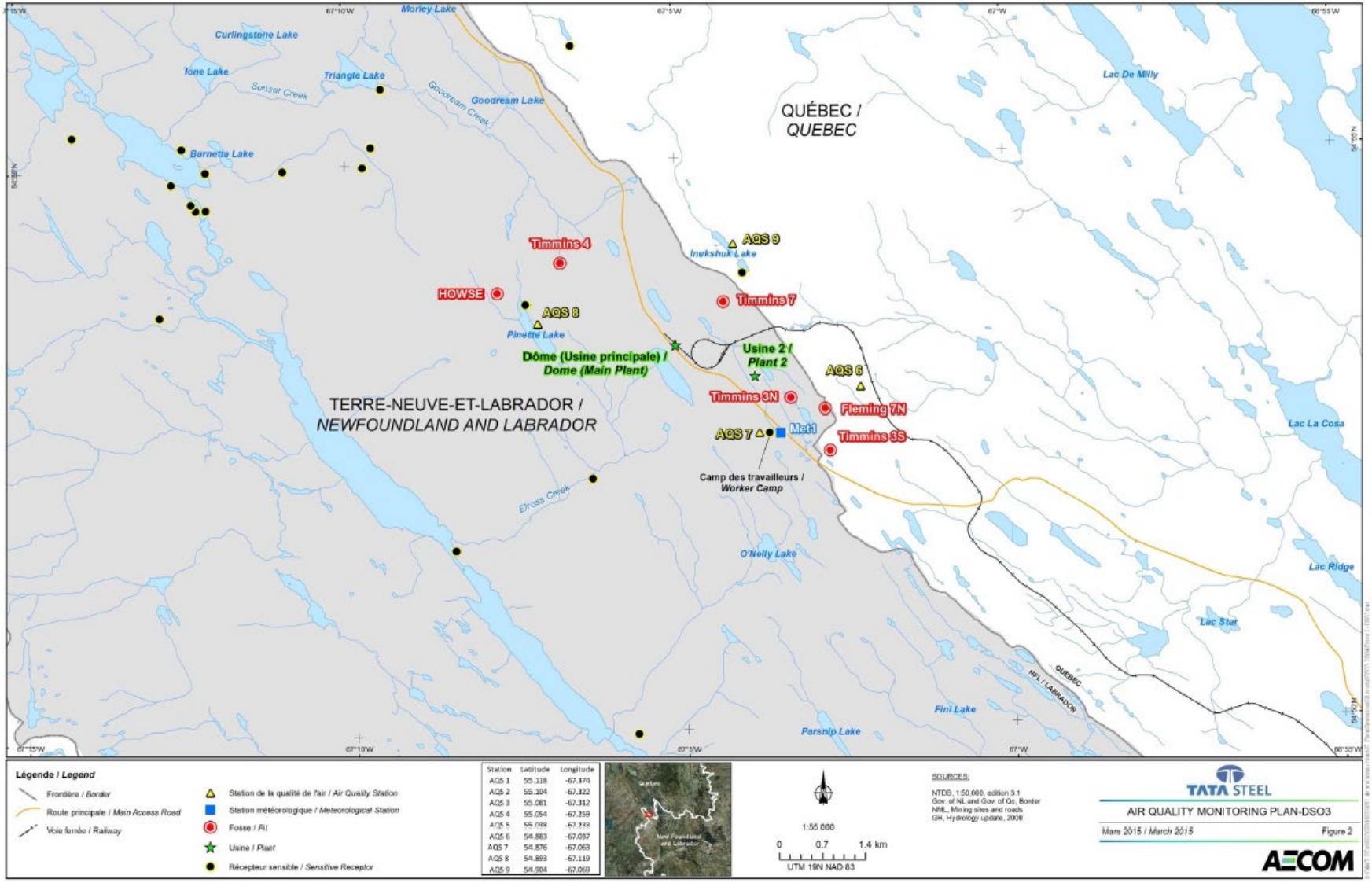

Figure 2. Location of air quality monitoring stations – DSO3

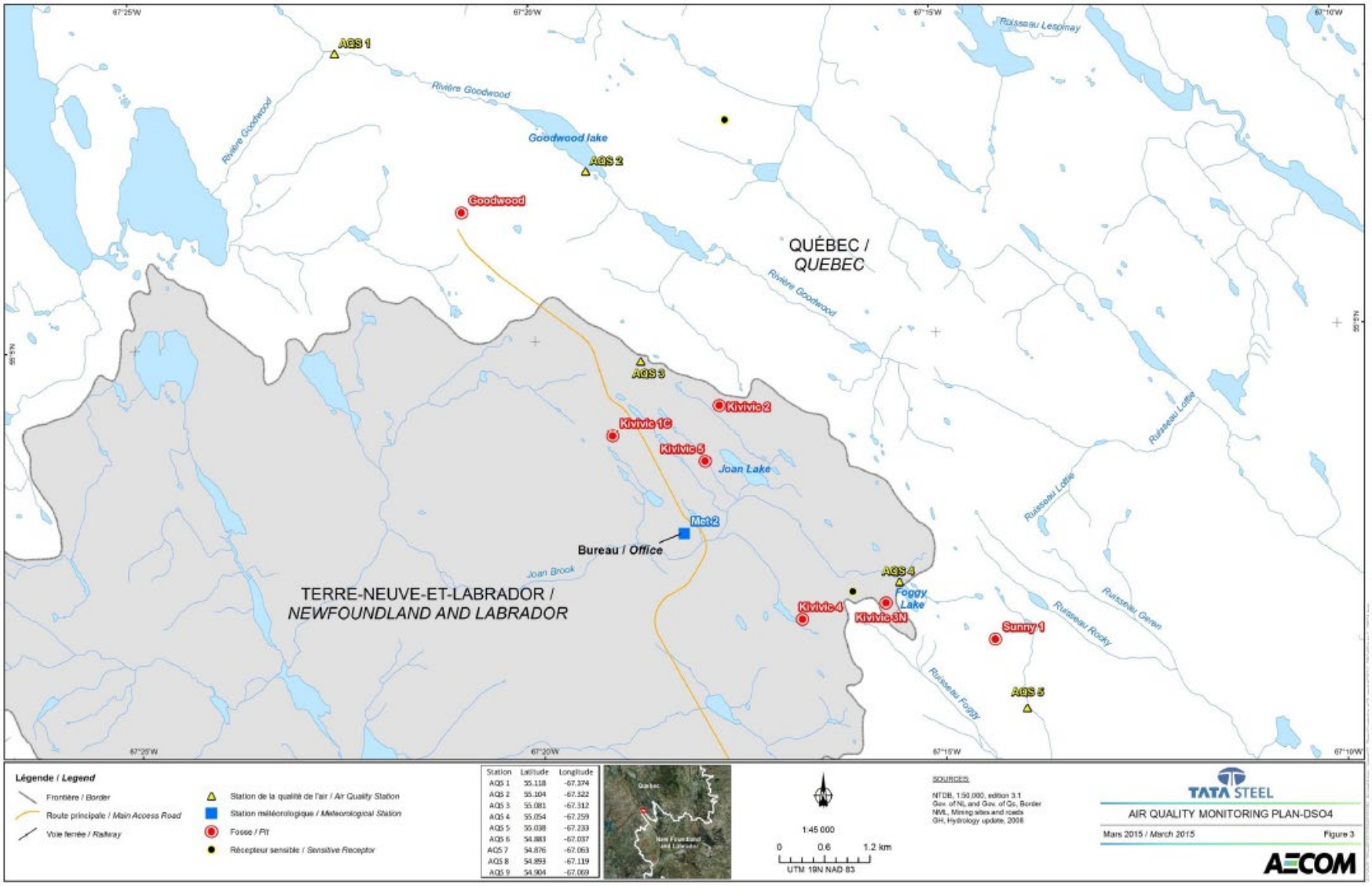

Figure 3. Location of air quality monitoring stations – DSO4

8.1.2.1 Snow sampling

Snow sampling for the 2021 winter period occurred at all stations between April 4 and April 19, 2021. Table 8 shows the sampling dates and results for the dust deposited in snow. Appendix X presents the deposition calculations for dust.

For the purpose of calculations, November 1st was used a as theoretical date for the start of winter after which snow remained permanently on the ground.

8.1.2.2 Summer dustfall sampling

For the summer period, results are available from the end of June to October. Table 8 shows the sampling dates and results for the dust deposition. Appendix X presents the deposition calculations for dust.

For dustfall calculations, October 10 was used as a theoretical date for the end of the sampling period after which date jars would be frozen permanently and would therefore stop collecting dust efficiently.

Table 8. Results of dust deposition - 2021

Quarter	Station	Start date (yyyy-mm-dd)	End date (yyyy-mm-dd)	Dust fallout (g/m²/30d)	Comment
Winter	AQS1	2020-11-01	2021-04-16	0.34566	
	AQS2	2020-11-01	2021-04-16	1.44194	
	AQS3	2020-11-01	2021-04-17	0.21550	
	AQS4	2020-11-01	2021-04-10	0.31406	
	AQS5	2020-11-01	2021-04-10	0.21008	
	AQS6	2020-11-01	2021-04-04	0.72975	
	AQS9	2020-11-01	2021-04-07	0.32438	
Q1	AQS1	2021-06-28	2021-08-01	1.05288	
	AQS2	2021-06-28	2021-08-01	1.23181	
	AQS3	2021-06-28	2021-08-01	1.33877	
	AQS4	2021-06-28	2021-08-01	0.56809	
	AQS5	2021-06-28	2021-08-01	0.31939	
	AQS6	2021-06-30	2021-08-01	0.37155	
	AQS9	2021-06-28	2021-08-02	0.61777	
Q2	AQS1	2021-08-01	2021-09-14	1.65045	
	AQS2	2021-08-01	N/A	N/A	Bear damage
	AQS3	2021-08-01	2021-09-14	0.84621	
	AQS4	2021-08-01	2021-09-14	0.80932	
	AQS5	2021-08-01	2021-09-14	0.80873	
	AQS6	2021-08-01	2021-09-14	0.46235	
	AQS9	2021-08-02	2021-09-15	0.80999	
Q3	AQS1	2021-09-14	N/A	N/A	Inaccessible
	AQS2	2021-09-15	2021-10-10	2.18702	
	AQS3	2021-09-14	2021-10-10	2.23576	
	AQS4	2021-09-14	2021-10-10	3.02852	

Quarter	Station	Start date (yyyy-mm-dd)	End date (yyyy-mm-dd)	Dust fallout ($g/m^2/30d$)	Comment
	AQS5	2021-09-14	N/A	N/A	Inaccessible
	AQS6	2021-09-14	2021-10-10	0.20460	
	AQS9	2021-09-15	2021-10-10	2.43117	

Notes: N/A= not applicable

8.1.3 PM2.5 and total particulate matter

The PQ-200 monitors used by TSMC continued to present issues preventing completion of the PM2.5 and TPM sampling requirements. Both units had been repaired and calibrated before the start of the sampling season and performed well during test runs done prior to the first field deployment.

However, as noted on previous years, these monitors are sensitive to transport on the rough roads that must be used to access the monitoring points. Basic field repairs are sometimes required after moving the monitor from one station to another when pre-operation leak tests fail, and more complex repairs are often required after a few movements. The monitor used for PM2.5 became unusable after only four sampling events and could not be repaired for several weeks during which only TPM could be monitored. By August 9, it became impossible for field technicians to properly fix the units which constantly failed leak tests; both PM2.5 and TPM monitoring were halted following this.

A consultant was mandated to explore possible replacements for the PQ-200s. Available technologies that could meet all the requirements of our sampling program were reviewed; however, no suitable replacement was suggested. Several other EPA-approved instruments utilizing the same sampling method exist but would likely suffer the same failures as the PQ-200s when used in the same conditions. TSMC will continue to explore replacement options, including implanting permanent stations. However, logistical, and financial constraints prevent this for now. The PQ-200 units will be repaired by a professional consultant and will be ready for use during the 2022 sampling season.

Another issue noted with the PQ-200s is the frequent discrepancies with results. PM2.5 and TPM sampling occur at the same time whenever both units are available, with the units placed only a few meters apart. Results on a third of the samples for which both units ran concurrently show higher PM2.5 concentrations than TPM (which is implausible). PM2.5 being a fraction of TPM, results for TPM concentrations should always be higher. The cause of these discrepancies has not been determined and could be multiple, such as: contamination of the sampling media, contamination of the sampler during transportation, malfunction of the instrument during the sampling period despite passing pre-operational tests, etc. The large proportion of implausible results also casts a doubt on the validity of all results from this type of monitoring done in the difficult conditions to which the samplers are exposed.

One exceedance was noted on the PM2.5 sample taken on July 23 at AQS5. However, results show a lower concentration of TPM which indicates an invalid result. Also, since the Sunny Project is inactive, there are no mining operations nearby and AQS5 is situated on a wind-swept mountainside with exposed soil and bare rock; therefore, dusty conditions are possible on windy days, but are unrelated to mining activities. Additionally, the dust deposition results at this station remain well below the NL standard and are usually among the lowest recorded at all stations, further evidencing that dust is not a common occurrence at this station.

Results for the samples obtained in 2021 are shown in Table 9 below. Results highlighted in yellow show discrepancies. Certificates of analysis are presented in Appendix XI.

Table 9. Results of PM2.5 particles and total particulate matter

Station	Date	TPM		PM2.5	
		Weight of Particles (g)	Concentration (ug/m³)	Weight of Particles (g)	Concentration (ug/m³)
AQS3	June 14	<0.0002	N/A	Damaged filter	
AQS4	June 16	0.0004	16.63	0.0004	16.63
AQS5	June 17	<0.0002	N/A	0.0002	8.32
AQS6	June 18	0.0004	16.63	0.0005	20.79
AQS9	June 19	<0.0002	N/A	0.0004	16.63
AQS2	June 28	<0.0002	N/A	Sampler defective	
AQS4	June 29	0.0002	8.32	Sampler defective	
AQS6	June 30	<0.0002	N/A	Sampler defective	
AQS2	July 10	0.0005	20.79	Sampler defective	
AQS4	July 11	<0.0002	N/A	Sampler defective	
AQS6	July 13	0.0006	24.95	0.0003	12.48
AQS5	July 23	0.0009	37.43	0.0012	49.90
AQS9	July 24	0.0008	33.27	0.0006	24.95
AQS2	July 26	0.0005	20.79	0.0002	8.32
AQS4	July 29	0.0006	24.95	0.0004	16.63
AQS6	August 02	0.0002	8.32	<0.0002	N/A
AQS2	August 07	0.0005	20.79	0.0002	8.32
AQS4	August 09	<0.0002	N/A	<0.0002	N/A

Notes: discrepancies; N/A= Not applicable

8.2 Meteorological stations

The meteorological stations were installed in August 2019 (Figure 2). The Kivivic station was installed on a flat and not too rocky area behind the trailers at KM24 (in Newfoundland and Labrador), at a prescribed distance of more than 10X the height of the surrounding buildings. A second station has been installed at the camp site. The stations can capture data on snowpack, precipitation, wind speed and direction, ambient temperature, and relative humidity. Data may be output in various frequency ranging from daily to every 2 minutes. Both stations were functional in 2021, except for the rain gauge (which did not perform well). A consultant was hired for maintenance and calibration of the stations; this is planned for summer 2022.

Figure 4. Kivivic Meteorological Station

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 and tests:

- Sulfur percentage;
- MABA static test;
- TCLP, SPLP and CTEU-9 lixiviation tests;
- Metals (Ag, As, Ba, Cd, Co, Cr, Cu, Fe, Sn, Mn, Hg, Mo, Ni, Pb, Se, Zn), analyzed in the rock sample and the lixiviate; and
- Parameters outlined in Directive 019 (B, U, total fluorides, nitrites, and nitrates).

9.1 2021 Monitoring

A total of 21 samples of waste rock were collected for analyses in 2021, while 1,375,511 tons of waste rock were extracted from the Goodwood pit during this period. Certificates of analysis are presented in Appendix XII.

Analytical results for the metal concentrations in the waste rock samples were interpreted according to the requirements under Directive 019 which stipulates that the criteria from the "*Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés*" from the MELCC must be used for the interpretation. The only metals for which criteria exceedances have been recorded are arsenic and manganese. Of the 21 samples analyzed, 9 exceeded the "A" criterion for arsenic with levels in the "A-B" range. Exceedances of the "B" criterion for manganese were recorded on one sample; and the "C" criterion for this same metal was exceeded on one sample. As mentioned in the EIA submitted in 2010 (New Millennium Capital Corp., 2010), these metals were found in the natural background at concentrations exceeding the current applicable criteria in the Goodwood area.

Sulfur percentages remain very low on all analyzed samples with most being under the detection limit. The highest value recorded was 0.04% on sample TSMC-81334, but this sample did not show any acid generation potential. The waste rock is therefore not considered as potentially acid generating.

Analytical results from the leachates of all three analytical methods (TCLP, SPLP and CTEU-9) did not show any concentrations above the criteria for resurgence in surface water.

9.2 Waste rock monitoring program update

No updates are planned. The monitoring program for the waste piles will be carried out in 2022 to ensure that the conditions of the certificate are met.

10 GEOTECHNICAL MONITORING

As per its certificate of operations for Project 2A, TSMC must verify the physical stability of the infrastructure at Goodwood on a regular basis (*Projet 2A – Exploitation Du Gisement Goodwood : Demande De Certificat D'Autorisation pour L'Exploitation Miniere en Vertu des Articles 22 et 32 de la LQE, Section 4.4*). This is done on a continual basis during operations at Goodwood; if personnel onsite observe any problems related to the physical stability of the infrastructure at Goodwood, it is reported to managers.

The major infrastructure, such as the dike of the Goodwood basin and the waste piles, will be inspected by external experts yearly. WSP consultants came to site in 2021 to conduct a geotechnical investigation of existing infrastructure. The results of this investigation are included on Appendix XIII. TSMC plans to continue these inspections in 2022.

Additionally, a stability analysis was done on the waste rock pile which concluded that the pile is stable, and that the safety factor was above the recommended acceptable criteria.

Their detailed observations for 2021 are presented in the reports in Appendix XIV.

11 AVIFAUNA SURVEY

In the EIA, TSMC committed to conduct a quinquennial monitoring of avifauna. These monitoring activities aim to determine whether the mining activities have had 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.

12 CLOSURE PLAN AND REHABILITATION

Rehabilitation activities done in 2021 for the Goodwood area were limited but provided encouraging results. Following the success with willow cuttings planted in 2020 in the Howse project sector, TSMC tried this approach at Goodwood which is located at higher elevation and has a shorter growing season. Cuttings were planted in the stripped soil areas at the base of the dike with a low population density to evaluate survival. Despite a dry period in the weeks following planting, survival was estimated to be above 75%.

Observations carried out in spring 2021 on the Howse project determined that the survival rate after one winter is excellent with very little mortality occurring during the winter. It is expected that the survival rate will be similar at Goodwood, although a slightly higher mortality rate is expected due to the shorter growing season and more exposed conditions.

This successful approach will be used again in 2022 with willow stems harvested in late fall 2021 and stored under snow for conservation. These cuttings will be planted to increase the population density at the base of the dike and additional areas such as the stripped soil around the water treatment plant pad will also be targeted.

In 2021, an updated version of TSMC's closure and rehabilitation plan was provided to the MERN. Specifications concerning the waste rock rocks berm that will secure the pit as well as the stability analysis for the pit in post-restoration are presented in this revision of the restoration plan.

13 COMMUNITIES

The Citizen Information Program, along with other community communications, is typically implemented and maintained by the Community Affairs Manager. Due to unforeseen circumstances, this representative has been absent for the majority of 2021. As a result, documentation and information on the respective work and communications with our neighboring communities is limited. A new representative has been appointed recently, which will again bring TSMC closer to the local population, their concerns, and comments. TSMC's relationship with neighboring communities is very important to the Company, which is looking forward to reviving the relationship.

Concerning the COVID-19 situation in 2021, a notice was shared to the neighboring communities and is presented in Appendix XV.

14 CONCLUSIONS RELATED TO 2021 OPERATIONS

In 2021, TSMC continued the operations at the Goodwood pit, and completed a large portion of the repairs required at the accumulation basin. However, several challenges including unplanned additional repairs and logistical issues prevented completion of the repairs. They will be finalized in 2022.

TSMC will start 2022 with a spring plan to capture all the meltwater from the spring thaw and redirect it to K1C pit, which is located in Labrador, in the same manner as the previous year. Operations at Goodwood are expected to be continuous, carrying on from the winter of 2021 into the spring and summer of 2022.

At the same time, preparations are ongoing for the commissioning of the water treatment plant as well as completion of the repairs at the Goodwood basin. They should be done during summer 2022 and the water treatment unit will be commissioned in 2023.

15 REFERENCES

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New Millenium Capital Corp. (2010) *DSO Project - Project 2a – Impact Statement Submitted to Government of Québec,* Final version of 2 August 2010

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.

TSMC [Tata Steel Minerals Canada Ltd.]. (2018) *Plan de suivi de la qualité de l'air du Projet DSO*. Tata Steel Minerals Canada Ltd, 22 p. et 3 Appendices.

APPENDICES

Appendix I. Summary table - monitoring program

Monitoring Program	Monitoring Type	Location	Date(s) Performed		Comments/Observation
Surface Water	Grab samples	EE-GW	June 6; July 26; September 5; October 10		
		ER-GW			
Groundwater	Verify presence of groundwater in wells	GDW-P01	July 10; September 20		Wells were dry
		GDW-P02			
Effluent	Grab samples	WTU effluent	n/a		No effluent produced in 2021
Air Quality (TPM & TPM2.5)	PQ-200 sampling	AQS2	**TPM**	**TPM2.5**	Multiple issues with equipment function prevented completion of sampling program
			June 28; July 10, 26; Aug 7	June 28; July 26; Aug 7	
		AQS3	June 14	June 14	
		AQS4	June 16, 29; July 11, 29	June 16; July 29	
		AQS5	June 17; July 23	June 17; July 23	
		AQS6	June 18, 30; July 12; Aug 2	June 18; July 12; Aug2	
		AQS9	June 19; July 24	June 19; July 24	
Air Quality (NO2)	Passive sampling	AQS2	January 10; February 14; April 16; May 25; June 28; August 1; September 9; November 20; December 27		Dates are those when sampling was removed *Some stations in NL have been removed from the sampling list
		AQS4	January 4; February 15; April 10; May 25; June 28; August 1; September 9; November 24; December 28		
		AQS6	January 12; April 6; May 25; June 30; August 1; September 9; November 15; December 22		
		AQS7	January 12; April 19; May 25*		
		AQS8	January 3; April 11; May 25*		
		AQS9	January 12; April 7; May 25; June 28; August 2; September 9; November 24; December 26		
Dust Deposition (Summer)	Dustfall jars	AQS1	June 28; August 1; September 14		
		AQS2	June 28; August 1*; November 20		Dates are those when sampling was removed AQS1 and 5 last sample not removed due to access, AQS2 damaged by bear with a new jar out 9/14
		AQS3	June 28; August 1; September 14; November 20		
		AQS4	June 28; August 1; September 14; November 24		
		AQS5	June 28; August 1; September 21*		
		AQS6	June 30; August 1; September 14; November 15		
		AQS9	June 28; August 2; September 15; November 24		
Dust Deposition (Winter)	Snow cores	AQS1, AQS2, AQS3, AQS4, AQS5, AQS6, AQS9	April 4, 7, 10, 16, 17, 19		*AQS7 & 8 have been removed from the program for 2022
Waste Rock (Acid Rock Drainage- ARD)	Grab samples	Goodwood waste rock			1 to 5 samples per month depending on waste rock movement
Invertebrates	Composite samples with Surber sampler	BEE (Lac Fra outflow) & BER (Lac Migration outflow)	September 2, 5		
Sediments	Grab samples				Not to be completed until 2024

Monitoring Program	Monitoring Type	Location	Date(s) Performed	Comments/Observation
Site Inspection	Visual inspection	Goodwood infrastructures	Daily	Completed by Mining personnel
Geotechnical Inspection	Inspection by consultant	Goodwood infrastructures	June	Completed by WSP
Bird Population	Field survey	Goodwood surrounding habitats		Next survey due in 2022

Appendix II. Letter to MELCC- Goodwood basin repairs

Montréal, le 20 janvier, 2022

Mariepier Arsenault
Inspectrice en environnement
Contrôle environnemental de la Côte-Nord
Ministère de l'Environnement et de la Lutte contre les changements climatiques
818, boulevard Laure, r.c.
Sept-Îles (Québec)
G4R 1Y8

Objet: Mise à jour – Construction du bassin de rétention Goodwood

Bonjour Mme Arsenault,

Tel que discuté lors de notre conversation téléphonique du 29 décembre dernier, nous vous transmettons une mise à jour des travaux effectués en 2021 au bassin de rétention Goodwood. La nécessité d'entreprendre ces travaux fait suite aux dommages observés sur la géomembrane à l'intérieur du bassin de rétention Goodwood lors de la fonte printanière de 2018. Ces dommages incluaient des ruptures de géomembrane, des perforations, des soulèvements ainsi que des fissures longitudinales. Un plan de réparation et de remise en état a été élaboré par la firme WSP afin de terminer les réparations des dommages qui ont été identifiés lors des inspections du bassin Goodwood. Ces travaux qui devaient être complétés en 2020 non finalement pu être réalisés en raison de la pandémie Covid-19. Au cours de la saison de construction 2021, Tata Steel Minerals Canada (TSMC) a donc commencé (sous surveillance de WSP), les réparations de réhabilitation du bassin Goodwood. Malheureusement, les travaux de réparation n'ont pu être achevés tel que prévu en 2021 en raison des contraintes logistiques et sanitaires reliées à la situation de pandémie ainsi que de plusieurs difficultés techniques rencontrées sur le site des travaux. Veuillez donc accepter cette lettre en guise de mise à jour de la saison de construction 2021 pour donner suite à votre visite du site du 7 octobre 2021. Cette lettre explique les mesures de réhabilitation terminées, les travaux à terminer, ainsi que les mesures d'atténuation prévues au printemps 2022.

L'étendue initiale des travaux de construction prévus pour 2021 qui comprenait les mesures d'atténuation suivantes est présentée à la figure 1 :

1. **Enlèvement de la digue temporaire**
2. **Construction et démantèlement d'une route d'accès temporaire**
3. **Construction du drain de fondation**: Installer un drain de fondation sous le bassin le long de la périphérie amont du bassin s'étendant d'un point haut partant du côté nord-ouest à un point bas du côté sud-est. L'eau recueillie dans le drain de fondation coule vers une station de pompage de laquelle l'eau sera pompée dans le bassin.

4. **Installation de la station de pompage**: Installation d'une station de pompage préfabriquée à la sortie du drain de fondation.
5. **Reprofilage de la digue en amont**: Les pentes amont dans trois zones (telles qu'identifiées dans la figure 1) nécessitaient l'enlèvement de l'enrochement et de la géomembrane, le reprofilage de la pente et l'installation d'une nouvelle géomembrane et un nouvel enrochement.
6. **Réparation de la géomembrane aux zones de soulèvement**: À tous les endroits où des dommages à la géomembrane existante ont été détectés, la géomembrane endommagée doit être retirée et remplacée par une nouvelle géomembrane et un nouvel enrochement.
7. **Achat et installation d'un système d'instrumentation et d'acquisition de données dans la digue**: aux locations identifiées sur le dessin conceptuel (**Error! Reference source not found.**), installation de piézomètres à corde vibrante et d'inclinomètres horizontaux et verticaux.

Tel que mentionné précédemment, en plus des contraintes reliées à la situation pandémique, plusieurs difficultés ont été rencontrées au cours de la période de construction 2021 et par conséquent, toutes les mesures de réhabilitation n'ont pu être achevées. Les principales difficultés techniques rencontrées sur le site des travaux sont présentées ci-après:

- Les inspections effectuées durant la construction ont permis d'identifier des zones additionnelles à réparer qui ont été ajoutées aux travaux. Les travaux ajoutés comprennent:
  - Des zones additionnelles de géomembrane endommagée où elle a dû être enlevée et remplacée par de la nouvelle géomembrane soudée.
  - La zone de soulèvement de la membrane (identifiée en vert sur la figure 1) était plus grande que prévu initialement. Cette zone a nécessité un enlèvement supplémentaire de géomembrane endommagée et le soudage d'une nouvelle géomembrane.
  - La zone à enrocher sur la crête de la digue était plus grande que prévu initialement.

- Arrivée plus tardive que prévu des entrepreneurs et des matériaux. Plus précisément, FC Liner n'était pas disponible avant octobre.

- Conditions météorologiques – travaux de soudure de la membrane discontinus en raison de la pluie, de la neige et des températures froides (Les travaux de construction ont été interrompus le 19 décembre 2021 en raison des conditions météorologiques défavorables).

- Déneigement fréquent requis plus tard dans la période de construction ayant ajouté des délais.

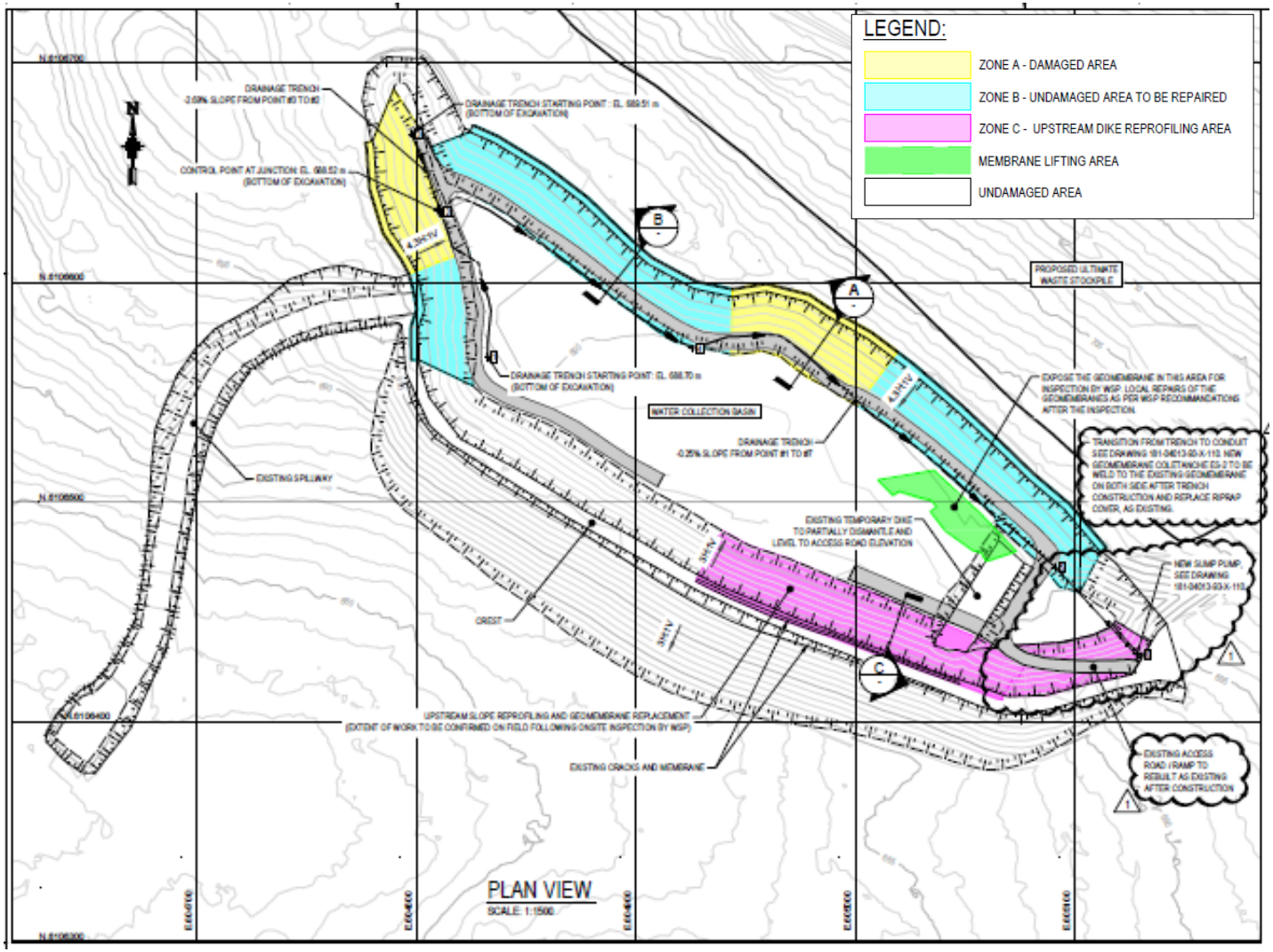


Figure 1: Aperçu du plan de réhabilitation du bassin de Goodwood

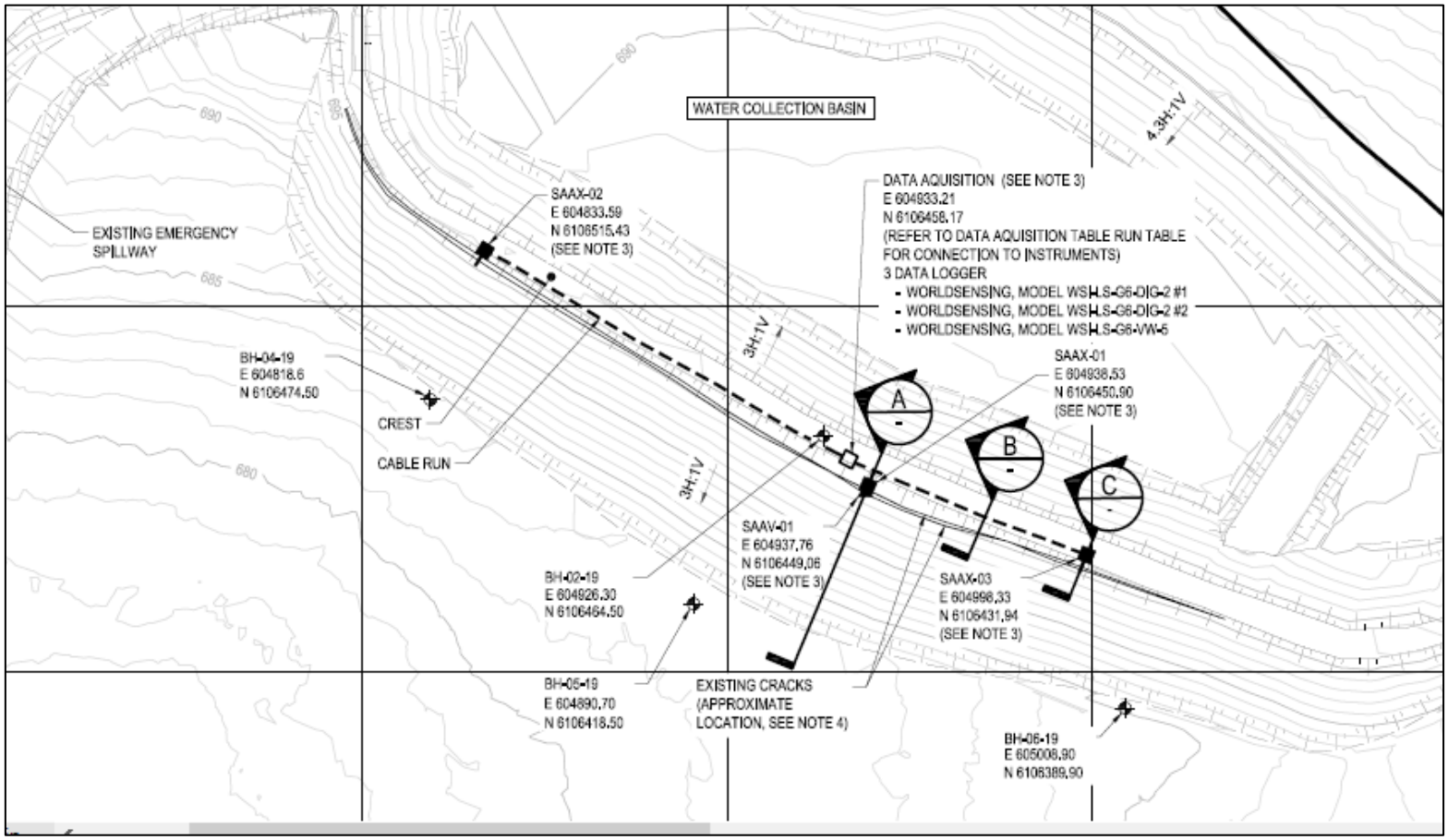


Figure 2: Système d'instrumentation et d'acquisition de données

TATA STEEL MINERALS CANADA LIMITED
1000 Sherbrooke West, Suite 1120, Montreal, Quebec, H3A 3G4, Canada
Tel: 001 514 764 6700, Fax: 001 514 764 6725
Registered Office: Suite 1700, Park Place, 666 Burrard Street, Vancouver, BC V6C 2X8, Canada

Malgré ces contraintes, les efforts déployés par TSMC ont permis d'avancer considérablement les travaux prévus initialement. Un résumé de l'état des travaux de la période de construction 2021 est présenté au ***Tableau 1***.

Tableau 1: Résumé des travaux de construction 2021

Item	Travaux	
	Complétés	**A compléter**
Enrochement de la crête de la digue	• Enrochement de la digue sur les côtés Ouest, Nord et Est. A noter que l'enrochement n'était originalement prévu que sur le côté Ouest.	• Zone B Sud-Est de la crête de la digue à enrocher (tel qu'identifié sur la **Figure 2**.)
Reprofilage de la pente et remplacement de la géomembrane en Zone A (Jaune sur la Figure 1) et Zone C (Rose sur la Figure 1)	• Reprofilage de la pente et remplacement de la géomembrane en Zone A complétés.	• Reprofilage de la pente, remplacement de la géomembrane et nouvel enrochement en Zone C • Enrochement de la pente en zone A
Construction de la tranchée de drainage	• Construction de la tranchée de drainage terminée du point 1 au point 6 tel qu'identifié sur la Figure 1	• Enrochement de la tranchée de la Station 0+000 à la Station 0+254. • Remplacer la géomembrane temporaire tel qu'expliqué ci-dessous et identifié à la ***Figure 3***.
Reprofilage de la zone Est du bassin (tel qu'identifié en vert à la Figure 1)	• Reprofilage dû au soulèvement de membrane de Sta. 0+254 à Sta. 0+357 terminé • Reprofilage dû au soulèvement de membrane de Sta. 0+260 à Sta. 0+410	• Tous les travaux sont terminés. Noter que la zone à reprofiler était plus grande que prévu.

Item	Travaux	
	Complétés	**A compléter**
Station de pompage	• Trou d'homme installé et pente remblayée	• Réexcaver autour du trou d'homme pour démonter la section du dessus. • Ajouter les 1.5m de structure manquante pour amener au niveau de la surface. • Remblayer avec du matériel convenable et compacter. • Installer le système de pompage dans le trou d'homme. • Installer une génératrice pour alimenter la station de pompage • Identifier et réparer la géomembrane non-soudée au niveau du plancher du bassin.
Digue temporaire	• Digue partiellement démantelée	• La zone doit être reprofilée et la géomembrane remplacée.
Route d'accès	• La route d'accès pour la construction est terminée.	• Enlever la route d'accès lorsque les travaux sont complétés.
Installation temporaire de géomembrane - La géomembrane a été temporairement mise en place dans la partie Est du bassin ainsi qu'à partir de la digue jusqu'à la partie Sud a en amont (identifié à la figure 3). La géomembrane temporaire doit être remplacée par une nouvelle géomembrane.	• La mise en place de géomembrane s'est poursuivie après le 6 décembre. Cependant, FC Liners ne garantit aucune soudure après cette date en raison des conditions météo. • Après le 15 décembre, la pose de la géomembrane a été poursuivie aux endroits où elle était manquante afin de limiter l'infiltration d'eau. Toutefois, celle-ci a été mise en place temporairement sans soudure.	• Remplacer la géomembrane temporaire par de la neuve. Soudure de la nouvelle géomembrane à celle en place.
Installation de piézomètres SAAV, SAAX et VW	• Aucun travail complété	• Installation des piézomètres SAAV, SAAX et VW.

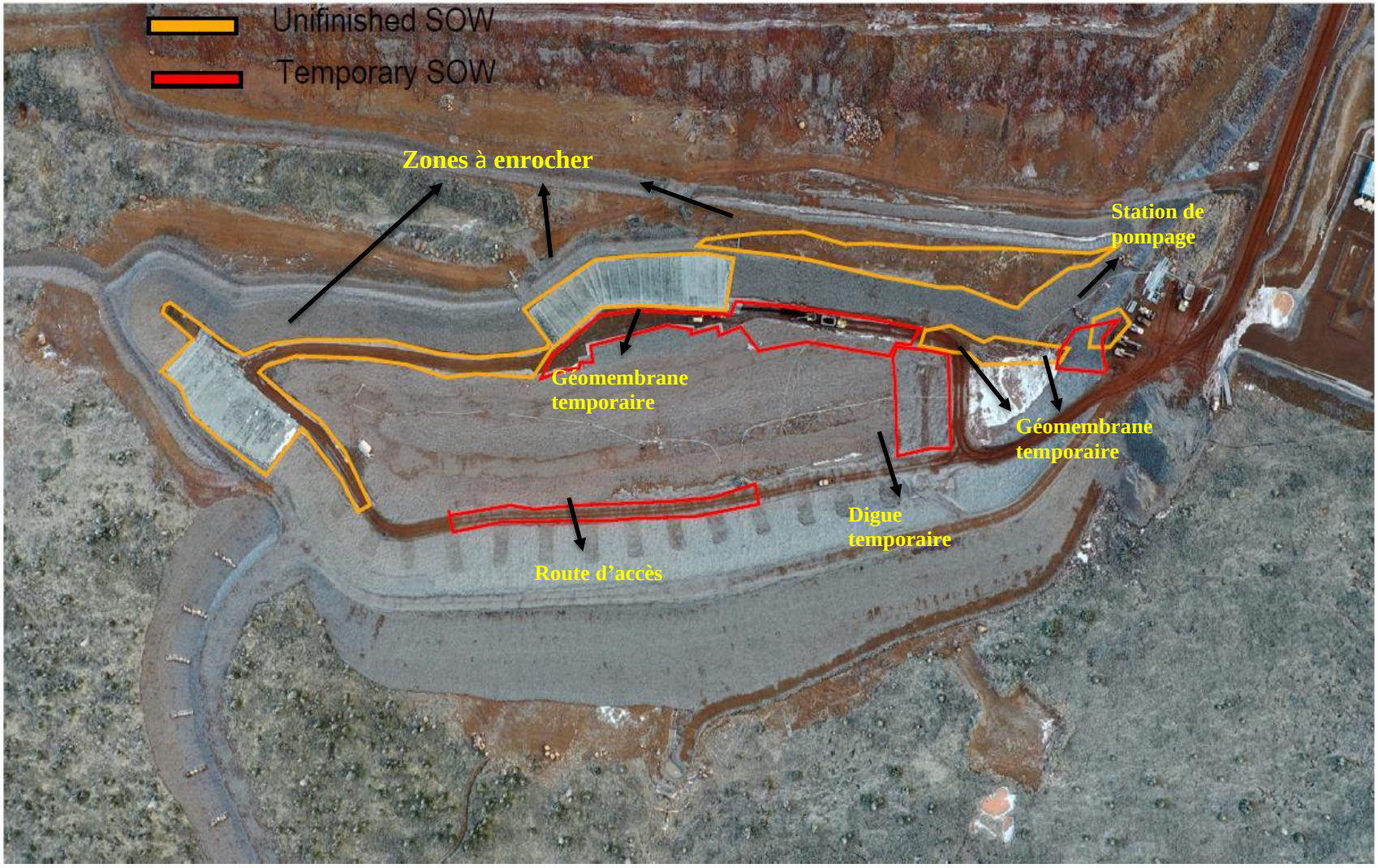


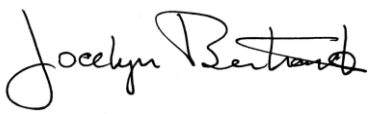
Figure 3: Travaux temporaires et à compléter

TSMC s'engage à mettre en œuvre tous les efforts nécessaires pour terminer au cours de la saison de construction 2022 les travaux énumérés au ***Tableau 1*** et présenté à la ***Figure 3***.

À cet effet, TSMC mettra en place un plan d'atténuation pour réduire le risque de déversements pendant la crue printanière de 2022. La principale mesure du plan d'atténuation est d'empêcher toute accumulation d'eau dans le bassin Goodwood pendant la crue printanière de 2022. Au fur et à mesure que l'eau s'accumulera dans le bassin, elle sera pompée vers la fosse Goodwood ou la fosse K1C. TSMC évalue présentement le volume à pomper, le type de pompes requis, ainsi que la tuyauterie requise. Une fois l'évaluation terminée, l'équipement requis sera commandé et installé avant la crue printanière (du début à la mi-avril).

Espérant que ces informations vous conviennent, n'hésitez pas à me contacter si vous avez besoin de plus ample information.

Veuillez agréer, Madame, mes salutations distinguées.



Jocelyn Bertrand
Directeur par intérim - Environnement

Appendix III. Photography report of the spring melt exfiltration- Goodwood basin

Visual of tbe exfiltration during spring melt		
		
May 23rd, 2021	May 29th, 2021	May 30th, 2021
		
June 1tt, 2021		

Appendix IV. Certificate of analysis- Water exfiltration

Your P.O. #: 3000000997
Your Project #: GOODWOOD
Site Location: GW EXFIL
Your C.O.C. #: N/A

Attention: Mariana Trindade

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

Report Date: 2021/08/20
Report #: R2683463
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

LAB BV JOB #: C117485
Received: 2021/04/23, 16:30

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Extractable Metals by ICP	2	2021/04/29	2021/04/30	STL SOP-00062	MA.200–Mét. 1.2 R7
Ammonia Nitrogen	2	N/A	2021/04/29	STL SOP-00040	MA.300–N 2.0 R2 m
pH	2	N/A	2021/04/23	STL SOP-00038	MA.100–pH 1.1 R3 m
Total Dissolved Solids	2	2021/04/23	2021/04/29	STL SOP-00050	MA.115–S.D. 1.0 R4 m
Total Nitrogen	2	2021/04/29	2021/04/29	STL SOP-00077	MOE:TOTNUT-E3516v1.3

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas 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 Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, results relate to the supplied samples tested.

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.

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

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Your P.O. #: 3000000997
Your Project #: GOODWOOD
Site Location: GW EXFIL
Your C.O.C. #: N/A

Attention: Mariana Trindade

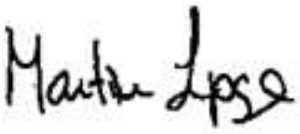
TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, QC
CANADA H3A 3G4

Report Date: 2021/08/20
Report #: R2683463
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

LAB BV JOB #: C117485
Received: 2021/04/23, 16:30

Encryption Key



Martine Lepage
Project Manager and Account Manager
24 Aug 2021 14:48:59

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: Martine.LEPAGE@bureauveritas.com
Phone# (418)543-3788 Ext:7066201

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Lab BV Job #: C117485
Report Date: 2021/08/20

TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD
Site Location: GW EXFIL
Your P.O. #: 3000000997
Sampler Initials: JFD

TOTAL EXTRACTABLE METALS (WATER)

Lab BV ID		JA5372	JA5373		
Sampling Date		2021/04/16 15:25	2021/04/20 14:50		
	Units	GW-EXF	GW-EXF-2	RDL	QC Batch
METALS					
Aluminum (Al)	ug/L	52	38	10	2181380
Antimony (Sb)	ug/L	<1.0	<1.0	1.0	2181380
Silver (Ag)	ug/L	<1.0	<1.0	1.0	2181380
Arsenic (As)	ug/L	<1.0	<1.0	1.0	2181380
Barium (Ba)	ug/L	<2.0	<2.0	2.0	2181380
Boron (B) †	ug/L	<50	<50	50	2181380
Cadmium (Cd)	ug/L	<0.20	<0.20	0.20	2181380
Calcium (Ca) †	ug/L	560	<500	500	2181380
Chromium (Cr)	ug/L	<5.0	<5.0	5.0	2181380
Cobalt (Co)	ug/L	<1.0	<1.0	1.0	2181380
Copper (Cu)	ug/L	<1.0	<1.0	1.0	2181380
Total Hardness (CaCO3) ††	ug/L	3000	2400	1000	2181380
Tin (Sn)	ug/L	<2.0	<2.0	2.0	2181380
Iron (Fe)	ug/L	160	<60	60	2181380
Magnesium (Mg) †	ug/L	380	310	100	2181380
Manganese (Mn)	ug/L	30	25	1.0	2181380
Mercury (Hg)	ug/L	<0.10	<0.10	0.10	2181380
Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	2181380
Nickel (Ni)	ug/L	<2.0	<2.0	2.0	2181380
Total phosphorous	ug/L	<10	<10	10	2181380
Lead (Pb)	ug/L	<0.50	<0.50	0.50	2181380
Potassium (K) †	ug/L	<500	<500	500	2181380
Selenium (Se)	ug/L	<3.0	<3.0	3.0	2181380
Sodium (Na)	ug/L	<500	<500	500	2181380
Thallium (Tl)	ug/L	<2.0	<2.0	2.0	2181380
Titanium (Ti) ††	ug/L	<10	<10	10	2181380
Uranium (U) ††	ug/L	<1.0	<1.0	1.0	2181380
Vanadium (V)	ug/L	<2.0	<2.0	2.0	2181380
Zinc (Zn)	ug/L	8.1	<7.0	7.0	2181380

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accredited
†† Parameter is not accreditable

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Lab BV Job #: C117485
Report Date: 2021/08/20

TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD
Site Location: GW EXFIL
Your P.O. #: 3000000997
Sampler Initials: JFD

CONVENTIONAL PARAMETERS (WATER)

Lab BV ID		JA5372	JA5373		
Sampling Date		2021/04/16 15:25	2021/04/20 14:50		
	Units	GW-EXF	GW-EXF-2	RDL	QC Batch
CONVENTIONALS					
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	<0.020	<0.020	0.020	2181356
pH	pH	6.36	6.14	N/A	2180011
TKN Total Kjeldahl Nitrogen	mg/L	<0.40	<0.40	0.40	2181342
Total Dissolved Solids	mg/L	27	23	10	2180042

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

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GENERAL COMMENTS

pH: Holding time already past upon reception.: JA5372, JA5373
Version 2: ajout métaux demandé par le client le 18 août 2021.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2180011	VPA	Spiked Blank	pH	2021/04/23		102	%
2180042	PS5	Spiked Blank	Total Dissolved Solids	2021/04/29		92	%
2180042	PS5	Method Blank	Total Dissolved Solids	2021/04/29	<10		mg/L
2181342	BPH	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/04/29		101	%
2181342	BPH	Method Blank	TKN Total Kjeldahl Nitrogen	2021/04/29	<0.40		mg/L
2181356	AHK	Spiked Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/04/29		108	%
2181356	AHK	Method Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/04/29	<0.020		mg/L
2181380	AT7	Spiked Blank	Aluminum (Al)	2021/04/30		101	%
			Antimony (Sb)	2021/04/30		113	%
			Silver (Ag)	2021/04/30		108	%
			Arsenic (As)	2021/04/30		106	%
			Barium (Ba)	2021/04/30		112	%
			Boron (B)	2021/04/30		112	%
			Cadmium (Cd)	2021/04/30		106	%
			Calcium (Ca)	2021/04/30		104	%
			Chromium (Cr)	2021/04/30		97	%
			Cobalt (Co)	2021/04/30		98	%
			Copper (Cu)	2021/04/30		96	%
			Tin (Sn)	2021/04/30		118	%
			Iron (Fe)	2021/04/30		101	%
			Magnesium (Mg)	2021/04/30		94	%
			Manganese (Mn)	2021/04/30		105	%
			Mercury (Hg)	2021/04/30		89	%
			Molybdenum (Mo)	2021/04/30		114	%
			Nickel (Ni)	2021/04/30		96	%
			Total phosphorous	2021/04/30		95	%
			Lead (Pb)	2021/04/30		104	%
			Potassium (K)	2021/04/30		102	%
			Selenium (Se)	2021/04/30		95	%
			Sodium (Na)	2021/04/30		93	%
			Thallium (Tl)	2021/04/30		105	%
			Titanium (Ti)	2021/04/30		102	%
			Uranium (U)	2021/04/30		107	%
			Vanadium (V)	2021/04/30		102	%
			Zinc (Zn)	2021/04/30		95	%
2181380	AT7	Method Blank	Aluminum (Al)	2021/04/30	<10		ug/L
			Antimony (Sb)	2021/04/30	<1.0		ug/L
			Silver (Ag)	2021/04/30	<1.0		ug/L
			Arsenic (As)	2021/04/30	<1.0		ug/L
			Barium (Ba)	2021/04/30	<2.0		ug/L
			Boron (B)	2021/04/30	<50		ug/L
			Cadmium (Cd)	2021/04/30	<0.20		ug/L
			Calcium (Ca)	2021/04/30	<500		ug/L
			Chromium (Cr)	2021/04/30	<5.0		ug/L
			Cobalt (Co)	2021/04/30	<1.0		ug/L
			Copper (Cu)	2021/04/30	<1.0		ug/L
			Total Hardness (CaCO3)	2021/04/30	<1000		ug/L
			Tin (Sn)	2021/04/30	<2.0		ug/L
			Iron (Fe)	2021/04/30	<60		ug/L
			Magnesium (Mg)	2021/04/30	<100		ug/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Manganese (Mn)	2021/04/30	<1.0		ug/L
			Mercury (Hg)	2021/04/30	<0.10		ug/L
			Molybdenum (Mo)	2021/04/30	1.2, RDL=1.0		ug/L
			Nickel (Ni)	2021/04/30	<2.0		ug/L
			Total phosphorous	2021/04/30	<10		ug/L
			Lead (Pb)	2021/04/30	<0.50		ug/L
			Potassium (K)	2021/04/30	<500		ug/L
			Selenium (Se)	2021/04/30	<3.0		ug/L
			Sodium (Na)	2021/04/30	<500		ug/L
			Thallium (Tl)	2021/04/30	<2.0		ug/L
			Titanium (Ti)	2021/04/30	<10		ug/L
			Uranium (U)	2021/04/30	<1.0		ug/L
			Vanadium (V)	2021/04/30	<2.0		ug/L
			Zinc (Zn)	2021/04/30	<7.0		ug/L

RDL = Reportable Detection Limit

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.

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

Lab BV Job #: C117485
Report Date: 2021/08/20

TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD
Site Location: GW EXFIL
Your P.O. #: 3000000997
Sampler Initials: JFD

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Miryam Assayag, B.Sc. Chemist, Montréal, Team Leader

Shu Yang, B.Sc. Chemist, Montreal, Analyst II

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

2021/08/20 15:25

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Your P.O. #: 3000000997
Your Project #: GOODWOOD EXFILTRATION
Site#: DS04
Your C.O.C. #: C#808542-01-01

Attention: Mariana Trindade

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

Report Date: 2021/06/02
Report #: R2661503
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C121652
Received: 2021/05/14, 08:45

Sample Matrix: Waste Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Suspended Solids	3	2021/05/15	2021/05/19	STL SOP-00015	MA.104–S.S. 2.0 m
Total Extractable Metals by ICP	3	2021/05/19	2021/05/20	STL SOP-00062	MA.200–Mét. 1.2 R7
Ammonia Nitrogen	3	N/A	2021/05/18	STL SOP-00040	MA.300–N 2.0 R2 m
pH	3	N/A	2021/05/14	STL SOP-00038	MA.100–pH 1.1 R3 m
Sulfides (as S2-)	3	2021/05/20	2021/05/20	STL SOP-00005	MA. 300 – S 1.2 R3 m
Total Nitrogen	3	2021/05/19	2021/05/19	STL SOP-00077	MOE:TOTNUT-E3516v1.3
Radium-226 Low Level (1, 2)	3	N/A	2021/06/01	BQL SOP-00006 BQL SOP-00017 BQL SOP-00032	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas 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 Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, results relate to the supplied samples tested.

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 Bureau Veritas Radiological via Montreal

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Your P.O. #: 3000000997
Your Project #: GOODWOOD EXFILTRATION
Site#: DS04
Your C.O.C. #: C#808542-01-01

Attention: Mariana Trindade

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

Report Date: 2021/06/02
Report #: R2661503
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C121652
Received: 2021/05/14, 08:45

(2) Radium-226 results have not been corrected for blanks.

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

Encryption Key

Martine Lepage
Project Manager and Account Manager
03 Jun 2021 16:59:16

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: Martine.LEPAGE@bureauveritas.com
Phone# (418)543-3788 Ext:7066201

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Lab BV Job #: C121652
Report Date: 2021/06/02

TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD EXFILTRATION
Your P.O. #: 3000000997
Sampler Initials: AC

RESULTS OF ANALYSES OF WASTE WATER

Lab BV ID		JC6563	JC6564	JC6565		
Sampling Date		2021/04/26 11:30	2021/05/03 11:30	2021/05/10 11:30		
COC Number		C#808542-01-01	C#808542-01-01	C#808542-01-01		
	Units	GD-EXFIL-3-2021	GD-EXFIL-4-2021	GD-EXFIL-5-2021	RDL	QC Batch
RADIONUCLIDE						
Radium-226	Bq/L	<0.005	<0.005	<0.005	0.005	2191580

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD EXFILTRATION
Your P.O. #: 3000000997
Sampler Initials: AC

TOTAL EXTRACTABLE METALS (WASTE WATER)

Lab BV ID		JC6563	JC6564	JC6565		
Sampling Date		2021/04/26 11:30	2021/05/03 11:30	2021/05/10 11:30		
COC Number		C#808542-01-01	C#808542-01-01	C#808542-01-01		
	Units	GD-EXFIL-3-2021	GD-EXFIL-4-2021	GD-EXFIL-5-2021	RDL	QC Batch
METALS						
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	1.0	2187490
Barium (Ba)	ug/L	<2.0	<2.0	<2.0	2.0	2187490
Copper (Cu)	ug/L	<1.0	<1.0	<1.0	1.0	2187490
Iron (Fe)	ug/L	85	83	490	60	2187490
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	2.0	2187490
Lead (Pb)	ug/L	<0.50	<0.50	<0.50	0.50	2187490
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	3.0	2187490
Zinc (Zn)	ug/L	<7.0	<7.0	<7.0	7.0	2187490

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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CONVENTIONAL PARAMETERS (WASTE WATER)

Lab BV ID		JC6563	JC6564	JC6564	JC6565		
Sampling Date		2021/04/26 11:30	2021/05/03 11:30	2021/05/03 11:30	2021/05/10 11:30		
COC Number		C#808542-01-01	C#808542-01-01	C#808542-01-01	C#808542-01-01		
	Units	GD-EXFIL-3-2021	GD-EXFIL-4-2021	GD-EXFIL-4-2021 Lab-Dup	GD-EXFIL-5-2021	RDL	QC Batch
CONVENTIONALS							
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	2187351
pH	pH	6.90	6.01	N/A	5.96	N/A	2186266
Sulfides (S2-)	mg/L	<0.020	<0.020	N/A	<0.020	0.020	2188006
TKN Total Kjeldahl Nitrogen	mg/L	<0.40	<0.40	N/A	<0.40	0.40	2187600
Total suspended solids (TSS)	mg/L	2.0	3.0	N/A	<2.0	2.0	2186401

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

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GENERAL COMMENTS

Total Suspended Solids: Holding time already past upon reception.: JC6563
pH: Holding time already past upon reception.: JC6563
Total Suspended Solids: Holding time already past upon reception.: JC6564
pH: Holding time already past upon reception.: JC6564, JC6565
Radium-226: Cette analyse est accréditée par le MELCC.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2186266	ANB	Spiked Blank	pH	2021/05/14		101	%
2186401	PS5	Spiked Blank	Total suspended solids (TSS)	2021/05/19		94	%
2186401	PS5	Method Blank	Total suspended solids (TSS)	2021/05/19	<2.0		mg/L
2187351	AHK	Spiked Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/05/18		107	%
2187351	AHK	Method Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/05/18	<0.020		mg/L
2187490	NET	Spiked Blank	Arsenic (As)	2021/05/20		111	%
			Barium (Ba)	2021/05/20		110	%
			Copper (Cu)	2021/05/20		96	%
			Iron (Fe)	2021/05/20		112	%
			Nickel (Ni)	2021/05/20		103	%
			Lead (Pb)	2021/05/20		103	%
			Selenium (Se)	2021/05/20		88	%
			Zinc (Zn)	2021/05/20		99	%
2187490	NET	Method Blank	Arsenic (As)	2021/05/20	<1.0		ug/L
			Barium (Ba)	2021/05/20	<2.0		ug/L
			Copper (Cu)	2021/05/20	<1.0		ug/L
			Iron (Fe)	2021/05/20	<60		ug/L
			Nickel (Ni)	2021/05/20	<2.0		ug/L
			Lead (Pb)	2021/05/20	<0.50		ug/L
			Selenium (Se)	2021/05/20	<3.0		ug/L
			Zinc (Zn)	2021/05/20	<7.0		ug/L
2187600	AHK	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/05/19		99	%
2187600	AHK	Method Blank	TKN Total Kjeldahl Nitrogen	2021/05/19	<0.40		mg/L
2188006	LI	Spiked Blank	Sulfides (S2-)	2021/05/20		104	%
2188006	LI	Method Blank	Sulfides (S2-)	2021/05/20	<0.020		mg/L
2191580	SHC	Spiked Blank	Radium-226	2021/05/28		97	%
			Radium-226	2021/05/28		97	%
2191580	SHC	Method Blank	Radium-226	2021/05/28	<0.005		Bq/L
			Radium-226	2021/05/28	<0.005		Bq/L

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.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Steven Simpson, Lab Director

Miryam Assayag, B.Sc. Chemist, Montréal, Team Leader

Shu Yang, B.Sc. Chemist, Montreal, Analyst II

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Your P.O. #: 3000000997
Your Project #: GOOWOOD EXFIL
Your C.O.C. #: N-A

Attention: Mariana Trindade

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

Report Date: 2021/08/20
Report #: R2683464
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

LAB BV JOB #: C125987
Received: 2021/06/02, 16:40

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Suspended Solids	2	2021/06/06	2021/06/08	STL SOP-00015	MA.104–S.S. 2.0 m
Total Extractable Metals by ICP	1	2021/06/03	2021/06/03	STL SOP-00062	MA.200–Mét. 1.2 R7
Total Extractable Metals by ICP	1	2021/06/09	2021/06/10	STL SOP-00062	MA.200–Mét. 1.2 R7
Ammonia Nitrogen	2	N/A	2021/06/11	STL SOP-00040	MA.300–N 2.0 R2 m
pH	2	N/A	2021/06/03	STL SOP-00038	MA.100–pH 1.1 R3 m
pH Measured @ 15° C	2	N/A	2021/06/03	STL SOP-00016	MA.100–pH 1.1 R3 m
Total Nitrogen	2	2021/06/11	2021/06/11	STL SOP-00077	MOE:TOTNUT-E3516v1.3
Un-ionized Ammonia as N @ 15° C	2	N/A	2021/06/11	STL SOP-00040	MA.300 – N 2.0 R1 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas 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 Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

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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 Bureau Veritas, results relate to the supplied samples tested.

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.

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

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Your P.O. #: 3000000997
Your Project #: GOOWOOD EXFIL
Your C.O.C. #: N-A

Attention: Mariana Trindade

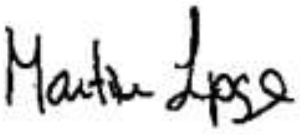
TATA STEEL MINERALS CANADA
1000, RUE SHERBROOKE OUEST
BUREAU 1120
MONTRÉAL, QC
CANADA H3A 3G4

Report Date: 2021/08/20
Report #: R2683464
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

LAB BV JOB #: C125987
Received: 2021/06/02, 16:40

Encryption Key



Martine Lepage
Project Manager and Account Manager
24 Aug 2021 14:50:34

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: Martine.LEPAGE@bureauveritas.com
Phone# (418)543-3788 Ext:7066201

==========

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TOTAL EXTRACTABLE METALS (WATER)

Lab BV ID		JE8352		JE8353		
Sampling Date		2021/05/17 16:35		2021/05/24 17:12		
COC Number		N-A		N-A		
	Units	GW-EXF-6	QC Batch	GW-EXF-7	RDL	QC Batch
METALS						
Aluminum (Al)	ug/L	64	2195025	40	10	2192836
Antimony (Sb)	ug/L	<1.0	2195025	<1.0	1.0	2192836
Silver (Ag)	ug/L	<1.0	2195025	<1.0	1.0	2192836
Arsenic (As)	ug/L	<1.0	2195025	<1.0	1.0	2192836
Barium (Ba)	ug/L	<2.0	2195025	<2.0	2.0	2192836
Boron (B) †	ug/L	<50	2195025	<50	50	2192836
Cadmium (Cd)	ug/L	<0.20	2195025	<0.20	0.20	2192836
Calcium (Ca) †	ug/L	<500	2195025	<500	500	2192836
Chromium (Cr)	ug/L	<5.0	2195025	<5.0	5.0	2192836
Cobalt (Co)	ug/L	<1.0	2195025	<1.0	1.0	2192836
Copper (Cu)	ug/L	<1.0	2195025	<1.0	1.0	2192836
Total Hardness (CaCO3) ††	ug/L	2000	2195025	2000	1000	2192836
Tin (Sn)	ug/L	<2.0	2195025	<2.0	2.0	2192836
Iron (Fe)	ug/L	240	2195025	140	60	2192836
Magnesium (Mg) †	ug/L	280	2195025	260	100	2192836
Manganese (Mn)	ug/L	44	2195025	42	1.0	2192836
Mercury (Hg)	ug/L	<0.10	2195025	<0.10	0.10	2192836
Molybdenum (Mo)	ug/L	<1.0	2195025	<1.0	1.0	2192836
Nickel (Ni)	ug/L	<2.0	2195025	<2.0	2.0	2192836
Total phosphorous	ug/L	<10	2195025	<10	10	2192836
Lead (Pb)	ug/L	<0.50	2195025	<0.50	0.50	2192836
Potassium (K) †	ug/L	<500	2195025	<500	500	2192836
Selenium (Se)	ug/L	<3.0	2195025	<3.0	3.0	2192836
Sodium (Na)	ug/L	<500	2195025	<500	500	2192836
Thallium (Tl)	ug/L	<2.0	2195025	<2.0	2.0	2192836
Titanium (Ti) ††	ug/L	<10	2195025	<10	10	2192836
Uranium (U) ††	ug/L	<1.0	2195025	<1.0	1.0	2192836
Vanadium (V)	ug/L	<2.0	2195025	<2.0	2.0	2192836
Zinc (Zn)	ug/L	<7.0	2195025	<7.0	7.0	2192836

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accredited
†† Parameter is not accreditable

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

CONVENTIONAL PARAMETERS (WATER)

Lab BV ID		JE8352	JE8353		
Sampling Date		2021/05/17 16:35	2021/05/24 17:12		
COC Number		N-A	N-A		
	Units	GW-EXF-6	GW-EXF-7	RDL	QC Batch
CONVENTIONALS					
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	0.037	<0.020	0.020	2196470
pH	pH	7.63	6.29	N/A	2192767
pH (15° C) †	pH	7.08	6.95	N/A	2193259
TKN Total Kjeldahl Nitrogen	mg/L	<0.40	<0.40	0.40	2195941
Un-ionized Ammonia at 15°C †	mg/L	<0.0005	<0.0005	0.0005	2192338
Total suspended solids (TSS)	mg/L	6.0	3.0	2.0	2193986

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
† Parameter is not accreditable

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

GENERAL COMMENTS

pH: Holding time already past upon reception.: JE8352
pH Measured @ 15° C: Holding time already past upon reception.: JE8352
Total Suspended Solids: Holding time already past upon reception.: JE8352
pH: Holding time already past upon reception.: JE8353
pH Measured @ 15° C: Holding time already past upon reception.: JE8353
Total Suspended Solids: Holding time already past upon reception.: JE8353
Version 2: ajout métaux demandé par le client le 18 août 2021

Results relate only to the items tested.

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2192767	ANB	Spiked Blank	pH	2021/06/03		101	%
2192836	AT7	Spiked Blank	Aluminum (Al)	2021/06/03		92	%
			Antimony (Sb)	2021/06/03		102	%
			Silver (Ag)	2021/06/03		98	%
			Arsenic (As)	2021/06/03		103	%
			Barium (Ba)	2021/06/03		97	%
			Boron (B)	2021/06/03		101	%
			Cadmium (Cd)	2021/06/03		96	%
			Calcium (Ca)	2021/06/03		95	%
			Chromium (Cr)	2021/06/03		97	%
			Cobalt (Co)	2021/06/03		98	%
			Copper (Cu)	2021/06/03		96	%
			Tin (Sn)	2021/06/03		112	%
			Iron (Fe)	2021/06/03		101	%
			Magnesium (Mg)	2021/06/03		98	%
			Manganese (Mn)	2021/06/03		102	%
			Mercury (Hg)	2021/06/03		110	%
			Molybdenum (Mo)	2021/06/03		104	%
			Nickel (Ni)	2021/06/03		94	%
			Total phosphorous	2021/06/03		95	%
			Lead (Pb)	2021/06/03		95	%
			Potassium (K)	2021/06/03		99	%
			Selenium (Se)	2021/06/03		101	%
			Sodium (Na)	2021/06/03		95	%
			Thallium (Tl)	2021/06/03		96	%
			Titanium (Ti)	2021/06/03		104	%
			Uranium (U)	2021/06/03		98	%
			Vanadium (V)	2021/06/03		100	%
			Zinc (Zn)	2021/06/03		94	%
2192836	AT7	Method Blank	Aluminum (Al)	2021/06/03	<10		ug/L
			Antimony (Sb)	2021/06/03	<1.0		ug/L
			Silver (Ag)	2021/06/03	<1.0		ug/L
			Arsenic (As)	2021/06/03	<1.0		ug/L
			Barium (Ba)	2021/06/03	<2.0		ug/L
			Boron (B)	2021/06/03	<50		ug/L
			Cadmium (Cd)	2021/06/03	<0.20		ug/L
			Calcium (Ca)	2021/06/03	<500		ug/L
			Chromium (Cr)	2021/06/03	<5.0		ug/L
			Cobalt (Co)	2021/06/03	<1.0		ug/L
			Copper (Cu)	2021/06/03	<1.0		ug/L
			Total Hardness (CaCO3)	2021/06/03	<1000		ug/L
			Tin (Sn)	2021/06/03	2.3, RDL=2.0		ug/L
			Iron (Fe)	2021/06/03	<60		ug/L
			Magnesium (Mg)	2021/06/03	<100		ug/L
			Manganese (Mn)	2021/06/03	<1.0		ug/L
			Mercury (Hg)	2021/06/03	<0.10		ug/L
			Molybdenum (Mo)	2021/06/03	<1.0		ug/L
			Nickel (Ni)	2021/06/03	<2.0		ug/L
			Total phosphorous	2021/06/03	<10		ug/L
			Lead (Pb)	2021/06/03	<0.50		ug/L
			Potassium (K)	2021/06/03	<500		ug/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Selenium (Se)	2021/06/03	<3.0		ug/L
			Sodium (Na)	2021/06/03	<500		ug/L
			Thallium (Tl)	2021/06/03	<2.0		ug/L
			Titanium (Ti)	2021/06/03	<10		ug/L
			Uranium (U)	2021/06/03	<1.0		ug/L
			Vanadium (V)	2021/06/03	<2.0		ug/L
			Zinc (Zn)	2021/06/03	<7.0		ug/L
2193259	CLO	QC Standard	pH (15° C)	2021/06/03		100	%
2193259	CLO	Spiked Blank	pH (15° C)	2021/06/03		100	%
2193986	PS5	Spiked Blank	Total suspended solids (TSS)	2021/06/08		98	%
2193986	PS5	Method Blank	Total suspended solids (TSS)	2021/06/08	<2.0		mg/L
2195025	NET	Spiked Blank	Aluminum (Al)	2021/06/10		108	%
			Antimony (Sb)	2021/06/10		105	%
			Silver (Ag)	2021/06/10		101	%
			Arsenic (As)	2021/06/10		106	%
			Barium (Ba)	2021/06/10		101	%
			Boron (B)	2021/06/10		104	%
			Cadmium (Cd)	2021/06/10		100	%
			Calcium (Ca)	2021/06/10		103	%
			Chromium (Cr)	2021/06/10		114	%
			Cobalt (Co)	2021/06/10		100	%
			Copper (Cu)	2021/06/10		98	%
			Tin (Sn)	2021/06/10		110	%
			Iron (Fe)	2021/06/10		105	%
			Magnesium (Mg)	2021/06/10		106	%
			Manganese (Mn)	2021/06/10		105	%
			Mercury (Hg)	2021/06/10		105	%
			Molybdenum (Mo)	2021/06/10		110	%
			Nickel (Ni)	2021/06/10		98	%
			Total phosphorous	2021/06/10		103	%
			Lead (Pb)	2021/06/10		100	%
			Potassium (K)	2021/06/10		105	%
			Selenium (Se)	2021/06/10		108	%
			Sodium (Na)	2021/06/10		102	%
			Thallium (Tl)	2021/06/10		99	%
			Titanium (Ti)	2021/06/10		108	%
			Uranium (U)	2021/06/10		102	%
			Vanadium (V)	2021/06/10		104	%
			Zinc (Zn)	2021/06/10		97	%
2195025	NET	Method Blank	Aluminum (Al)	2021/06/10	<10		ug/L
			Antimony (Sb)	2021/06/10	<1.0		ug/L
			Silver (Ag)	2021/06/10	<1.0		ug/L
			Arsenic (As)	2021/06/10	<1.0		ug/L
			Barium (Ba)	2021/06/10	<2.0		ug/L
			Boron (B)	2021/06/10	<50		ug/L
			Cadmium (Cd)	2021/06/10	<0.20		ug/L
			Calcium (Ca)	2021/06/10	<500		ug/L
			Chromium (Cr)	2021/06/10	<5.0		ug/L
			Cobalt (Co)	2021/06/10	<1.0		ug/L
			Copper (Cu)	2021/06/10	<1.0		ug/L
			Total Hardness (CaCO3)	2021/06/10	<1000		ug/L
			Tin (Sn)	2021/06/10	<2.0		ug/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Iron (Fe)	2021/06/10	<60		ug/L
			Magnesium (Mg)	2021/06/10	<100		ug/L
			Manganese (Mn)	2021/06/10	<1.0		ug/L
			Mercury (Hg)	2021/06/10	<0.10		ug/L
			Molybdenum (Mo)	2021/06/10	<1.0		ug/L
			Nickel (Ni)	2021/06/10	<2.0		ug/L
			Total phosphorous	2021/06/10	<10		ug/L
			Lead (Pb)	2021/06/10	<0.50		ug/L
			Potassium (K)	2021/06/10	<500		ug/L
			Selenium (Se)	2021/06/10	<3.0		ug/L
			Sodium (Na)	2021/06/10	<500		ug/L
			Thallium (Tl)	2021/06/10	<2.0		ug/L
			Titanium (Ti)	2021/06/10	<10		ug/L
			Uranium (U)	2021/06/10	<1.0		ug/L
			Vanadium (V)	2021/06/10	<2.0		ug/L
			Zinc (Zn)	2021/06/10	<7.0		ug/L
2195941	AJ1	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/06/11		96	%
2195941	AJ1	Method Blank	TKN Total Kjeldahl Nitrogen	2021/06/11	<0.40		mg/L
2196470	ANB	Spiked Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/06/11		113	%
2196470	ANB	Method Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/06/11	<0.020		mg/L

RDL = Reportable Detection Limit

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

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

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

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Shu Yang, B.Sc. Chemist, Montreal, Analyst II

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Appendix V. Goodwood pumping plan

6108000 606000 6107000 607000 6106000 608000 6105000

Contingency Plan
If pumping from the temporary pond to K1C using the continuous line is not producing the desired results, the line will be broken again and the initial setup utilized in FY20 will be used where water is pumped from the temporary pond to the natural intermediate pond then to K1C.

Pump Locations
#1 - Point of exfiltration
#2 - Temporary pond
#3 - Natural intermediate pond - Contingency Plan
#4 - Goodwood pit

Note:
- All pumps are Godwin 6" CD150M Dri-Prime models
- There will be a 5th Godwin 6" CD150M Dri-Prime pump available in Goodwood as a backup.

Québec

Goodwood

4

Temporary Pond
Volume: 2650 m³

3

HDPE Pipe (Length: 3.18 Km)

Kivivic 1C

2

1

12" HDPE connected as in FY20 to make a continuous line from temporary pond to K1C pit.

Newfoundland & Labrador

6108000 605000 6107000 604000

608000 6104000

604000 6106000 605000 6105000 606000 6104000 607000

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
Pump Locations

Goodwood Water Management Area 4

0 150 300 600
Meters

SCALE:
1:12,000

UTM 19N NAD 83

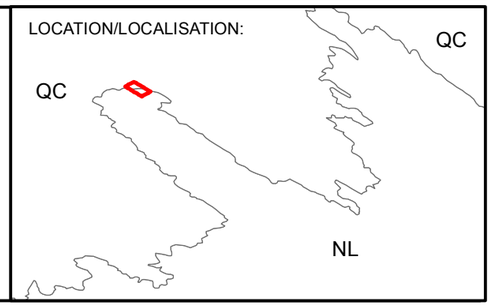
FILE, VERSION, DATE, AUTHOR/
FICHIER, VERSION, DATE, AUTEUR:

GIS-DEV-83 , 2019-03-18, E.F.

SOURCES:

TATA STEEL MINERALS CANADA

LOCATION/LOCALISATION:



605000

606000

6108000

6106000

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.

Goodwood

4

12" HDPE pipe at natural intermediate pond connected

3

Temporary Pond
Volume: 2650 m^3

Contingency Plan
Break the continuous line at the natural intermediate pond and use pump 3 to pump from the intermediate pond to K1C.

2

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.

1

Pump 1 will capture any water exfiltration from the dyke and pump it into the temporary pond

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.

QC

NL

604000

606000

6107000 604000

6106000 605000

- 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

0 110 220 440
Meters

SCALE:
1:7,500

UTM 19N NAD 83

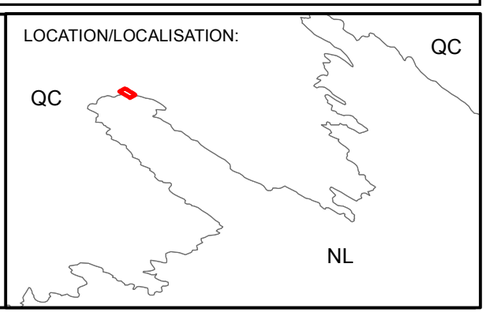
FILE, VERSION, DATE, AUTHOR/
FICHIER, VERSION, DATE, AUTEUR:

GIS-DEV-83-01 , 2019-03-18, E.F.

SOURCES:

TATA STEEL MINERALS CANADA

LOCATION/LOCALISATION:



Appendix VI. Snow management plan - unrepaired sections

Québec, December 17, 2021

Mr. Pallav Sinha
Environmental Coordinator
TATA STEEL MINERALS CANADA
1000 Rue Sherbrooke Street West, Suite 1120
Montreal, Quebec H3A 3G4

Subject: **Goodwood Pond Rehabilitation – Partial completion of work and risk associated with 2022 spring thaw**

Client Ref.: **181-04013-94**

Dear Sir Sinha,

During spring thaw 2018, damages were observed to the newly constructed accumulation pond including geomembrane failures in two areas and punctures and uplifts in other areas. An exfiltration was observed downstream of the toe of the dyke. A longitudinal crack was also noted on the dike's crest, on the downstream side.

Rehabilitation works were designed by WSP to address and mitigate the risk of experiencing subsequent issues related to the identified causes of failure detailed in January 9th, 2019 and November 23rd, 2020, engineering briefs prepared by WSP.

As defined before construction project implementation, TSMC is responsible for the planning, management and coordination of the construction work. TSMC mandated GRM for the execution of the construction work, FC liner for the geomembrane installation and WSP for the technical surveillance of the work. Construction of the pond rehabilitation repairs was initially set to begin in June 2021. The starting date was first delayed to July and finally to August 27, 2021 so almost 2 months later than originally planned.

As of December 17, 2021, construction of the rehabilitation is still not completed and will not be complete before Spring/Summer 2022 as weather in Schefferville do not allow the contractor to perform quality work. Indeed, FC Liner, the subcontractor responsible for the geomembrane installation, issued a construction site memo on December 6, 2021, stating that all geomembrane installed from the beginning of December 2021 are not under FC liner warranty and only installed with the goal of limiting water infiltration in the subgrade (underneath the bottom geomembrane).

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Canada

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Fax: +1 418-624-1857
wsp.com

In addition, due to the current weather conditions at the site, some of the planned repairs will not be performed or completed as per design requirements before Spring/Summer 2022. Therefore, TSMC requested WSP to provide mitigation measures to reduce the risk of damaging the work performed so far, and to be able to manage the red water during the next spring freshet. In response to this request, WSP developed the mitigation measures attached to this letter.

Although we trust that the mitigation measures will help reducing the risk to the infrastructure and the environment, WSP cannot guarantee the sustainability of the work performed in 2021 either that additional damages to the infrastructure will be completely avoided. Indeed, portions of the design that aimed at addressing issues that led to 2018 failures are still not in place or partially completed. Also, portions of the geomembrane installation are not compliant, and watertightness of the welding cannot be guaranteed. The proposed actions are more based on common sense and experience than on engineering calculations so WSP cannot be held liable for their effectiveness. WSP developed this action plan only to support TSMC for the unfortunate situation where the repair work cannot be completed during winter.

As TSMC will be responsible to implement the mitigation plan, it is critical that proper planning and adequate resources are assigned to perform these tasks to maximize the plan success in limiting any potential additional damages to the pond infrastructure and/or the surrounding environment.

A detailed site inspection will be required after Spring thaw 2022 is over to assess the site condition and develop, if required, an action plan to address any additional defect observed during this inspection, prior to resuming the construction in Spring/Summer 2022.

It is also expected that this situation will be properly addressed by TSMC with all authorities, regulators and stakeholders involved in the project.

If you require any additional information, do not hesitate to contact the undersigned.

Yours truly,

Carl Gauthier, Eng. PMP
National Director – Mining & Industrial Environmental Services

CG/lp

c.c.: Vivek Kumar Agarwal, TSMC
Adam Doucette, TSMC
Pierre-Olivier Maltais, WSP

Encl.: Proposed mitigation plan

WSP Ref.: 181-04013-94

GOOWOOD POND CONSTRUCTION REPAIR INTERRUPTION MITIGATION PLAN

This mitigation plan is aimed to minimize potential damages to the newly repaired areas and unrepaired sectors as well as the currently undamaged infrastructures between now and construction work resume in Spring 2022. The figures extracted for daily reports illustrate the tasks described below.

Tasks description

Complete the installation of the geomembrane over the newly installation bottom drain with the aim of limiting water infiltration underneath the pond geomembrane during the 2022 spring thaw. In areas where welding is no more possible, due to winter conditions, WSP proposes two options:

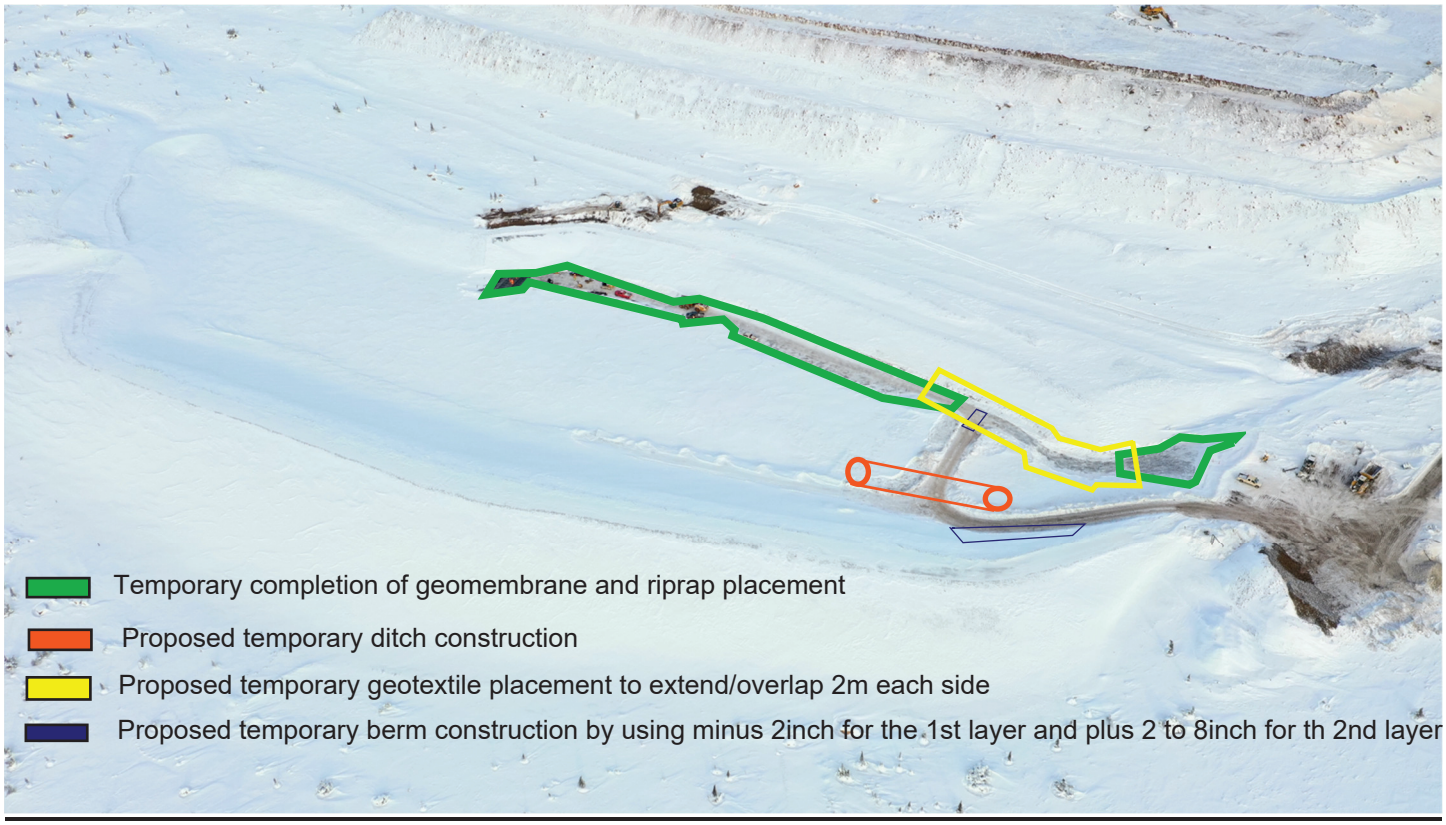
- A) Unroll geomembrane to cover the areas non-covered by a liner and ballast with a layer of granular material. Ain to use 2 m overlap on top of the membrane already in place.
- B) Unroll a double layer of unwoven geotextile to cover the areas non-covered by a liner and ballast with a layer of granular material, aim to use 2 m overlap on top of the membrane already in place.
- Option A (i.e. use of geomembrane) is strongly recommended by WSP to limit at the most possible extent the infiltration of water underneath the retention pond geomembrane during 2022 spring freshet. It will also limit the quantity of water to be pumped inside the manhole, at the outflow of the newly built drainage toe trench.
- The others actions include:
  - Dismantle the south part of the existing temporary dyke to allow the water to reach the low point of the pond and facilitate Spring pumping;
  - Built a temporary berm on top of a defect observed at the south-east area of the “dyke portion” of the accumulation pond to reduce water infiltration underneath the geomembrane. The use of a geomembrane between 2 layers of granular material is recommended to limit possible exfiltration through this defect.
  - Ensure to have an adequate pumping capacity (and redundancy) to limit the water accumulation in the pond (at the low point inside Goodwood pond). The pumping set up shall be in place as soon as the thawing seasons begin at the site. A daily (and potentially constant during active snow melt) monitoring of water levels in the pond shall be put in place and the pit dewatering operations shall be coordinated with all involved stakeholders ;
  - Have a sump pump install inside the manhole, at the outflow of the drainage toe trench, to avoid any accumulation of water inside the manhole. This water can be pumped back to the low point into the Goodwood pond to be transferred to KC1 ;
  - Ensure to have an adequate pumping capacity (and redundancy) to limit the water accumulation inside both little ponds located outside the retention pond, downgradient to the dyke, where seepage and runoff water from the WRD cumulate typically in Spring time. This measure is to avoid any contact water to flow uncontrolled into the surrounding environment. This water can be pumped back to the low point into the Goodwood pond to be transferred to KC1 ;
  - Snow removal in the ditches to help drainage of snowmelt water around the pond;
  - Snow removal of the two roads leading to the basin will be such that snow will be removed and sent to another location;
  - Inspection of infrastructure: the inspection of infrastructure before and during the snowmelt will enable TSMC to locate any defect and undertake corrective action where needed.

- Plan for mitigation measures to limit the red water runoff that flows along the access road to Goodwood accumulation pond. The construction of a berm to deflect the water toward the pond as it should be, instead of around the pond, would be a possible solution.

This list should not be seen as limitative and it is expected that people on-site will refine the mitigation plan and measures based on observations and actual site conditions as these can vary from season to season depending on weather conditions. In addition, as the pond was subject to construction in 2021 that was not completed, the way the structure will react in the Spring time is more difficult to anticipate compared to the few previous years. Additional attention is then required.

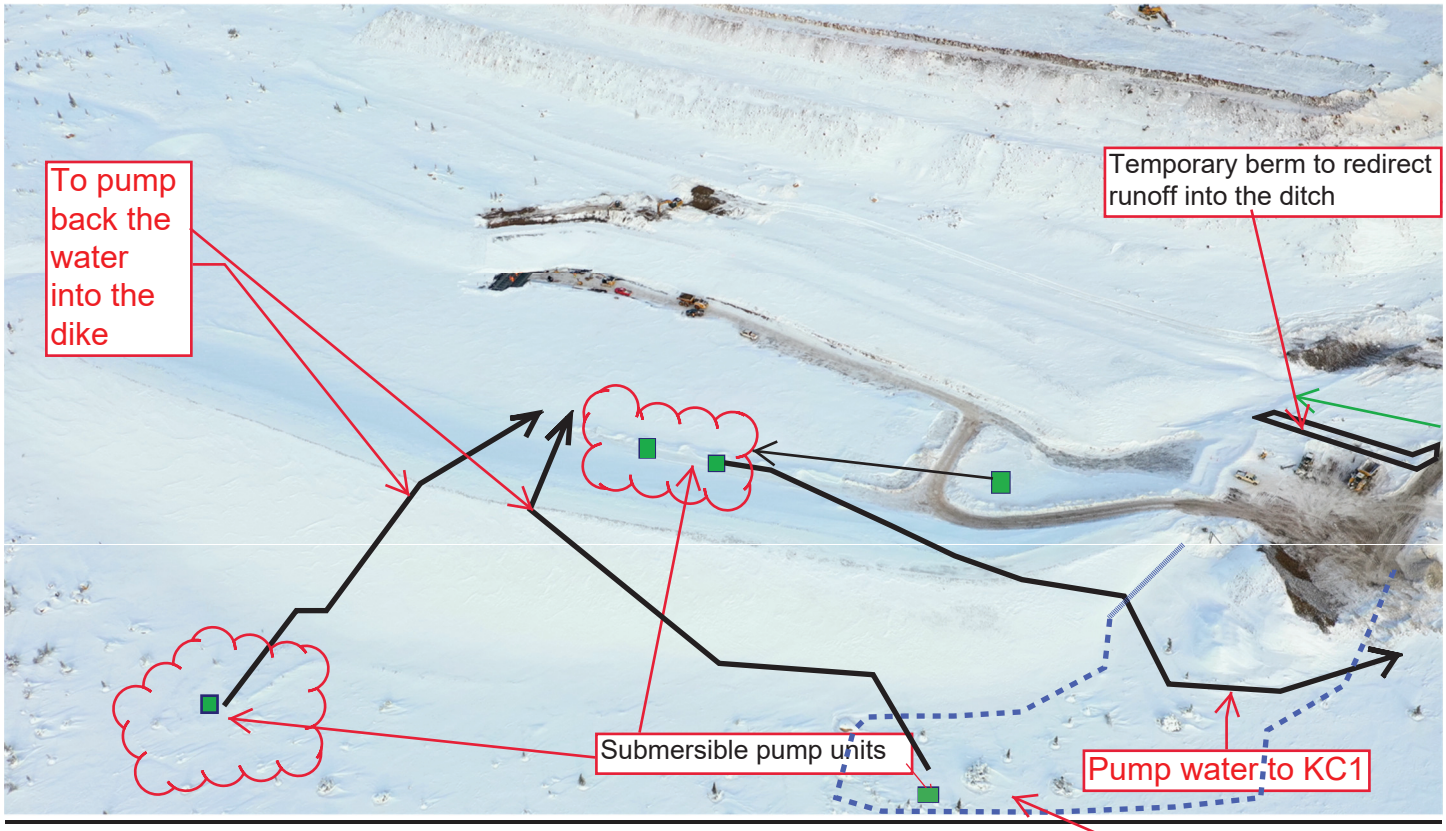
CONSTRUCTION PROGRESS REPORT

Project: TSMC – WATER MANAGEMENT GOODWOOD AREA	**Date:** 2021-12-13	**Day: Monday**
Site Supervisor: Yacouba Doro	**C :** (437) 999-8370	**E:** Yacouba.doro@wsp.com
Temp. AM: -13ºC Light Snow - Windy (Feels like -21ºC)	**Temp. PM:** -13ºC Snow (Feels like -21ºC)	
Contractor: GRM	**WSP Project Number:** 181-04013-95	



Suggestions:

- **Suggested placement of geotextile on the remaining 60 meters section (approximately 330sqm)**
- **Suggested to construct a temporary ditch between small and collection basins**
- **Suggested to construct a temporary berm on the west side of the existing access road/ramp to the dike (reason: observed damaged of geomembrane along the downstream slope)**
- **Suggested to construct a temporary berm by extending the East intersection access road**



Mitigations Plan: (after suggestions implementation)

- **Proposed to have two (2) Submersible pumps with High-head (high-pressure) pumps which are capable of handling flows at significantly higher total dynamic head ratings (tdh). They can pump over long distances such as KC1, etc. and extreme changes in elevation or into pressurized systems.**

- **Proposed to have another submersible pump such as high-efficiency pumps which are known for their performance and reliable continuous-duty operation.**

- **Proposed an illustrated field-going guide of observable water/road interaction problems damaging to Goodwood Pond access road adjacent to the ditch, where runoff has been deposited sediments and ~~affecting~~ water quality or aquatic life in streams downslope of the outer west dike**
  may affect

Appendix VII. Certificate of analysis-water sampling

Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Your C.O.C. #: 229608-01-02

Attention: Mariana Trindade

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

Report Date: 2021/08/03
Report #: R2678766
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C135626
Received: 2021/07/15, 09:00

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Alkalinity (pH end point 4.5)	2	N/A	2021/07/19	STL SOP-00038	SM 23 2320-B m
Anions	2	N/A	2021/07/17	STL SOP-00014	MA.300–Ions 1.3 R3 m
Biochemical Oxygen Demand (5 days) (4)	2	2021/07/16	2021/07/21	STL SOP-00008	MA315-DBO 1.1 R3 m
Petroleum Hydrocarbons (C10-C50)	2	2021/07/17	2021/07/19	STL SOP-00173	MA.400–HYD. 1.1 R3 m
Total Cyanide	2	2021/07/17	2021/07/19	STL SOP-00035	MA300-CN 1.2 R4 m
Chemical Oxygen Demand	2	2021/07/20	2021/07/20	STL SOP-00009	MA315-DCO 1.1 R4 m
Fecal coliforms	2	N/A	2021/07/15	QUE SOP-00303	MA.700-Fec.Ec 1.0 R5
Total coliforms	2	N/A	2021/07/15	QUE SOP-00304	MA.700-Col 1.0 R4
Conductivity	2	N/A	2021/07/19	STL SOP-00038	SM 23 2510-B m
Hexavalent Chromium (Cr 6+)	2	N/A	2021/07/16	STL SOP-00037	MA200-CrHex 1.1 R1 m
Dissolved Organic Carbon (5)	2	2021/07/16	2021/07/17	STL SOP-00243	SM 23 5310-B m
Fluoride	2	N/A	2021/07/21	STL SOP-00038	SM 23 4500-F m
Total Suspended Solids	2	2021/07/19	2021/07/21	STL SOP-00015	MA.104–S.S. 2.0 m
Total Extractible Trace Metals by ICP-MS	2	2021/07/17	2021/07/27	STL SOP-00006	MA203–Mét Tra1.1 R1m
Ammonia Nitrogen	2	N/A	2021/07/20	STL SOP-00040	MA.300–N 2.0 R2 m
Nitrate and/or Nitrite	2	N/A	2021/07/17	STL SOP-00014	MA.300–Ions 1.3 R3 m
Dissolved Oxygen	2	N/A	2021/07/15	STL SOP-00008	MA.315–DBO 1.1 R3 m
pH	2	N/A	2021/07/19	STL SOP-00038	MA.100–pH 1.1 R3 m
Total Phenols by 4-AAP	2	2021/07/20	2021/07/20	STL SOP-00033	MA404–I.Phé 2.2 R2 m
Total Phosphorus Low Level by ICP-MS (1)	2	2021/07/22	2021/07/24	QUE SOP-00132	MA.200-Mét. 1.2 R7
Sulfides (as S2-)	2	2021/07/23	2021/07/23	STL SOP-00005	MA. 300 – S 1.2 R3 m
Total Dissolved Solids	2	2021/07/19	2021/07/20	STL SOP-00050	MA.115–S.D. 1.0 R4 m
Total Nitrogen	2	2021/07/20	2021/07/22	STL SOP-00077	MOE:TOTNUT-E3516v1.3
Total Organic Carbon (6)	2	N/A	2021/07/16	STL SOP-00243	SM 23 5310-B m
Uranium by ICP-MS	2	2021/07/15	2021/07/15	STL SOP-00062	MA.200–Mét. 1.2 R5 m
Radium-226 Low Level (2, 7)	2	N/A	2021/08/02	BQL SOP-00006 BQL SOP-00017 BQL SOP-00032	Alpha Spectrometry
Reactive Silica(SiO2) (3)	2	2021/07/21	2021/07/22	ATL SOP 00022	EPA 366.0 m

Remarks:

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Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Your C.O.C. #: 229608-01-02

Attention: Mariana Trindade

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

Report Date: 2021/08/03
Report #: R2678766
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C135626
Received: 2021/07/15, 09:00

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas 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 Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, results relate to the supplied samples tested.

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 Bureau Veritas - Québec
(2) This test was performed by Bureau Veritas Radiological via Montreal
(3) This test was performed by Bureau Veritas Bedford via Montreal
(4) Please note that in the event a biochemical oxygen demand analysis cannot begin within the 48-hours holding time required (for a sample preserved at 4°C), sample will be frozen, unless otherwise specified by a regulation, to maintain it's integrity.
(5) DOC present in the sample should be considered as non-purgeable DOC
(6) TOC present in the sample should be considered as non-purgeable TOC
(7) Radium-226 results have not been corrected for blanks.

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

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Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Your C.O.C. #: 229608-01-02

Attention: Mariana Trindade

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

Report Date: 2021/08/03
Report #: R2678766
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CERTIFICATE OF ANALYSIS

LAB BV JOB #: C135626
Received: 2021/07/15, 09:00

Encryption Key

Stephane Gagnon
Project Manager
04 Aug 2021 08:35:46

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: Martine.LEPAGE@bureauveritas.com
Phone# (418)543-3788 Ext:7066201

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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TATA STEEL MINERALS CANADA
Client Project #: QC SURFACE WATER
Your P.O. #: 3000000997

RESULTS OF ANALYSES OF SURFACE WATER

Lab BV ID		JJ9445	JJ9446		
Sampling Date		2021/06/26 11:30	2021/06/26 11:30		
COC Number		229608-01-02	229608-01-02		
	Units	ER-GW-Q1-2021	EE-GW-Q1-2021	RDL	QC Batch
INORGANICS					
Reactive silica (SiO2) †	mg/L	<0.50	1.0	0.50	2211615
RADIONUCLIDE					
Radium-226	Bq/L	<0.005	<0.005	0.005	2212307

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable

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HYDROCARBONS BY GCFID (SURFACE WATER)

Lab BV ID		JJ9445	JJ9446		
Sampling Date		2021/06/26 11:30	2021/06/26 11:30		
COC Number		229608-01-02	229608-01-02		
	Units	ER-GW-Q1-2021	EE-GW-Q1-2021	RDL	QC Batch
PETROLEUM HYDROCARBONS					
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	<100	100	2209348
Surrogate Recovery (%)					
1-Chlorooctadecane	%	80	99	N/A	2209348

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

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TOTAL EXTRACTABLE METALS (SURFACE WATER)

Lab BV ID		JJ9445		JJ9446		
Sampling Date		2021/06/26 11:30		2021/06/26 11:30		
COC Number		229608-01-02		229608-01-02		
	Units	ER-GW-Q1-2021	RDL	EE-GW-Q1-2021	RDL	QC Batch
METALS						
Total phosphorous	ug/L	4.6	2.0	5.1	2.2	2210951
Aluminum (Al) †	ug/L	14	5.0	27	5.0	2209334
Antimony (Sb) †	ug/L	0.0080	0.0050	<0.0050	0.0050	2209334
Silver (Ag) †	ug/L	<0.0030	0.0030	0.0037	0.0030	2209334
Arsenic (As) †	ug/L	<0.080	0.080	<0.080	0.080	2209334
Barium (Ba) †	ug/L	0.52	0.030	1.3	0.030	2209334
Boron (B) †	ug/L	0.37	0.30	1.5	0.30	2209334
Cadmium (Cd) †	ug/L	<0.0060	0.0060	<0.0060	0.0060	2209334
Calcium (Ca) †	ug/L	64	20	120	20	2209334
Chromium (Cr) †	ug/L	<0.040	0.040	0.045	0.040	2209334
Cobalt (Co) †	ug/L	0.032	0.0080	0.031	0.0080	2209334
Copper (Cu) †	ug/L	<0.050	0.050	<0.050	0.050	2209334
Tin (Sn) †	ug/L	<0.050	0.050	<0.050	0.050	2209334
Iron (Fe) †	ug/L	40	0.50	43	0.50	2209334
Magnesium (Mg) †	ug/L	41	10	87	10	2209334
Manganese (Mn) †	ug/L	19	0.030	19	0.030	2209334
Mercury (Hg) †	ug/L	<0.0020	0.0020	<0.0020	0.0020	2209334
Molybdenum (Mo) †	ug/L	<0.010	0.010	<0.010	0.010	2209334
Nickel (Ni) †	ug/L	<0.030	0.030	<0.030	0.030	2209334
Lead (Pb) †	ug/L	0.011	0.010	0.011	0.010	2209334
Potassium (K) †	ug/L	45	10	79	10	2209334
Selenium (Se) †	ug/L	<0.050	0.050	<0.050	0.050	2209334
Sodium (Na) †	ug/L	77	10	160	10	2209334
Thallium (Tl) †	ug/L	<0.010	0.010	<0.010	0.010	2209334
Titanium (Ti) †	ug/L	<0.40	0.40	<0.40	0.40	2209334
Uranium (U) †	ug/L	0.0027	0.0010	0.0030	0.0010	2209334
Vanadium (V) †	ug/L	<0.050	0.050	<0.050	0.050	2209334
Zinc (Zn) †	ug/L	<0.50	0.50	<0.50	0.50	2209334
Total Hardness (CaCO3) †	ug/L	330	40	670	40	2209334

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable

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CONVENTIONAL PARAMETERS (SURFACE WATER)

Lab BV ID		JJ9445	JJ9446	JJ9446		
Sampling Date		2021/06/26 11:30	2021/06/26 11:30	2021/06/26 11:30		
COC Number		229608-01-02	229608-01-02	229608-01-02		
	Units	ER-GW-Q1-2021	EE-GW-Q1-2021	EE-GW-Q1-2021 Lab-Dup	RDL	QC Batch
CONVENTIONALS						
BOD5	mg/L	<4.0	<4.0	N/A	4.0	2208765
COD	mg/L	6.0	<5.0	N/A	5.0	2209915
Conductivity	mS/cm	0.0025	0.0034	N/A	0.0010	2209552
Dissolved organic carbon †	mg/L	2.0	1.5	N/A	0.20	2209246
Dissolved oxygen †	mg/L	7.5	7.3	N/A	1.0	2208640
Fluoride (F)	mg/L	<0.10	<0.10	N/A	0.10	2210615
Hexavalent Chromium (Cr 6+)	mg/L	<0.0080	<0.0080	N/A	0.0080	2208966
Nitrates (N-NO3-)	mg/L	<0.020	0.046	N/A	0.020	2209250
Nitrites (N-NO2-)	mg/L	<0.020	<0.020	N/A	0.020	2209250
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	<0.020	0.14	N/A	0.020	2209962
pH	pH	5.59	5.62	N/A	N/A	2209548
Phenols-4AAP	mg/L	<0.0020	<0.0020	N/A	0.0020	2210028
Sulfides (S2-)	mg/L	<0.020	<0.020	N/A	0.020	2211769
TKN Total Kjeldahl Nitrogen	mg/L	<0.40	<0.40	N/A	0.40	2210098
Total Cyanide (CN)	mg/L	<0.0030	<0.0030	N/A	0.0030	2209347
Total Organic Carbon	mg/L	1.8	1.4	N/A	0.20	2208669
Alkalinity Total (as CaCO3) pH 4.5 †	mg/L	<1.0	<1.0	N/A	1.0	2209551
Bicarbonates (HCO3 as CaCO3) †	mg/L	<1.0	<1.0	N/A	1.0	2209551
Carbonate (CO3 as CaCO3) †	mg/L	<1.0	<1.0	N/A	1.0	2209551
Chloride (Cl)	mg/L	0.063	0.13	N/A	0.050	2209251
Sulfates (SO4)	mg/L	<0.50	<0.50	N/A	0.50	2209251
Total Dissolved Solids	mg/L	93	<10	<10	10	2209524
Total suspended solids (TSS)	mg/L	<2.0	2.0	N/A	2.0	2209703

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
† Parameter is not accreditable

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MICROBIOLOGY (SURFACE WATER)

Lab BV ID		JJ9445	JJ9446		
Sampling Date		2021/06/26 11:30	2021/06/26 11:30		
COC Number		229608-01-02	229608-01-02		
	Units	ER-GW-Q1-2021	EE-GW-Q1-2021	RDL	QC Batch
MICROBIOLGICAL TESTS					
Total coliforms	UFC/100ml	210	190	10	2208665
Fecal coliforms	UFC/100ml	<10	<10	10	2208494

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Dissolved Oxygen: Holding time already past upon reception.: JJ9445
Dissolved Organic Carbon: Sample received > 24hrs after sampling, filtered and preserved in the lab.: JJ9445
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JJ9445
Total Suspended Solids: Holding time already past upon reception.: JJ9445
Total Dissolved Solids: Holding time already past upon reception.: JJ9445
Fecal coliforms: Holding time already past upon reception.: JJ9445
Total coliforms: Holding time already past upon reception.: JJ9445
Total Alkalinity (pH end point 4.5): Holding time already past upon reception.: JJ9445
pH: Holding time already past upon reception.: JJ9445
Anions: Holding time already past upon reception.: JJ9445
Nitrate and/or Nitrite: Holding time already past upon reception.: JJ9445
Total Cyanide: Holding time already past upon reception.: JJ9445
Dissolved Oxygen: Holding time already past upon reception.: JJ9446
Dissolved Organic Carbon: Sample received > 24hrs after sampling, filtered and preserved in the lab.: JJ9446
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JJ9446
Total Suspended Solids: Holding time already past upon reception.: JJ9446
Total Dissolved Solids: Holding time already past upon reception.: JJ9446
Fecal coliforms: Holding time already past upon reception.: JJ9446
Total coliforms: Holding time already past upon reception.: JJ9446
Total Alkalinity (pH end point 4.5): Holding time already past upon reception.: JJ9446
pH: Holding time already past upon reception.: JJ9446
Anions: Holding time already past upon reception.: JJ9446
Nitrate and/or Nitrite: Holding time already past upon reception.: JJ9446
Total Cyanide: Holding time already past upon reception.: JJ9446

CONVENTIONAL PARAMETERS (SURFACE WATER)

Carbone organique total < Carbone organique dissous : Les deux résultats sont considérés équivalents puisque dans les limites acceptables pour une analyse en duplicata. Radium-226: Cette analyse est accréditée par le MELCC.

MICROBIOLOGY (SURFACE WATER)

For samples JJ9445 and JJ9446, please note that the total coliforms analysis was performed despite the 48 hour expiry date being exceeded. The results should therefore be interpreted with caution.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2208669	AHK	Spiked Blank	Total Organic Carbon	2021/07/16		98	%
2208669	AHK	Method Blank	Total Organic Carbon	2021/07/16	<0.20		mg/L
2208765	AGO	QC Standard	BOD5	2021/07/21		103	%
2208765	AGO	Spiked Blank	BOD5	2021/07/21		106	%
2208765	AGO	Spiked Blank DUP	BOD5	2021/07/21		101	%
2208765	AGO	Method Blank	BOD5	2021/07/21	<2.0		mg/L
2208765	AGO	Method Blank DUP	BOD5	2021/07/21	2.3, RDL=2.0		mg/L
2208966	CLO	QC Standard	Hexavalent Chromium (Cr 6+)	2021/07/16		100	%
2208966	CLO	Spiked Blank	Hexavalent Chromium (Cr 6+)	2021/07/16		102	%
2208966	CLO	Method Blank	Hexavalent Chromium (Cr 6+)	2021/07/16	<0.0080		mg/L
2209246	AHK	Spiked Blank	Dissolved organic carbon	2021/07/17		101	%
2209246	AHK	Method Blank	Dissolved organic carbon	2021/07/17	<0.20		mg/L
2209250	VPA	Spiked Blank	Nitrates (N-NO3-)	2021/07/17		99	%
			Nitrites (N-NO2-)	2021/07/17		98	%
2209250	VPA	Method Blank	Nitrates (N-NO3-)	2021/07/17	<0.020		mg/L
			Nitrites (N-NO2-)	2021/07/17	<0.020		mg/L
2209251	VPA	Spiked Blank	Chloride (Cl)	2021/07/17		99	%
			Sulfates (SO4)	2021/07/17		100	%
2209251	VPA	Method Blank	Chloride (Cl)	2021/07/17	<0.050		mg/L
			Sulfates (SO4)	2021/07/17	<0.50		mg/L
2209334	ST5	Spiked Blank	Aluminum (Al)	2021/07/27		93	%
			Antimony (Sb)	2021/07/27		107	%
			Silver (Ag)	2021/07/27		103	%
			Arsenic (As)	2021/07/27		98	%
			Barium (Ba)	2021/07/27		109	%
			Boron (B)	2021/07/27		86	%
			Cadmium (Cd)	2021/07/27		99	%
			Calcium (Ca)	2021/07/27		96	%
			Chromium (Cr)	2021/07/27		101	%
			Cobalt (Co)	2021/07/27		98	%
			Copper (Cu)	2021/07/27		83	%
			Tin (Sn)	2021/07/27		118	%
			Iron (Fe)	2021/07/27		97	%
			Magnesium (Mg)	2021/07/27		94	%
			Manganese (Mn)	2021/07/27		98	%
			Mercury (Hg)	2021/07/27		115	%
			Molybdenum (Mo)	2021/07/27		113	%
			Nickel (Ni)	2021/07/27		103	%
			Lead (Pb)	2021/07/27		94	%
			Potassium (K)	2021/07/27		97	%
			Selenium (Se)	2021/07/27		91	%
			Sodium (Na)	2021/07/27		98	%
			Thallium (Tl)	2021/07/27		87	%
			Titanium (Ti)	2021/07/27		98	%
			Uranium (U)	2021/07/27		81	%
			Vanadium (V)	2021/07/27		99	%
			Zinc (Zn)	2021/07/27		106	%
2209334	ST5	Method Blank	Aluminum (Al)	2021/07/27	<5.0		ug/L
			Antimony (Sb)	2021/07/27	<0.0050		ug/L
			Silver (Ag)	2021/07/27	<0.0030		ug/L
			Arsenic (As)	2021/07/27	<0.080		ug/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Barium (Ba)	2021/07/27	<0.030		ug/L
			Boron (B)	2021/07/27	<0.30		ug/L
			Cadmium (Cd)	2021/07/27	<0.0060		ug/L
			Calcium (Ca)	2021/07/27	<20		ug/L
			Chromium (Cr)	2021/07/27	<0.040		ug/L
			Cobalt (Co)	2021/07/27	<0.0080		ug/L
			Copper (Cu)	2021/07/27	<0.050		ug/L
			Tin (Sn)	2021/07/27	<0.050		ug/L
			Iron (Fe)	2021/07/27	<0.50		ug/L
			Magnesium (Mg)	2021/07/27	<10		ug/L
			Manganese (Mn)	2021/07/27	<0.030		ug/L
			Mercury (Hg)	2021/07/27	<0.0020		ug/L
			Molybdenum (Mo)	2021/07/27	<0.010		ug/L
			Nickel (Ni)	2021/07/27	<0.030		ug/L
			Lead (Pb)	2021/07/27	<0.010		ug/L
			Potassium (K)	2021/07/27	<10		ug/L
			Selenium (Se)	2021/07/27	<0.050		ug/L
			Sodium (Na)	2021/07/27	<10		ug/L
			Thallium (Tl)	2021/07/27	<0.010		ug/L
			Titanium (Ti)	2021/07/27	<0.40		ug/L
			Uranium (U)	2021/07/27	<0.0010		ug/L
			Vanadium (V)	2021/07/27	<0.050		ug/L
			Zinc (Zn)	2021/07/27	<0.50		ug/L
			Total Hardness (CaCO3)	2021/07/27	<40		ug/L
2209347	AJ1	Spiked Blank	Total Cyanide (CN)	2021/07/19		107	%
2209347	AJ1	Method Blank	Total Cyanide (CN)	2021/07/20	<0.0030		mg/L
2209348	MDD	Spiked Blank	1-Chlorooctadecane	2021/07/19		79	%
			Petroleum Hydrocarbons (C10-C50)	2021/07/19		84	%
2209348	MDD	Spiked Blank DUP	1-Chlorooctadecane	2021/07/19		110	%
			Petroleum Hydrocarbons (C10-C50)	2021/07/19		101	%
2209348	MDD	Method Blank	1-Chlorooctadecane	2021/07/19		91	%
			Petroleum Hydrocarbons (C10-C50)	2021/07/19	<100		ug/L
2209524	SKL	Spiked Blank	Total Dissolved Solids	2021/07/20		96	%
2209524	SKL	Method Blank	Total Dissolved Solids	2021/07/20	<10		mg/L
2209548	YAZ	Spiked Blank	pH	2021/07/19		101	%
2209551	YAZ	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/07/19		102	%
			Carbonate (CO3 as CaCO3)	2021/07/19		102	%
2209551	YAZ	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/07/19	<1.0		mg/L
			Bicarbonates (HCO3 as CaCO3)	2021/07/19	<1.0		mg/L
			Carbonate (CO3 as CaCO3)	2021/07/19	<1.0		mg/L
2209552	YAZ	Spiked Blank	Conductivity	2021/07/19		102	%
2209552	YAZ	Method Blank	Conductivity	2021/07/19	<0.0010		mS/cm
2209703	PS5	Spiked Blank	Total suspended solids (TSS)	2021/07/21		95	%
2209703	PS5	Method Blank	Total suspended solids (TSS)	2021/07/21	<2.0		mg/L
2209915	MSM	Spiked Blank	COD	2021/07/20		100	%
2209915	MSM	Spiked Blank DUP	COD	2021/07/20		100	%
2209915	MSM	Method Blank	COD	2021/07/20	<5.0		mg/L
2209962	CLO	Spiked Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/07/20		100	%
2209962	CLO	Method Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/07/20	<0.020		mg/L
2210028	AJ1	QC Standard	Phenols-4AAP	2021/07/20		96	%
2210028	AJ1	Spiked Blank	Phenols-4AAP	2021/07/20		107	%
2210028	AJ1	Method Blank	Phenols-4AAP	2021/07/20	<0.0020		mg/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2210098	VPA	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/07/22		101	%
2210098	VPA	Method Blank	TKN Total Kjeldahl Nitrogen	2021/07/22	<0.40		mg/L
2210615	YAZ	Spiked Blank	Fluoride (F)	2021/07/21		89	%
2210615	YAZ	Method Blank	Fluoride (F)	2021/07/21	<0.10		mg/L
2210951	MHV	QC Standard	Total phosphorous	2021/07/26		100	%
2210951	MHV	Spiked Blank	Total phosphorous	2021/07/24		94	%
2210951	MHV	Method Blank	Total phosphorous	2021/07/26	<2.0		ug/L
2211615	EMT	Matrix Spike	Reactive silica (SiO2)	2021/07/22		NC	%
2211615	EMT	Spiked Blank	Reactive silica (SiO2)	2021/07/22		97	%
2211615	EMT	Method Blank	Reactive silica (SiO2)	2021/07/22	<0.50		mg/L
2211769	LI	Spiked Blank	Sulfides (S2-)	2021/07/23		90	%
2211769	LI	Method Blank	Sulfides (S2-)	2021/07/23	<0.020		mg/L
2212307	SHC	Spiked Blank	Radium-226	2021/07/24		96	%
			Radium-226	2021/07/24		96	%
2212307	SHC	Method Blank	Radium-226	2021/07/24	<0.005		Bq/L
			Radium-226	2021/07/24	<0.005		Bq/L

RDL = Reportable Detection Limit

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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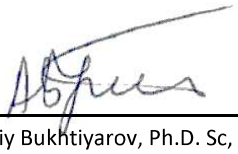
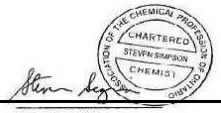
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

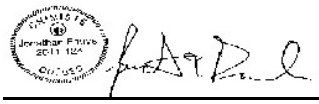


Andriy Bukhtiyarov, Ph.D. Sc, Ste-Foy, Analyst 2



Steven Simpson, Lab Director

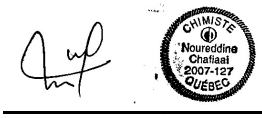
Frederic Arnau, B.Sc., Chemist, Montreal, Scientific Service Specialist



Jonathan Fauvel, B.Sc., Chemist, Montreal, Manager of Inorganics

Miryam Assayag, B.Sc. Chemist, Montréal, Team Leader

Michelina Cinquino, Analyst II



Noureddine Chafiaai, B.Sc., Chemist, Montreal, Team leader

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The analytical data and all QC contained in this report were reviewed and validated by:

Shu Yang, B.Sc. Chemist, Montreal, Analyst II

Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

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Your P.O. #: 3000000997
Your Project #: GOODWOOD QC,JW
Site#: DS04
Site Location: DS04
Your C.O.C. #: 832205-04-01

Attention: Mariana Trindade

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

Report Date: 2021/09/01
Report #: R2686671
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C140106
Received: 2021/08/05, 12:50

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Alkalinity (pH end point 4.5)	2	N/A	2021/08/06	STL SOP-00038	SM 23 2320-B m
Anions	2	N/A	2021/08/06	STL SOP-00014	MA.300–Ions 1.3 R3 m
Biochemical Oxygen Demand (5 days) (4)	2	2021/08/06	2021/08/11	STL SOP-00008	MA315-DBO 1.1 R3 m
Petroleum Hydrocarbons (C10-C50)	2	2021/08/06	2021/08/06	STL SOP-00173	MA.400–HYD. 1.1 R3 m
Total Cyanide	2	2021/08/06	2021/08/06	STL SOP-00035	MA300-CN 1.2 R4 m
Chemical Oxygen Demand	1	2021/08/10	2021/08/10	STL SOP-00009	MA315-DCO 1.1 R4 m
Chemical Oxygen Demand	1	2021/08/09	2021/08/09	STL SOP-00009	MA315-DCO 1.1 R4 m
Fecal coliforms	2	N/A	2021/08/05	QUE SOP-00303	MA.700-Fec.Ec 1.0 R5
Total coliforms	2	N/A	2021/08/05	QUE SOP-00304	MA.700-Col 1.0 R4
Conductivity	2	N/A	2021/08/06	STL SOP-00038	SM 23 2510-B m
Hexavalent Chromium (Cr 6+)	2	N/A	2021/08/09	STL SOP-00037	MA200-CrHex 1.1 R1 m
Dissolved Organic Carbon (5)	2	2021/08/05	2021/08/06	STL SOP-00243	SM 23 5310-B m
Fluoride	2	N/A	2021/08/09	STL SOP-00038	SM 23 4500-F m
Total Suspended Solids	2	2021/08/06	2021/08/10	STL SOP-00015	MA.104–S.S. 2.0 m
Total Extractable Metals by ICP	2	2021/08/10	2021/08/16	STL SOP-00062	MA.200–Mét. 1.2 R7
Total Extractible Trace Metals by ICP-MS	2	2021/08/07	2021/08/16	STL SOP-00006	MA203–Mét Tra1.1 R1m
Ammonia Nitrogen	2	N/A	2021/08/09	STL SOP-00040	MA.300–N 2.0 R2 m
Nitrate and/or Nitrite	2	N/A	2021/08/06	STL SOP-00014	MA.300–Ions 1.3 R3 m
Dissolved Oxygen	2	N/A	2021/08/05	STL SOP-00008	MA.315–DBO 1.1 R3 m
pH	2	N/A	2021/08/06	STL SOP-00038	MA.100–pH 1.1 R3 m
Total Phenols by 4-AAP	2	2021/08/10	2021/08/10	STL SOP-00033	MA404–I.Phé 2.2 R2 m
Total Phosphorus Low Level by ICP-MS (1)	2	2021/08/10	2021/08/10	QUE SOP-00132	MA.200-Mét. 1.2 R7
Sulfides (as S2-)	2	2021/08/10	2021/08/10	STL SOP-00005	MA. 300 – S 1.2 R3 m
Sulfides (H2S)	2	N/A	2021/08/10	STL SOP-00005	MA. 300 – S 1.2 R3 m
Total Dissolved Solids	2	2021/08/06	2021/08/09	STL SOP-00050	MA.115–S.D. 1.0 R4 m
Total Nitrogen	2	2021/08/09	2021/08/10	STL SOP-00077	MOE:TOTNUT-E3516v1.3
Total Organic Carbon (6)	2	N/A	2021/08/06	STL SOP-00243	SM 23 5310-B m
Total Extractable Mercury - Cold Vapour (2)	2	2021/08/11	2021/08/11	CAM SOP-00453	EPA 7470 m

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Your P.O. #: 3000000997
Your Project #: GOODWOOD QC,JW
Site#: DS04
Site Location: DS04
Your C.O.C. #: 832205-04-01

Attention: Mariana Trindade

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

Report Date: 2021/09/01
Report #: R2686671
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C140106
Received: 2021/08/05, 12:50

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Radium-226 Low Level (3, 7)	2	N/A	2021/08/21	BQL SOP-00006 BQL SOP-00017 BQL SOP-00032	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas 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 Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, results relate to the supplied samples tested.

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 Bureau Veritas - Québec
(2) This test was performed by Bureau Veritas Mississauga via Montreal
(3) This test was performed by Bureau Veritas Radiological via Montreal
(4) Please note that in the event a biochemical oxygen demand analysis cannot begin within the 48-hours holding time required (for a sample preserved at 4°C), sample will be frozen, unless otherwise specified by a regulation, to maintain it's integrity.
(5) DOC present in the sample should be considered as non-purgeable DOC
(6) TOC present in the sample should be considered as non-purgeable TOC
(7) Radium-226 results have not been corrected for blanks.

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Your P.O. #: 3000000997
Your Project #: GOODWOOD QC,JW
Site#: DS04
Site Location: DS04
Your C.O.C. #: 832205-04-01

Attention: Mariana Trindade

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

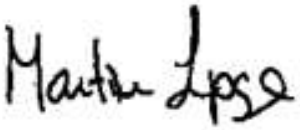
Report Date: 2021/09/01
Report #: R2686671
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C140106
Received: 2021/08/05, 12:50

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

Encryption Key



Martine Lepage
Project Manager and Account Manager
02 Sep 2021 14:05:09

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: Martine.LEPAGE@bureauveritas.com
Phone# (418)543-3788 Ext:7066201

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Lab BV Job #: C140106
Report Date: 2021/09/01

TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD QC,JW
Site Location: DS04
Your P.O. #: 3000000997
Sampler Initials: AC

RESULTS OF ANALYSES OF SURFACE WATER

Lab BV ID		JM5694	JM5695		
Sampling Date		2021/07/26 16:30	2021/07/26 15:30		
COC Number		832205-04-01	832205-04-01		
	Units	DS04-ER-GW-Q2-2021	DS04-EE-GW-Q2-2021	RDL	QC Batch
METALS					
Mercury (Hg) †	ug/L	<0.01	<0.01	0.01	2218601
RADIONUCLIDE					
Radium-226	Bq/L	<0.005	<0.005	0.005	2222419

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable

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TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD QC,JW
Site Location: DS04
Your P.O. #: 3000000997
Sampler Initials: AC

HYDROCARBONS BY GCFID (SURFACE WATER)

Lab BV ID		JM5694	JM5695		
Sampling Date		2021/07/26 16:30	2021/07/26 15:30		
COC Number		832205-04-01	832205-04-01		
	Units	DS04-ER-GW-Q2-2021	DS04-EE-GW-Q2-2021	RDL	QC Batch
PETROLEUM HYDROCARBONS					
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	<100	100	2216561
Surrogate Recovery (%)					
1-Chlorooctadecane	%	95	94	N/A	2216561

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

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD QC,JW
Site Location: DS04
Your P.O. #: 3000000997
Sampler Initials: AC

TOTAL EXTRACTABLE METALS (SURFACE WATER)

Lab BV ID		JM5694	JM5695		
Sampling Date		2021/07/26 16:30	2021/07/26 15:30		
COC Number		832205-04-01	832205-04-01		
	Units	DS04-ER-GW-Q2-2021	DS04-EE-GW-Q2-2021	RDL	QC Batch
METALS					
Total phosphorous	ug/L	3.4	4.8	2.0	2217540
Aluminum (Al) †	ug/L	11	25	5.0	2217145
Antimony (Sb) †	ug/L	<0.0050	0.010	0.0050	2217145
Silver (Ag) †	ug/L	<0.0030	<0.0030	0.0030	2217145
Arsenic (As) †	ug/L	<0.080	0.092	0.080	2217145
Barium (Ba) †	ug/L	0.26	1.3	0.030	2217145
Boron (B) †	ug/L	0.98	3.0	0.30	2217145
Cadmium (Cd) †	ug/L	<0.0060	<0.0060	0.0060	2217145
Calcium (Ca) †	ug/L	98	170	20	2217145
Chromium (Cr) †	ug/L	0.14	0.071	0.040	2217145
Cobalt (Co) †	ug/L	0.016	0.018	0.0080	2217145
Copper (Cu) †	ug/L	0.28	0.56	0.050	2217145
Total Hardness (CaCO3) †	ug/L	<1000	<1000	1000	2217970
Tin (Sn) †	ug/L	<0.050	<0.050	0.050	2217145
Iron (Fe) †	ug/L	24	340	0.50	2217145
Magnesium (Mg) †	ug/L	53	110	10	2217145
Manganese (Mn) †	ug/L	13	8.5	0.030	2217145
Mercury (Hg) †	ug/L	<0.0020	<0.0020	0.0020	2217145
Molybdenum (Mo) †	ug/L	<0.010	<0.010	0.010	2217145
Nickel (Ni) †	ug/L	0.072	0.16	0.030	2217145
Lead (Pb) †	ug/L	0.023	0.042	0.010	2217145
Potassium (K) †	ug/L	96	190	10	2217145
Selenium (Se) †	ug/L	<0.050	<0.050	0.050	2217145
Sodium (Na)	ug/L	<500	<500	500	2217970
Thallium (Tl) †	ug/L	<0.010	<0.010	0.010	2217145
Titanium (Ti) †	ug/L	1.6	<0.40	0.40	2217145
Uranium (U) †	ug/L	<0.0010	0.0047	0.0010	2217145
Vanadium (V) †	ug/L	0.064	0.050	0.050	2217145
Zinc (Zn) †	ug/L	0.59	1.2	0.50	2217145

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable

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TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD QC,JW
Site Location: DS04
Your P.O. #: 3000000997
Sampler Initials: AC

CONVENTIONAL PARAMETERS (SURFACE WATER)

Lab BV ID		JM5694	JM5694		JM5695		
Sampling Date		2021/07/26 16:30	2021/07/26 16:30		2021/07/26 15:30		
COC Number		832205-04-01	832205-04-01		832205-04-01		
	Units	DS04-ER-GW-Q2-2021	DS04-ER-GW-Q2-2021 Lab-Dup	QC Batch	DS04-EE-GW-Q2-2021	RDL	QC Batch
CONVENTIONALS							
BOD5	mg/L	<4.0	N/A	2216571	<4.0	4.0	2216571
COD	mg/L	<5.0	N/A	2217363	<5.0	5.0	2217539
Conductivity	mS/cm	0.028	N/A	2216779	0.0021	0.0010	2216779
Dissolved organic carbon †	mg/L	1.0	N/A	2216526	1.4	0.20	2216526
Dissolved oxygen †	mg/L	9.5	N/A	2216521	9.7	1.0	2216521
Fluoride (F)	mg/L	<0.10	<0.10	2217245	<0.10	0.10	2217245
Hexavalent Chromium (Cr 6+)	mg/L	<0.0080	N/A	2217261	<0.0080	0.0080	2217261
Nitrates (N-NO3-)	mg/L	<0.020	N/A	2216608	<0.020	0.020	2216608
Nitrites (N-NO2-)	mg/L	<0.020	N/A	2216608	<0.020	0.020	2216608
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	<0.020	N/A	2217326	<0.020	0.020	2217326
pH	pH	7.80	N/A	2216777	6.02	N/A	2216777
Phenols-4AAP	mg/L	<0.0020	N/A	2217806	<0.0020	0.0020	2217806
Sulfides (H2S) †	mg/L	<0.021	N/A	2216550	<0.021	0.021	2216550
Sulfides (S2-)	mg/L	<0.020	N/A	2217918	<0.020	0.020	2217918
TKN Total Kjeldahl Nitrogen	mg/L	<0.40	N/A	2217403	<0.40	0.40	2217403
Total Cyanide (CN)	mg/L	<0.0030	N/A	2216663	<0.0030	0.0030	2216663
Total Organic Carbon	mg/L	1.2	1.2	2216528	1.5	0.20	2216528
Alkalinity Total (as CaCO3) pH 4.5 †	mg/L	7.1	N/A	2216778	1.1	1.0	2216778
Chloride (Cl)	mg/L	0.087	N/A	2216621	0.16	0.050	2216621
Sulfates (SO4)	mg/L	<0.50	N/A	2216621	<0.50	0.50	2216621
Total Dissolved Solids	mg/L	<10	N/A	2216580	<10	10	2216580
Total suspended solids (TSS)	mg/L	4.0	N/A	2216799	4.0	2.0	2216799

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
† Parameter is not accreditable

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD QC,JW
Site Location: DS04
Your P.O. #: 3000000997
Sampler Initials: AC

MICROBIOLOGY (SURFACE WATER)

Lab BV ID		JM5694	JM5695		
Sampling Date		2021/07/26 16:30	2021/07/26 15:30		
COC Number		832205-04-01	832205-04-01		
	Units	DS04-ER-GW-Q2-2021	DS04-EE-GW-Q2-2021	RDL	QC Batch
MICROBIOLGICAL TESTS					
Total coliforms	UFC/100ml	980	4500	10	2216518
Fecal coliforms	UFC/100ml	<10	180	10	2216517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Dissolved Oxygen: Holding time already past upon reception.: JM5694
Dissolved Organic Carbon: Holding time already past upon reception.: JM5694
Fecal coliforms: Holding time already past upon reception.: JM5694
Total coliforms: Holding time already past upon reception.: JM5694
Total Suspended Solids: Holding time already past upon reception.: JM5694
Total Dissolved Solids: Holding time already past upon reception.: JM5694
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JM5694
Nitrate and/or Nitrite: Holding time already past upon reception.: JM5694
pH: Holding time already past upon reception.: JM5694
Dissolved Oxygen: Holding time already past upon reception.: JM5695
Dissolved Organic Carbon: Holding time already past upon reception.: JM5695
Fecal coliforms: Holding time already past upon reception.: JM5695
Total coliforms: Holding time already past upon reception.: JM5695
Total Suspended Solids: Holding time already past upon reception.: JM5695
Total Dissolved Solids: Holding time already past upon reception.: JM5695
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JM5695
Nitrate and/or Nitrite: Holding time already past upon reception.: JM5695
pH: Holding time already past upon reception.: JM5695

Radium-226: Cette analyse est accréditée par le MELCC.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2216526	AHK	Spiked Blank	Dissolved organic carbon	2021/08/06		102	%
2216526	AHK	Method Blank	Dissolved organic carbon	2021/08/06	<0.20		mg/L
2216528	AHK	Spiked Blank	Total Organic Carbon	2021/08/06		102	%
2216528	AHK	Method Blank	Total Organic Carbon	2021/08/06	<0.20		mg/L
2216561	SBD	Spiked Blank	1-Chlorooctadecane	2021/08/06		97	%
			Petroleum Hydrocarbons (C10-C50)	2021/08/06		97	%
2216561	SBD	Method Blank	1-Chlorooctadecane	2021/08/06		102	%
			Petroleum Hydrocarbons (C10-C50)	2021/08/06	<100		ug/L
2216571	LKO	QC Standard	BOD5	2021/08/11		68	%
2216571	LKO	Spiked Blank	BOD5	2021/08/11		102	%
2216571	LKO	Spiked Blank DUP	BOD5	2021/08/11		104	%
2216571	LKO	Method Blank	BOD5	2021/08/11	<2.0		mg/L
2216571	LKO	Method Blank DUP	BOD5	2021/08/11	<2.0		mg/L
2216580	MQI	Spiked Blank	Total Dissolved Solids	2021/08/09		97	%
2216580	MQI	Method Blank	Total Dissolved Solids	2021/08/09	<10		mg/L
2216608	TGU	Spiked Blank	Nitrates (N-NO3-)	2021/08/06		98	%
			Nitrites (N-NO2-)	2021/08/06		97	%
2216608	TGU	Method Blank	Nitrates (N-NO3-)	2021/08/06	<0.020		mg/L
			Nitrites (N-NO2-)	2021/08/06	<0.020		mg/L
2216621	TGU	Spiked Blank	Chloride (Cl)	2021/08/06		98	%
			Sulfates (SO4)	2021/08/06		100	%
2216621	TGU	Method Blank	Chloride (Cl)	2021/08/06	<0.050		mg/L
			Sulfates (SO4)	2021/08/06	<0.50		mg/L
2216663	AJ1	Spiked Blank	Total Cyanide (CN)	2021/08/06		98	%
2216663	AJ1	Method Blank	Total Cyanide (CN)	2021/08/06	<0.0030		mg/L
2216777	ABT	Spiked Blank	pH	2021/08/06		101	%
2216778	ABT	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/08/06		104	%
2216778	ABT	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/08/06	<1.0		mg/L
2216779	ABT	Spiked Blank	Conductivity	2021/08/06		99	%
2216779	ABT	Method Blank	Conductivity	2021/08/06	<0.0010		mS/cm
2216799	PS5	Spiked Blank	Total suspended solids (TSS)	2021/08/10		95	%
2216799	PS5	Method Blank	Total suspended solids (TSS)	2021/08/10	<2.0		mg/L
2217145	ZEO	Spiked Blank	Aluminum (Al)	2021/08/16		102	%
			Antimony (Sb)	2021/08/16		108	%
			Silver (Ag)	2021/08/16		106	%
			Arsenic (As)	2021/08/16		110	%
			Barium (Ba)	2021/08/16		109	%
			Boron (B)	2021/08/16		113	%
			Cadmium (Cd)	2021/08/16		105	%
			Calcium (Ca)	2021/08/16		100	%
			Chromium (Cr)	2021/08/16		100	%
			Cobalt (Co)	2021/08/16		105	%
			Copper (Cu)	2021/08/16		119	%
			Tin (Sn)	2021/08/16		101	%
			Iron (Fe)	2021/08/16		103	%
			Magnesium (Mg)	2021/08/16		104	%
			Manganese (Mn)	2021/08/16		108	%
			Mercury (Hg)	2021/08/16		108	%
			Molybdenum (Mo)	2021/08/16		103	%
			Nickel (Ni)	2021/08/16		103	%

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Lead (Pb)	2021/08/16		110	%
			Potassium (K)	2021/08/16		109	%
			Selenium (Se)	2021/08/16		87	%
			Sodium (Na)	2021/08/16		106	%
			Thallium (Tl)	2021/08/16		105	%
			Titanium (Ti)	2021/08/16		111	%
			Uranium (U)	2021/08/16		107	%
			Vanadium (V)	2021/08/16		103	%
			Zinc (Zn)	2021/08/16		* (1)	%
2217145	ZEO	Method Blank	Aluminum (Al)	2021/08/16	<5.0		ug/L
			Antimony (Sb)	2021/08/16	<0.0050		ug/L
			Silver (Ag)	2021/08/16	<0.0030		ug/L
			Arsenic (As)	2021/08/16	<0.080		ug/L
			Barium (Ba)	2021/08/16	<0.030		ug/L
			Boron (B)	2021/08/16	<0.30		ug/L
			Cadmium (Cd)	2021/08/16	<0.0060		ug/L
			Calcium (Ca)	2021/08/16	<20		ug/L
			Chromium (Cr)	2021/08/16	<0.040		ug/L
			Cobalt (Co)	2021/08/16	<0.0080		ug/L
			Copper (Cu)	2021/08/16	<0.050		ug/L
			Tin (Sn)	2021/08/16	<0.050		ug/L
			Iron (Fe)	2021/08/16	<0.50		ug/L
			Magnesium (Mg)	2021/08/16	<10		ug/L
			Manganese (Mn)	2021/08/16	0.064, RDL=0.030		ug/L
			Mercury (Hg)	2021/08/16	<0.0020		ug/L
			Molybdenum (Mo)	2021/08/16	<0.010		ug/L
			Nickel (Ni)	2021/08/16	<0.030		ug/L
			Lead (Pb)	2021/08/16	<0.010		ug/L
			Potassium (K)	2021/08/16	<10		ug/L
			Selenium (Se)	2021/08/16	<0.050		ug/L
			Sodium (Na)	2021/08/16	<10		ug/L
			Thallium (Tl)	2021/08/16	<0.010		ug/L
			Titanium (Ti)	2021/08/16	<0.40		ug/L
			Uranium (U)	2021/08/16	<0.0010		ug/L
			Vanadium (V)	2021/08/16	<0.050		ug/L
			Zinc (Zn)	2021/08/16	<0.50		ug/L
			Total Hardness (CaCO3)	2021/08/16	<40		ug/L
2217245	ABT	Spiked Blank	Fluoride (F)	2021/08/09		95	%
2217245	ABT	Method Blank	Fluoride (F)	2021/08/09	<0.10		mg/L
2217261	ANB	QC Standard	Hexavalent Chromium (Cr 6+)	2021/08/09		99	%
2217261	ANB	Spiked Blank	Hexavalent Chromium (Cr 6+)	2021/08/09		101	%
2217261	ANB	Method Blank	Hexavalent Chromium (Cr 6+)	2021/08/09	<0.0080		mg/L
2217326	ANB	Spiked Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/08/09		108	%
2217326	ANB	Method Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/08/09	<0.020		mg/L
2217363	MSM	Spiked Blank	COD	2021/08/09		100	%
2217363	MSM	Spiked Blank DUP	COD	2021/08/09		108	%
2217363	MSM	Method Blank	COD	2021/08/09	<5.0		mg/L
2217403	VPA	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/08/10		103	%
2217403	VPA	Method Blank	TKN Total Kjeldahl Nitrogen	2021/08/10	<0.40		mg/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2217539	MSM	Spiked Blank	COD	2021/08/10		104	%
2217539	MSM	Spiked Blank DUP	COD	2021/08/10		100	%
2217539	MSM	Method Blank	COD	2021/08/10	<5.0		mg/L
2217540	MHV	QC Standard	Total phosphorous	2021/08/10		107	%
2217540	MHV	Spiked Blank	Total phosphorous	2021/08/10		97	%
2217540	MHV	Method Blank	Total phosphorous	2021/08/10	<2.0		ug/L
2217806	ANB	QC Standard	Phenols-4AAP	2021/08/10		97	%
2217806	ANB	Spiked Blank	Phenols-4AAP	2021/08/10		97	%
2217806	ANB	Method Blank	Phenols-4AAP	2021/08/10	<0.0020		mg/L
2217918	LI	Spiked Blank	Sulfides (S2-)	2021/08/10		93	%
2217918	LI	Method Blank	Sulfides (S2-)	2021/08/10	<0.020		mg/L
2217970	JGZ	Spiked Blank	Aluminum (Al)	2021/08/15		92	%
			Antimony (Sb)	2021/08/15		100	%
			Silver (Ag)	2021/08/15		81	%
			Arsenic (As)	2021/08/15		99	%
			Barium (Ba)	2021/08/15		97	%
			Boron (B)	2021/08/15		91	%
			Cadmium (Cd)	2021/08/15		95	%
			Calcium (Ca)	2021/08/15		93	%
			Chromium (Cr)	2021/08/15		92	%
			Cobalt (Co)	2021/08/15		91	%
			Copper (Cu)	2021/08/15		91	%
			Tin (Sn)	2021/08/15		104	%
			Iron (Fe)	2021/08/15		96	%
			Magnesium (Mg)	2021/08/15		91	%
			Manganese (Mn)	2021/08/15		96	%
			Mercury (Hg)	2021/08/15		93	%
			Molybdenum (Mo)	2021/08/15		105	%
			Nickel (Ni)	2021/08/15		90	%
			Lead (Pb)	2021/08/15		91	%
			Potassium (K)	2021/08/15		98	%
			Selenium (Se)	2021/08/15		102	%
			Sodium (Na)	2021/08/15		90	%
			Thallium (Tl)	2021/08/15		70 (2)	%
			Titanium (Ti)	2021/08/15		96	%
			Uranium (U)	2021/08/15		93	%
			Vanadium (V)	2021/08/15		95	%
			Zinc (Zn)	2021/08/15		89	%
2217970	JGZ	Method Blank	Aluminum (Al)	2021/08/15	<10		ug/L
			Antimony (Sb)	2021/08/15	<1.0		ug/L
			Silver (Ag)	2021/08/15	<1.0		ug/L
			Arsenic (As)	2021/08/15	<1.0		ug/L
			Barium (Ba)	2021/08/15	<2.0		ug/L
			Boron (B)	2021/08/15	<50		ug/L
			Cadmium (Cd)	2021/08/15	<0.20		ug/L
			Calcium (Ca)	2021/08/15	<500		ug/L
			Chromium (Cr)	2021/08/15	<5.0		ug/L
			Cobalt (Co)	2021/08/15	<1.0		ug/L
			Copper (Cu)	2021/08/15	<1.0		ug/L
			Total Hardness (CaCO3)	2021/08/15	<1000		ug/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Tin (Sn)	2021/08/15	<2.0		ug/L
			Iron (Fe)	2021/08/15	<60		ug/L
			Magnesium (Mg)	2021/08/15	<100		ug/L
			Manganese (Mn)	2021/08/15	<1.0		ug/L
			Mercury (Hg)	2021/08/15	<0.10		ug/L
			Molybdenum (Mo)	2021/08/15	<1.0		ug/L
			Nickel (Ni)	2021/08/15	<2.0		ug/L
			Lead (Pb)	2021/08/15	<0.50		ug/L
			Potassium (K)	2021/08/15	<500		ug/L
			Selenium (Se)	2021/08/15	<3.0		ug/L
			Sodium (Na)	2021/08/15	<500		ug/L
			Thallium (Tl)	2021/08/15	<2.0		ug/L
			Titanium (Ti)	2021/08/15	<10		ug/L
			Uranium (U)	2021/08/15	<1.0		ug/L
			Vanadium (V)	2021/08/15	<2.0		ug/L
			Zinc (Zn)	2021/08/15	<7.0		ug/L
2218601	éCY	Matrix Spike	Mercury (Hg)	2021/08/11		106	%
2218601	éCY	Spiked Blank	Mercury (Hg)	2021/08/11		107	%
2218601	éCY	Method Blank	Mercury (Hg)	2021/08/11	<0.01		ug/L
2222419	MOE	Spiked Blank	Radium-226	2021/08/21		95	%
			Radium-226	2021/08/21		95	%
			Radium-226	2021/08/21		95	%
2222419	MOE	Method Blank	Radium-226	2021/08/21	<0.005		Bq/L
			Radium-226	2021/08/21	<0.005		Bq/L
			Radium-226	2021/08/21	<0.005		Bq/L

RDL = Reportable Detection Limit

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

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

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

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

(1) Dû à une erreur de laboratoire, la récupération de ce paramètre dans le blanc fortifié est impossible.

(2) Recovery or relative percent difference (RPD) for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria

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TATA STEEL MINERALS CANADA
Client Project #: GOODWOOD QC,JW
Site Location: DS04
Your P.O. #: 3000000997
Sampler Initials: AC

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Caroline Bougie, B.Sc. Chemist, Montreal, Laboratory Coordinator

Anastassia Hamanov, Scientific Service Specialist

Steven Simpson, Lab Director

Frederic Arnau, B.Sc., Chemist, Montreal, Scientific Service Specialist

Faouzi Sarsi, B.Sc. Chemist, Montréal, SR Analyst

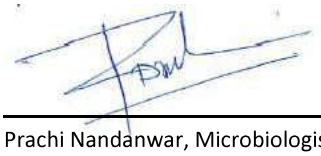
Maria Dragna Apopei, B.Sc., Chemist, Montréal

Miryam Assayag, B.Sc. Chemist, Montréal, Team Leader

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by:



Prachi Nandanwar, Microbiologist, Montreal, Scientific Specialist

Shu Yang, B.Sc. Chemist, Montreal, Analyst II

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Site#: DS04
Site Location: GOODWOOD QC
Your C.O.C. #: 229608-01-01

Attention: Mariana Trindade

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

Report Date: 2021/10/08
Report #: R2696357
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C147265
Received: 2021/09/08, 17:00

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Alkalinity (pH end point 4.5)	2	N/A	2021/09/09	STL SOP-00038	SM 23 2320-B m
Anions	2	N/A	2021/09/11	STL SOP-00014	MA.300–Ions 1.3 R3 m
Biochemical Oxygen Demand (5 days) (4)	2	2021/09/10	2021/09/15	STL SOP-00008	MA315-DBO 1.1 R3 m
Pet. Hydrocarbons (C10-C50) in waters	2	2021/09/18	2021/09/21	STL SOP-00173	MA.400–HYD. 1.1 R3 m
Total Cyanide	2	2021/09/09	2021/09/10	STL SOP-00035	MA300-CN 1.2 R4 m
Chemical Oxygen Demand	2	2021/09/13	2021/09/13	STL SOP-00009	MA315-DCO 1.1 R4 m
Fecal Coliforms 0-60 000 CFU/100ml _WW	2	N/A	2021/09/08	QUE SOP-00303	MA.700-Fec.Ec 1.0 R5
Total Coliforms 10-80 000 CFU/100ml _WW	2	N/A	2021/09/08	QUE SOP-00304	MA.700-Col 1.0 R4
Conductivity	2	N/A	2021/09/09	STL SOP-00038	SM 23 2510-B m
Hexavalent Chromium (Cr 6+)	2	N/A	2021/09/16	STL SOP-00037	MA200-CrHex 1.1 R1 m
Dissolved Organic Carbon (5)	2	2021/09/17	2021/09/17	STL SOP-00243	SM 23 5310-B m
Fluoride	2	N/A	2021/09/15	STL SOP-00038	SM 23 4500-F m
Total Suspended Solids	2	2021/09/10	2021/09/13	STL SOP-00015	MA.104–S.S. 2.0 m
Total Extractible Trace Metals by ICP-MS	2	2021/09/21	2021/09/23	STL SOP-00006	MA203–Mét Tra1.1 R1m
Ammonia Nitrogen	2	N/A	2021/09/11	STL SOP-00040	MA.300–N 2.0 R2 m
Nitrate and/or Nitrite	2	N/A	2021/09/11	STL SOP-00014	MA.300–Ions 1.3 R3 m
Dissolved Oxygen	2	N/A	2021/09/08	STL SOP-00008	MA.315–DBO 1.1 R3 m
pH	2	N/A	2021/09/09	STL SOP-00038	MA.100–pH 1.1 R3 m
Total Phenols by 4-AAP	2	2021/09/10	2021/09/14	STL SOP-00033	MA404–I.Phé 2.2 R2 m
Total Phosphorus Low Level by ICP-MS (1)	1	2021/09/10	2021/09/11	QUE SOP-00132	MA.200-Mét. 1.2 R7
Total Phosphorus Low Level by ICP-MS (1)	1	2021/09/14	2021/09/17	QUE SOP-00132	MA.200-Mét. 1.2 R7
Sulfides (as S2-)	2	2021/09/17	2021/09/17	STL SOP-00005	MA. 300 – S 1.2 R3 m
Total Dissolved Solids	2	2021/09/11	2021/09/15	STL SOP-00050	MA.115–S.D. 1.0 R4 m
Total Nitrogen	1	2021/09/13	2021/09/14	STL SOP-00077	MOE:TOTNUT-E3516v1.3
Total Nitrogen	1	2021/09/15	2021/09/15	STL SOP-00077	MOE:TOTNUT-E3516v1.3
Total Organic Carbon (6)	2	N/A	2021/09/17	STL SOP-00243	SM 23 5310-B m
Uranium by ICP-MS	2	2021/09/08	2021/09/09	STL SOP-00062	MA.200–Mét. 1.2 R5 m
Radium-226 Low Level (2, 7)	1	N/A	2021/09/27	BQL SOP-00006 BQL SOP-00017 BQL SOP-00032	Alpha Spectrometry

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Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Site#: DS04
Site Location: GOODWOOD QC
Your C.O.C. #: 229608-01-01

Attention: Mariana Trindade

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

Report Date: 2021/10/08
Report #: R2696357
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C147265
Received: 2021/09/08, 17:00

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Radium-226 Low Level (2, 7)	1	N/A	2021/09/28	BQL SOP-00006 BQL SOP-00017 BQL SOP-00032	Alpha Spectrometry
Reactive Silica(SiO2) (3)	2	2021/09/16	2021/09/16	ATL SOP 00022	EPA 366.0 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas 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 Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, results relate to the supplied samples tested.

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 Bureau Veritas - Québec, 2690 Avenue Dalton , Ste-Foy, QC, G1P 3S4
(2) This test was performed by Bureau Veritas - Radiological, 6790 Kitimat Rd, Unit 4 , Mississauga, ON, L5N 5L9
(3) This test was performed by Bureau Veritas Bedford, Suit 105, 200 Bluewater Rd. , Bedford, NS, B4B1G9
(4) Please note that in the event a biochemical oxygen demand analysis cannot begin within the 48-hours holding time required (for a sample preserved at 4°C), sample will be frozen, unless otherwise specified by a regulation, to maintain it's integrity.
(5) DOC present in the sample should be considered as non-purgeable DOC
(6) TOC present in the sample should be considered as non-purgeable TOC
(7) Radium-226 results have not been corrected for blanks.

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Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Site#: DS04
Site Location: GOODWOOD QC
Your C.O.C. #: 229608-01-01

Attention: Mariana Trindade

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

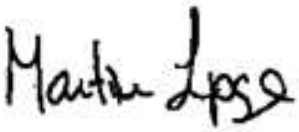
Report Date: 2021/10/08
Report #: R2696357
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C147265
Received: 2021/09/08, 17:00

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

Encryption Key



Martine Lepage
Project Manager and Account Manager
08 Oct 2021 16:29:48

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: Martine.LEPAGE@bureauveritas.com
Phone# (418)543-3788 Ext:7066201

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Lab BV Job #: C147265
Report Date: 2021/10/08

TATA STEEL MINERALS CANADA
Client Project #: QC SURFACE WATER
Site Location: GOODWOOD QC
Your P.O. #: 3000000997

RESULTS OF ANALYSES OF SURFACE WATER

Lab BV ID		JQ3411	JQ3411	JQ3412		
Sampling Date		2021/09/05 10:30	2021/09/05 10:30	2021/09/05 12:10		
COC Number		229608-01-01	229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-Q3-2021	DS04-QC-ER-GW-Q3-2021 Lab-Dup	DS04-QC-EE-GW-Q3-2021	RDL	QC Batch
INORGANICS						
Reactive silica (SiO2) †	mg/L	<0.50	N/A	0.66	0.50	2230942
RADIONUCLIDE						
Radium-226	Bq/L	<0.005	<0.005	<0.005	0.005	2234641

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable
N/A = Not Applicable

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TATA STEEL MINERALS CANADA
Client Project #: QC SURFACE WATER
Site Location: GOODWOOD QC
Your P.O. #: 3000000997

HYDROCARBONS BY GCFID (SURFACE WATER)

Lab BV ID		JQ3411	JQ3412		
Sampling Date		2021/09/05 10:30	2021/09/05 12:10		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-Q3-2021	DS04-QC-EE-GW-Q3-2021	RDL	QC Batch
PETROLEUM HYDROCARBONS					
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	<100	100	2231360
Surrogate Recovery (%)					
1-Chlorooctadecane	%	96	101	N/A	2231360

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

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TOTAL EXTRACTABLE METALS (SURFACE WATER)

Lab BV ID		JQ3411	JQ3411		JQ3412		
Sampling Date		2021/09/05 10:30	2021/09/05 10:30		2021/09/05 12:10		
COC Number		229608-01-01	229608-01-01		229608-01-01		
	Units	DS04-QC-ER-GW-Q3-2021	DS04-QC-ER-GW-Q3-2021 Lab-Dup	QC Batch	DS04-QC-EE-GW-Q3-2021	RDL	QC Batch
METALS							
Total phosphorous	ug/L	5.0	4.9	2228629	3.4	2.0	2229882
Aluminum (Al) †	ug/L	33	N/A	2232112	9.0	5.0	2232112
Antimony (Sb) †	ug/L	0.0085	N/A	2232112	0.0060	0.0050	2232112
Silver (Ag) †	ug/L	<0.0030	N/A	2232112	0.0031	0.0030	2232112
Arsenic (As) †	ug/L	<0.080	N/A	2232112	<0.080	0.080	2232112
Barium (Ba) †	ug/L	0.75	N/A	2232112	1.1	0.030	2232112
Boron (B) †	ug/L	0.66	N/A	2232112	2.5	0.30	2232112
Cadmium (Cd) †	ug/L	<0.0060	N/A	2232112	<0.0060	0.0060	2232112
Calcium (Ca) †	ug/L	130	N/A	2232112	150	20	2232112
Chromium (Cr) †	ug/L	0.044	N/A	2232112	<0.040	0.040	2232112
Cobalt (Co) †	ug/L	0.035	N/A	2232112	0.014	0.0080	2232112
Copper (Cu) †	ug/L	0.17	N/A	2232112	0.16	0.050	2232112
Tin (Sn) †	ug/L	<0.050	N/A	2232112	<0.050	0.050	2232112
Iron (Fe) †	ug/L	91 (1)	N/A	2232112	44 (1)	1.0	2232112
Magnesium (Mg) †	ug/L	73	N/A	2232112	97	10	2232112
Manganese (Mn) †	ug/L	24	N/A	2232112	9.8	0.030	2232112
Mercury (Hg) †	ug/L	<0.0020	N/A	2232112	<0.0020	0.0020	2232112
Molybdenum (Mo) †	ug/L	<0.010	N/A	2232112	<0.010	0.010	2232112
Nickel (Ni) †	ug/L	0.16	N/A	2232112	0.066	0.030	2232112
Lead (Pb) †	ug/L	0.019	N/A	2232112	0.014	0.010	2232112
Potassium (K) †	ug/L	31 (1)	N/A	2232112	100 (1)	11	2232112
Selenium (Se) †	ug/L	<0.050	N/A	2232112	<0.050	0.050	2232112
Sodium (Na) †	ug/L	100	N/A	2232112	180	10	2232112
Thallium (Tl) †	ug/L	<0.010	N/A	2232112	<0.010	0.010	2232112
Titanium (Ti) †	ug/L	<0.40	N/A	2232112	<0.40	0.40	2232112
Uranium (U) †	ug/L	0.0028	N/A	2232112	0.0026	0.0010	2232112
Vanadium (V) †	ug/L	<0.050	N/A	2232112	<0.050	0.050	2232112
Zinc (Zn) †	ug/L	0.71	N/A	2232112	<0.50	0.50	2232112
Total Hardness (CaCO3) †	ug/L	620	N/A	2232112	760	40	2232112

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable
N/A = Not Applicable
(1) The detection limit was raised due to instrumentation.

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CONVENTIONAL PARAMETERS (SURFACE WATER)

Lab BV ID		JQ3411	JQ3411		
Sampling Date		2021/09/05 10:30	2021/09/05 10:30		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-Q3-2021	DS04-QC-ER-GW-Q3-2021 Lab-Dup	RDL	QC Batch
CONVENTIONALS					
BOD5	mg/L	<4.0	N/A	4.0	2228457
COD	mg/L	9.0	N/A	5.0	2229328
Conductivity	mS/cm	0.0035	N/A	0.0010	2228009
Dissolved organic carbon †	mg/L	3.6	N/A	0.20	2231139
Dissolved oxygen †	mg/L	9.7	N/A	1.0	2227894
Fluoride (F)	mg/L	<0.10	N/A	0.10	2229865
Hexavalent Chromium (Cr 6+)	mg/L	<0.0080	N/A	0.0080	2230136
Nitrates (N-NO3-)	mg/L	<0.020	N/A	0.020	2228068
Nitrites (N-NO2-)	mg/L	<0.020	N/A	0.020	2228068
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	<0.020	<0.020	0.020	2229096
pH	pH	5.38	N/A	N/A	2228008
Phenols-4AAP	mg/L	<0.0020	N/A	0.0020	2228835
Sulfides (S2-)	mg/L	<0.020	N/A	0.020	2231101
TKN Total Kjeldahl Nitrogen	mg/L	<0.40	N/A	0.40	2230103
Total Cyanide (CN)	mg/L	<0.0030	N/A	0.0030	2228139
Total Organic Carbon	mg/L	3.6	N/A	0.20	2230846
Alkalinity Total (as CaCO3) pH 4.5 †	mg/L	<1.0	N/A	1.0	2228010
Bicarbonates (HCO3 as CaCO3) †	mg/L	<1.0	N/A	1.0	2228010
Carbonate (CO3 as CaCO3) †	mg/L	<1.0	N/A	1.0	2228010
Chloride (Cl)	mg/L	0.11	N/A	0.050	2228077
Sulfates (SO4)	mg/L	<0.50	N/A	0.50	2228077
Total Dissolved Solids	mg/L	25	N/A	10	2228978
Total suspended solids (TSS)	mg/L	2.0	N/A	2.0	2228611

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
† Parameter is not accreditable

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TATA STEEL MINERALS CANADA
Client Project #: QC SURFACE WATER
Site Location: GOODWOOD QC
Your P.O. #: 3000000997

CONVENTIONAL PARAMETERS (SURFACE WATER)

Lab BV ID		JQ3412		
Sampling Date		2021/09/05 12:10		
COC Number		229608-01-01		
	Units	DS04-QC-EE-GW-Q3-2021	RDL	QC Batch
CONVENTIONALS				
BOD5	mg/L	<4.0	4.0	2228457
COD	mg/L	<5.0	5.0	2229328
Conductivity	mS/cm	0.0023	0.0010	2228009
Dissolved organic carbon †	mg/L	1.4	0.20	2231139
Dissolved oxygen †	mg/L	10	1.0	2227894
Fluoride (F)	mg/L	<0.10	0.10	2229865
Hexavalent Chromium (Cr 6+)	mg/L	<0.0080	0.0080	2230136
Nitrates (N-NO3-)	mg/L	<0.020	0.020	2228068
Nitrites (N-NO2-)	mg/L	<0.020	0.020	2228068
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	<0.020	0.020	2229096
pH	pH	5.96	N/A	2228008
Phenols-4AAP	mg/L	<0.0020	0.0020	2228835
Sulfides (S2-)	mg/L	<0.020	0.020	2231101
TKN Total Kjeldahl Nitrogen	mg/L	<0.40	0.40	2229426
Total Cyanide (CN)	mg/L	<0.0030	0.0030	2228139
Total Organic Carbon	mg/L	1.4	0.20	2230846
Alkalinity Total (as CaCO3) pH 4.5 †	mg/L	<1.0	1.0	2228010
Bicarbonates (HCO3 as CaCO3) †	mg/L	<1.0	1.0	2228010
Carbonate (CO3 as CaCO3) †	mg/L	<1.0	1.0	2228010
Chloride (Cl)	mg/L	0.19	0.050	2228077
Sulfates (SO4)	mg/L	<0.50	0.50	2228077
Total Dissolved Solids	mg/L	10	10	2228978
Total suspended solids (TSS)	mg/L	2.0	2.0	2228611

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable
N/A = Not Applicable

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TATA STEEL MINERALS CANADA
Client Project #: QC SURFACE WATER
Site Location: GOODWOOD QC
Your P.O. #: 3000000997

MICROBIOLOGY (SURFACE WATER)

Lab BV ID		JQ3411	JQ3412		
Sampling Date		2021/09/05 10:30	2021/09/05 12:10		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-Q3-2021	DS04-QC-EE-GW-Q3-2021	RDL	QC Batch
MICROBIOLGICAL TESTS					
Total coliforms	UFC/100ml	710	190	10	2227891
Fecal coliforms	UFC/100ml	<10	<10	10	2227907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Dissolved Oxygen: Holding time already past upon reception.: JQ3411
Dissolved Organic Carbon: Sample received > 24hrs after sampling, filtered and preserved in the lab.: JQ3411
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JQ3411
Nitrate and/or Nitrite: Holding time already past upon reception.: JQ3411
pH: Holding time already past upon reception.: JQ3411
Fecal Coliforms 0-60 000 CFU/100ml _WW: Holding time already past upon reception.: JQ3411
Total Coliforms 10-80 000 CFU/100ml _WW: Holding time already past upon reception.: JQ3411
Dissolved Oxygen: Holding time already past upon reception.: JQ3412
Dissolved Organic Carbon: Sample received > 24hrs after sampling, filtered and preserved in the lab.: JQ3412
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JQ3412
Nitrate and/or Nitrite: Holding time already past upon reception.: JQ3412
pH: Holding time already past upon reception.: JQ3412
Fecal Coliforms 0-60 000 CFU/100ml _WW: Holding time already past upon reception.: JQ3412
Total Coliforms 10-80 000 CFU/100ml _WW: Holding time already past upon reception.: JQ3412
Radium-226: Cette analyse est accréditée par le MELCC.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2228008	YAZ	Spiked Blank	pH	2021/09/09		102	%
2228009	YAZ	Spiked Blank	Conductivity	2021/09/09		102	%
2228009	YAZ	Method Blank	Conductivity	2021/09/09	<0.0010		mS/cm
2228010	YAZ	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/09/09		105	%
			Carbonate (CO3 as CaCO3)	2021/09/09		105	%
2228010	YAZ	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/09/09	<1.0		mg/L
			Bicarbonates (HCO3 as CaCO3)	2021/09/09	<1.0		mg/L
			Carbonate (CO3 as CaCO3)	2021/09/09	<1.0		mg/L
2228068	RHT	Spiked Blank	Nitrates (N-NO3-)	2021/09/11		108	%
			Nitrites (N-NO2-)	2021/09/11		108	%
2228068	RHT	Method Blank	Nitrates (N-NO3-)	2021/09/11	<0.020		mg/L
			Nitrites (N-NO2-)	2021/09/11	<0.020		mg/L
2228077	RHT	Spiked Blank	Chloride (Cl)	2021/09/11		108	%
			Sulfates (SO4)	2021/09/11		110	%
2228077	RHT	Method Blank	Chloride (Cl)	2021/09/11	<0.050		mg/L
			Sulfates (SO4)	2021/09/11	<0.50		mg/L
2228139	AJ1	Spiked Blank	Total Cyanide (CN)	2021/09/10		86	%
2228139	AJ1	Method Blank	Total Cyanide (CN)	2021/09/10	<0.0030		mg/L
2228457	LKO	QC Standard	BOD5	2021/09/15		107	%
2228457	LKO	Spiked Blank	BOD5	2021/09/15		98	%
2228457	LKO	Spiked Blank DUP	BOD5	2021/09/15		99	%
2228457	LKO	Method Blank	BOD5	2021/09/15	<2.0		mg/L
2228457	LKO	Method Blank DUP	BOD5	2021/09/15	<2.0		mg/L
2228611	PS5	Spiked Blank	Total suspended solids (TSS)	2021/09/13		96	%
2228611	PS5	Method Blank	Total suspended solids (TSS)	2021/09/13	<2.0		mg/L
2228629	JRC	QC Standard	Total phosphorous	2021/09/11		105	%
2228629	JRC	Spiked Blank	Total phosphorous	2021/09/11		101	%
2228629	JRC	Method Blank	Total phosphorous	2021/09/11	<2.0		ug/L
2228835	AJ1	Spiked Blank	Phenols-4AAP	2021/09/14		100	%
2228835	AJ1	Method Blank	Phenols-4AAP	2021/09/14	<0.0020		mg/L
2228978	MQI	Spiked Blank	Total Dissolved Solids	2021/09/15		98	%
2228978	MQI	Method Blank	Total Dissolved Solids	2021/09/15	<10		mg/L
2229096	CLO	Spiked Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/09/11		106	%
2229096	CLO	Method Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/09/11	<0.020		mg/L
2229328	DY3	Spiked Blank	COD	2021/09/13		100	%
2229328	DY3	Spiked Blank DUP	COD	2021/09/13		100	%
2229328	DY3	Method Blank	COD	2021/09/13	<5.0		mg/L
2229426	NM2	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/09/14		99	%
2229426	NM2	Method Blank	TKN Total Kjeldahl Nitrogen	2021/09/14	<0.40		mg/L
2229865	ANB	Spiked Blank	Fluoride (F)	2021/09/15		97	%
2229865	ANB	Method Blank	Fluoride (F)	2021/09/15	<0.10		mg/L
2229882	SLR	QC Standard	Total phosphorous	2021/09/17		98	%
2229882	SLR	Spiked Blank	Total phosphorous	2021/09/17		101	%
2229882	SLR	Method Blank	Total phosphorous	2021/09/17	<2.0		ug/L
2230103	AJ1	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/09/15		99	%
2230103	AJ1	Method Blank	TKN Total Kjeldahl Nitrogen	2021/09/15	<0.40		mg/L
2230136	ANB	QC Standard	Hexavalent Chromium (Cr 6+)	2021/09/16		96	%
2230136	ANB	Spiked Blank	Hexavalent Chromium (Cr 6+)	2021/09/16		102	%
2230136	ANB	Method Blank	Hexavalent Chromium (Cr 6+)	2021/09/16	<0.0080		mg/L
2230846	HZU	Spiked Blank	Total Organic Carbon	2021/09/16		100	%
2230846	HZU	Method Blank	Total Organic Carbon	2021/09/16	<0.20		mg/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2230942	EMT	Matrix Spike	Reactive silica (SiO2)	2021/09/16		83	%
2230942	EMT	Spiked Blank	Reactive silica (SiO2)	2021/09/16		94	%
2230942	EMT	Method Blank	Reactive silica (SiO2)	2021/09/16	<0.50		mg/L
2231101	LI	Spiked Blank	Sulfides (S2-)	2021/09/17		86	%
2231101	LI	Method Blank	Sulfides (S2-)	2021/09/17	<0.020		mg/L
2231139	HZU	Spiked Blank	Dissolved organic carbon	2021/09/17		100	%
2231139	HZU	Method Blank	Dissolved organic carbon	2021/09/17	<0.20		mg/L
2231360	AEB	Spiked Blank	1-Chlorooctadecane	2021/09/21		99	%
			Petroleum Hydrocarbons (C10-C50)	2021/09/21		87	%
2231360	AEB	Spiked Blank DUP	1-Chlorooctadecane	2021/09/21		100	%
			Petroleum Hydrocarbons (C10-C50)	2021/09/21		93	%
2231360	AEB	Method Blank	1-Chlorooctadecane	2021/09/21		104	%
			Petroleum Hydrocarbons (C10-C50)	2021/09/21	<100		ug/L
2232112	JF1	Spiked Blank	Aluminum (Al)	2021/09/23		109	%
			Antimony (Sb)	2021/09/23		110	%
			Silver (Ag)	2021/09/23		106	%
			Arsenic (As)	2021/09/23		116	%
			Barium (Ba)	2021/09/23		111	%
			Boron (B)	2021/09/23		109	%
			Cadmium (Cd)	2021/09/23		109	%
			Calcium (Ca)	2021/09/23		106	%
			Chromium (Cr)	2021/09/23		102	%
			Cobalt (Co)	2021/09/23		112	%
			Copper (Cu)	2021/09/23		116	%
			Tin (Sn)	2021/09/23		113	%
			Iron (Fe)	2021/09/23		108	%
			Magnesium (Mg)	2021/09/23		101	%
			Manganese (Mn)	2021/09/23		119	%
			Mercury (Hg)	2021/09/23		132	%
			Molybdenum (Mo)	2021/09/23		102	%
			Nickel (Ni)	2021/09/23		101	%
			Lead (Pb)	2021/09/23		111	%
			Potassium (K)	2021/09/23		104	%
			Selenium (Se)	2021/09/23		106	%
			Sodium (Na)	2021/09/23		107	%
			Thallium (Tl)	2021/09/23		103	%
			Titanium (Ti)	2021/09/23		107	%
			Uranium (U)	2021/09/23		107	%
			Vanadium (V)	2021/09/23		110	%
			Zinc (Zn)	2021/09/23		114	%
2232112	JF1	Method Blank	Aluminum (Al)	2021/09/23	<5.0		ug/L
			Antimony (Sb)	2021/09/23	<0.0050		ug/L
			Silver (Ag)	2021/09/23	<0.0030		ug/L
			Arsenic (As)	2021/09/23	<0.080		ug/L
			Barium (Ba)	2021/09/23	<0.030		ug/L
			Boron (B)	2021/09/23	<0.30		ug/L
			Cadmium (Cd)	2021/09/23	<0.0060		ug/L
			Calcium (Ca)	2021/09/23	<20		ug/L
			Chromium (Cr)	2021/09/23	<0.040		ug/L
			Cobalt (Co)	2021/09/23	<0.0080		ug/L
			Copper (Cu)	2021/09/23	<0.050		ug/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Tin (Sn)	2021/09/23	<0.050		ug/L
			Iron (Fe)	2021/09/23	<1.0		ug/L
			Magnesium (Mg)	2021/09/23	<10		ug/L
			Manganese (Mn)	2021/09/23	0.031, RDL=0.030		ug/L
			Mercury (Hg)	2021/09/23	<0.0020		ug/L
			Molybdenum (Mo)	2021/09/23	<0.010		ug/L
			Nickel (Ni)	2021/09/23	<0.030		ug/L
			Lead (Pb)	2021/09/23	<0.010		ug/L
			Potassium (K)	2021/09/23	<11		ug/L
			Selenium (Se)	2021/09/23	<0.050		ug/L
			Sodium (Na)	2021/09/23	<10		ug/L
			Thallium (Tl)	2021/09/23	<0.010		ug/L
			Titanium (Ti)	2021/09/23	<0.40		ug/L
			Uranium (U)	2021/09/23	<0.0010		ug/L
			Vanadium (V)	2021/09/23	<0.050		ug/L
			Zinc (Zn)	2021/09/23	<0.50		ug/L
			Total Hardness (CaCO3)	2021/09/23	<40		ug/L
2234641	MOE	Spiked Blank	Radium-226	2021/09/27		89	%
			Radium-226	2021/09/27		89	%
			Radium-226	2021/09/27		89	%
2234641	MOE	Method Blank	Radium-226	2021/09/27	<0.005		Bq/L
			Radium-226	2021/09/27	<0.005		Bq/L
			Radium-226	2021/09/27	<0.005		Bq/L

RDL = Reportable Detection Limit

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

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

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

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

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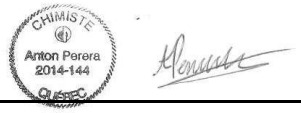
TATA STEEL MINERALS CANADA
Client Project #: QC SURFACE WATER
Site Location: GOODWOOD QC
Your P.O. #: 3000000997

VALIDATION SIGNATURE PAGE

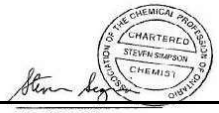
The analytical data and all QC contained in this report were reviewed and validated by:



Anton Perera, B.Sc., Chemist, Montreal, Laboratory Supervisor

Alex Thibert
Membre OCQ #2020-05

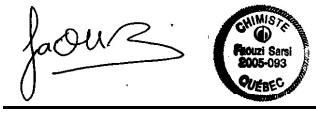
Alex Thibert, B.Sc., Chemist, Montréal, Analyst II, Chemist in Training



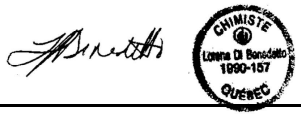
B.Sc., M.B.A., CChem

Steven Simpson, Lab Director

Frederic Arnau, B.Sc., Chemist, Montreal, Scientific Service Specialist



Faouzi Sarsi, B.Sc. Chemist, Montréal, SR Analyst



Lorena Di Benedetto, B.Sc., Chemist, Customer Service Specialist

Miryam Assayag, B.Sc. Chemist, Montréal, Team Leader

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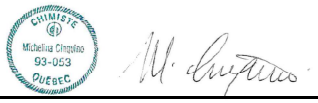
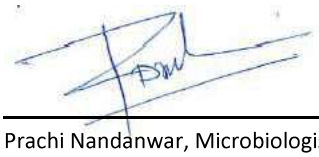
VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by:

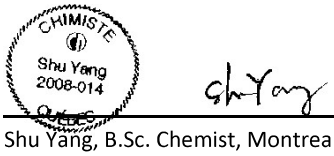


Michelina Cinquino, Analyst II



Prachi Nandanwar, Microbiologist, Montreal, Scientific Specialist

Noureddine Chafiaai, B.Sc., Chemist, Montreal, Team leader



Shu Yang, B.Sc. Chemist, Montreal, Analyst II

Automated Statchk

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Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Your C.O.C. #: 229608-01-01

Attention: Mariana Trindade

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

Report Date: 2022/01/05
Report #: R2725201
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C158312
Received: 2021/10/27, 15:30

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Alkalinity (pH end point 4.5)	2	N/A	2021/11/05	STL SOP-00038	SM 23 2320-B m
Anions	2	N/A	2021/10/29	STL SOP-00014	MA.300–Ions 1.3 R3 m
Biochemical Oxygen Demand (5 days) (4)	1	2021/10/28	2021/11/02	STL SOP-00008	MA315-DBO 1.1 R3 m
Biochemical Oxygen Demand (5 days) (4)	1	2021/10/29	2021/11/03	STL SOP-00008	MA315-DBO 1.1 R3 m
Pet. Hydrocarbons (C10-C50) in waters	2	2021/11/08	2021/11/09	STL SOP-00173	MA.400–HYD. 1.1 R3 m
Total Cyanide	2	2021/11/01	2021/11/04	STL SOP-00035	MA300-CN 1.2 R4 m
Chemical Oxygen Demand	2	2021/11/03	2021/11/03	STL SOP-00009	MA315-DCO 1.1 R4 m
Fecal Coliforms 10-60 000 CFU/100ml _WW	2	N/A	2021/10/28	QUE SOP-00303	MA.700-Fec.Ec 1.0 R5
Total Coliforms 10-80 000 CFU/100ml _WW	2	N/A	2021/10/28	QUE SOP-00304	MA.700-Col 1.0 R4
Conductivity	2	N/A	2021/11/05	STL SOP-00038	SM 23 2510-B m
Hexavalent Chromium (Cr 6+)	2	N/A	2021/11/05	STL SOP-00037	MA200-CrHex 1.1 R1 m
Dissolved Organic Carbon (5)	2	2021/11/05	2021/11/05	STL SOP-00243	SM 23 5310-B m
Fluoride	2	N/A	2021/11/04	STL SOP-00038	SM 23 4500-F m
Total Suspended Solids	2	2021/11/01	2021/11/02	STL SOP-00015	MA.104–S.S. 2.0 m
Total Extractible Trace Metals by ICP-MS	2	2021/11/03	2021/11/12	STL SOP-00006	MA203–Mét Tra1.1 R1m
Ammonia Nitrogen	2	N/A	2021/11/06	STL SOP-00040	MA.300–N 2.0 R2 m
Nitrate and/or Nitrite	2	N/A	2021/10/29	STL SOP-00014	MA.300–Ions 1.3 R3 m
Dissolved Oxygen	2	N/A	2021/10/28	STL SOP-00008	MA.315–DBO 1.1 R3 m
pH	2	N/A	2021/11/05	STL SOP-00038	MA.100–pH 1.1 R3 m
Total Phenols by 4-AAP	2	2021/11/06	2021/11/06	STL SOP-00033	MA404–I.Phé 2.2 R2 m
Total Phosphorus Low Level by ICP-MS (1)	2	2021/10/30	2021/11/03	QUE SOP-00132	MA.200-Mét. 1.2 R7
Sulfides (as S2-)	2	2021/11/07	2021/11/07	STL SOP-00005	MA. 300 – S 1.2 R3 m
Total Dissolved Solids	2	2021/10/28	2021/10/29	STL SOP-00050	MA.115–S.D. 1.0 R4 m
Total Nitrogen	2	2021/11/04	2021/11/04	STL SOP-00077	MOE:TOTNUT-E3516v1.3
Total Organic Carbon (6)	2	N/A	2021/11/08	STL SOP-00243	SM 23 5310-B m
Uranium by ICP-MS	2	2021/10/27	2021/10/29	STL SOP-00062	MA.200–Mét. 1.2 R5 m
Radium-226 Low Level (2, 7)	2	N/A	2021/12/24	BQL SOP-00006 BQL SOP-00017 BQL SOP-00032	Alpha Spectrometry
Reactive Silica(SiO2) (3)	2	2021/11/03	2021/11/03	ATL SOP 00022	EPA 366.0 m

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Your P.O. #: 3000000997
Your Project #: QC SURFACE WATER
Your C.O.C. #: 229608-01-01

Attention: Mariana Trindade

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

Report Date: 2022/01/05
Report #: R2725201
Version: 1 - Final

CERTIFICATE OF ANALYSIS

LAB BV JOB #: C158312
Received: 2021/10/27, 15:30

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas 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 Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, results relate to the supplied samples tested.

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 Bureau Veritas - Québec, 2690 Avenue Dalton , Ste-Foy, QC, G1P 3S4
(2) This test was performed by Bureau Veritas - Radiological, 6790 Kitimat Rd, Unit 4 , Mississauga, ON, L5N 5L9
(3) This test was performed by Bureau Veritas Bedford, Suit 105, 200 Bluewater Rd. , Bedford, NS, B4B1G9
(4) Please note that in the event a biochemical oxygen demand analysis cannot begin within the 48-hours holding time required (for a sample preserved at 4°C), sample will be frozen, unless otherwise specified by a regulation, to maintain it's integrity.
(5) DOC present in the sample should be considered as non-purgeable DOC
(6) TOC present in the sample should be considered as non-purgeable TOC
(7) Radium-226 results have not been corrected for blanks.

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

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Report Date: 2022/01/05
Report #: R2725201
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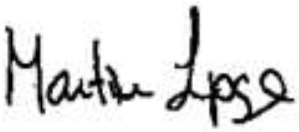
CERTIFICATE OF ANALYSIS

LAB BV JOB #: C158312
Received: 2021/10/27, 15:30

Encryption Key



Martine Lepage
Project Manager and Account Manager
25 Jan 2022 16:47:52

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Martine Lepage, Project Manager and Account Manager
Email: Martine.LEPAGE@bureauveritas.com
Phone# (418)543-3788 Ext:7066201

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RESULTS OF ANALYSES OF SURFACE WATER

Lab BV ID		JW4047	JW4048		
Sampling Date		2021/10/10 14:55	2021/10/10 15:55		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-04-2021	DS04-QC-EE-GW-Q4-2021	RDL	QC Batch
INORGANICS					
Reactive silica (SiO2) †	mg/L	0.54	0.74	0.50	2248331
RADIONUCLIDE					
Radium-226	Bq/L	<0.005	<0.005	0.005	2262048

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable

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HYDROCARBONS BY GCFID (SURFACE WATER)

Lab BV ID		JW4047	JW4048		
Sampling Date		2021/10/10 14:55	2021/10/10 15:55		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-04-2021	DS04-QC-EE-GW-Q4-2021	RDL	QC Batch
PETROLEUM HYDROCARBONS					
Petroleum Hydrocarbons (C10-C50)	ug/L	<100	<100	100	2249411
Surrogate Recovery (%)					
1-Chlorooctadecane	%	75	73	N/A	2249411

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

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TOTAL EXTRACTABLE METALS (SURFACE WATER)

Lab BV ID		JW4047	JW4048		
Sampling Date		2021/10/10 14:55	2021/10/10 15:55		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-04-2021	DS04-QC-EE-GW-Q4-2021	RDL	QC Batch
METALS					
Total phosphorous	ug/L	5.1	8.0	2.0	2246585
Aluminum (Al) †	ug/L	73	<5.0	5.0	2247918
Antimony (Sb) †	ug/L	<0.0050	0.0070	0.0050	2247918
Silver (Ag) †	ug/L	<0.0030	<0.0030	0.0030	2247918
Arsenic (As) †	ug/L	<0.080	<0.080	0.080	2247918
Barium (Ba) †	ug/L	0.83	1.1	0.030	2247918
Boron (B) †	ug/L	0.57	1.9	0.30	2247918
Cadmium (Cd) †	ug/L	<0.0060	0.0060	0.0060	2247918
Calcium (Ca) †	ug/L	92	150	20	2247918
Chromium (Cr) †	ug/L	0.099	<0.040	0.040	2247918
Cobalt (Co) †	ug/L	0.046	<0.0080	0.0080	2247918
Copper (Cu) †	ug/L	0.25	0.12	0.050	2247918
Tin (Sn) †	ug/L	<0.050	<0.050	0.050	2247918
Iron (Fe) †	ug/L	150	27	0.50	2247918
Magnesium (Mg) †	ug/L	64	98	10	2247918
Manganese (Mn) †	ug/L	17	7.5	0.030	2247918
Mercury (Hg) †	ug/L	<0.0020	<0.0020	0.0020	2247918
Molybdenum (Mo) †	ug/L	<0.010	<0.010	0.010	2247918
Nickel (Ni) †	ug/L	0.13	0.050	0.030	2247918
Lead (Pb) †	ug/L	0.11	<0.010	0.010	2247918
Potassium (K) †	ug/L	53	78	10	2247918
Selenium (Se) †	ug/L	<0.050	<0.050	0.050	2247918
Sodium (Na) †	ug/L	94	170	10	2247918
Thallium (Tl) †	ug/L	<0.010	<0.010	0.010	2247918
Titanium (Ti) †	ug/L	1.6	<0.40	0.40	2247918
Uranium (U) †	ug/L	0.0095	<0.0010	0.0010	2247918
Vanadium (V) †	ug/L	0.087	<0.050	0.050	2247918
Zinc (Zn) †	ug/L	0.98	0.54	0.50	2247918
Total Hardness (CaCO3) †	ug/L	490	790	40	2247918

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable

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CONVENTIONAL PARAMETERS (SURFACE WATER)

Lab BV ID		JW4047	JW4047		
Sampling Date		2021/10/10 14:55	2021/10/10 14:55		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-04-2021	DS04-QC-ER-GW-04-2021 Lab-Dup	RDL	QC Batch
CONVENTIONALS					
BOD5	mg/L	<4.0	N/A	4.0	2245860
COD	mg/L	<5.0	N/A	5.0	2247807
Conductivity	mS/cm	0.0017	N/A	0.0010	2248921
Dissolved organic carbon †	mg/L	1.3	N/A	0.20	2249026
Dissolved oxygen †	mg/L	9.6	N/A	1.0	2245932
Fluoride (F)	mg/L	<0.10	N/A	0.10	2248194
Hexavalent Chromium (Cr 6+)	mg/L	<0.0080	N/A	0.0080	2248779
Nitrates (N-NO3-)	mg/L	<0.020	N/A	0.020	2246153
Nitrites (N-NO2-)	mg/L	<0.020	N/A	0.020	2246153
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	1.1	N/A	0.040	2249171
pH	pH	5.51	N/A	N/A	2248907
Phenols-4AAP	mg/L	<0.0020	N/A	0.0020	2249247
Sulfides (S2-)	mg/L	<0.020	N/A	0.020	2249359
TKN Total Kjeldahl Nitrogen	mg/L	1.7	1.7	0.40	2248344
Total Cyanide (CN)	mg/L	<0.0030	N/A	0.0030	2246966
Total Organic Carbon	mg/L	1.5	N/A	0.20	2249575
Alkalinity Total (as CaCO3) pH 4.5 †	mg/L	<1.0	N/A	1.0	2248919
Bicarbonates (HCO3 as CaCO3) †	mg/L	<1.0	N/A	1.0	2248919
Carbonate (CO3 as CaCO3) †	mg/L	<1.0	N/A	1.0	2248919
Chloride (Cl)	mg/L	0.060	N/A	0.050	2246156
Sulfates (SO4)	mg/L	<0.50	N/A	0.50	2246156
Total Dissolved Solids	mg/L	25	N/A	10	2245657
Total suspended solids (TSS)	mg/L	2.0	N/A	2.0	2246729

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
† Parameter is not accreditable

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CONVENTIONAL PARAMETERS (SURFACE WATER)

Lab BV ID		JW4048		
Sampling Date		2021/10/10 15:55		
COC Number		229608-01-01		
	Units	DS04-QC-EE-GW-Q4-2021	RDL	QC Batch
CONVENTIONALS				
BOD5	mg/L	<4.0	4.0	2246350
COD	mg/L	6.0	5.0	2247721
Conductivity	mS/cm	0.0023	0.0010	2248921
Dissolved organic carbon †	mg/L	0.99	0.20	2249039
Dissolved oxygen †	mg/L	9.8	1.0	2245932
Fluoride (F)	mg/L	<0.10	0.10	2248194
Hexavalent Chromium (Cr 6+)	mg/L	<0.0080	0.0080	2248779
Nitrates (N-NO3-)	mg/L	<0.020	0.020	2246153
Nitrites (N-NO2-)	mg/L	<0.020	0.020	2246153
Nitrogen ammonia (N-NH4+ and N-NH3)	mg/L	0.71	0.020	2249171
pH	pH	5.91	N/A	2248907
Phenols-4AAP	mg/L	<0.0020	0.0020	2249238
Sulfides (S2-)	mg/L	<0.020	0.020	2249359
TKN Total Kjeldahl Nitrogen	mg/L	0.95	0.40	2248344
Total Cyanide (CN)	mg/L	<0.0030	0.0030	2246966
Total Organic Carbon	mg/L	1.1	0.20	2249575
Alkalinity Total (as CaCO3) pH 4.5 †	mg/L	1.5	1.0	2248919
Bicarbonates (HCO3 as CaCO3) †	mg/L	1.5	1.0	2248919
Carbonate (CO3 as CaCO3) †	mg/L	<1.0	1.0	2248919
Chloride (Cl)	mg/L	0.15	0.050	2246156
Sulfates (SO4)	mg/L	<0.50	0.50	2246156
Total Dissolved Solids	mg/L	15	10	2245657
Total suspended solids (TSS)	mg/L	2.0	2.0	2246729

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable
N/A = Not Applicable

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MICROBIOLOGY (SURFACE WATER)

Lab BV ID		JW4047	JW4048		
Sampling Date		2021/10/10 14:55	2021/10/10 15:55		
COC Number		229608-01-01	229608-01-01		
	Units	DS04-QC-ER-GW-04-2021	DS04-QC-EE-GW-Q4-2021	RDL	QC Batch
MICROBIOLGICAL TESTS					
Total coliforms	UFC/100ml	280	27	10	2245847
Fecal coliforms	UFC/100ml	<10	<10	10	2245846

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Dissolved Oxygen: Holding time already past upon reception.: JW4047
Dissolved Organic Carbon: Holding time already past upon reception.: JW4047
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JW4047
Total Suspended Solids: Holding time already past upon reception.: JW4047
Total Dissolved Solids: Holding time already past upon reception.: JW4047
Nitrate and/or Nitrite: Holding time already past upon reception.: JW4047
pH: Holding time already past upon reception.: JW4047
Fecal Coliforms 10-60 000 CFU/100ml _WW: Holding time already past upon reception.: JW4047
Total Coliforms 10-80 000 CFU/100ml _WW: Holding time already past upon reception.: JW4047
Dissolved Oxygen: Holding time already past upon reception.: JW4048
Dissolved Organic Carbon: Holding time already past upon reception.: JW4048
Biochemical Oxygen Demand (5 days): Holding time already past upon reception.: JW4048
Total Suspended Solids: Holding time already past upon reception.: JW4048
Total Dissolved Solids: Holding time already past upon reception.: JW4048
Nitrate and/or Nitrite: Holding time already past upon reception.: JW4048
pH: Holding time already past upon reception.: JW4048
Fecal Coliforms 10-60 000 CFU/100ml _WW: Holding time already past upon reception.: JW4048
Total Coliforms 10-80 000 CFU/100ml _WW: Holding time already past upon reception.: JW4048

Sample JW4047 [DS04-QC-ER-GW-04-2021] : For sample JW4047, please note that the microbiological analysis were performed passed the maximal holding time (48h). Radium-226: Cette analyse est accréditée par le MELCC.

Sample JW4048 [DS04-QC-EE-GW-Q4-2021] : For sampleJW4048, please note that the microbiological analysis were performed passed the maximal holding time (48h).

HYDROCARBONS BY GCFID (SURFACE WATER)

The extraction was performed passed holding time for samples JW4047 and JW4048 .

CONVENTIONAL PARAMETERS (SURFACE WATER)

Total Cyanide, Alkalinity: Samples received after hold time.

Dissolved organic carbon: The samples have been filtered and preserved holding time passed.JW4047, JW4048

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

Total organic Carbon : Holding time not respected.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
2245657	MQI	Spiked Blank	Total Dissolved Solids	2021/10/29		98	%
2245657	MQI	Method Blank	Total Dissolved Solids	2021/10/29	<10		mg/L
2245860	SLC	QC Standard	BOD5	2021/11/02		94	%
2245860	SLC	Spiked Blank	BOD5	2021/11/02		94	%
2245860	SLC	Spiked Blank DUP	BOD5	2021/11/02		88	%
2245860	SLC	Method Blank	BOD5	2021/11/02	<2.0		mg/L
2245860	SLC	Method Blank DUP	BOD5	2021/11/02	<2.0		mg/L
2246153	SNA	Spiked Blank	Nitrates (N-NO3-)	2021/10/29		102	%
			Nitrites (N-NO2-)	2021/10/29		97	%
2246153	SNA	Method Blank	Nitrates (N-NO3-)	2021/10/29	<0.020		mg/L
			Nitrites (N-NO2-)	2021/10/29	<0.020		mg/L
2246156	SMA	Spiked Blank	Chloride (Cl)	2021/10/29		98	%
			Sulfates (SO4)	2021/10/29		101	%
2246156	SMA	Method Blank	Chloride (Cl)	2021/10/29	<0.050		mg/L
			Sulfates (SO4)	2021/10/29	<0.50		mg/L
2246350	LKO	QC Standard	BOD5	2021/11/03		103	%
2246350	LKO	Spiked Blank	BOD5	2021/11/03		97	%
2246350	LKO	Spiked Blank DUP	BOD5	2021/11/03		82	%
2246350	LKO	Method Blank	BOD5	2021/11/03	<2.0		mg/L
2246350	LKO	Method Blank DUP	BOD5	2021/11/03	<2.0		mg/L
2246585	MZS	QC Standard	Total phosphorous	2021/11/03		106	%
2246585	MZS	Spiked Blank	Total phosphorous	2021/11/03		116	%
2246585	MZS	Method Blank	Total phosphorous	2021/11/03	<2.0		ug/L
2246729	PS5	Spiked Blank	Total suspended solids (TSS)	2021/11/02		96	%
2246729	PS5	Method Blank	Total suspended solids (TSS)	2021/11/02	<2.0		mg/L
2246966	AJ1	Spiked Blank	Total Cyanide (CN)	2021/11/04		100	%
2246966	AJ1	Method Blank	Total Cyanide (CN)	2021/11/04	<0.0030		mg/L
2247721	LD2	Spiked Blank	COD	2021/11/03		100	%
2247721	LD2	Spiked Blank DUP	COD	2021/11/03		100	%
2247721	LD2	Method Blank	COD	2021/11/03	<5.0		mg/L
2247807	DY3	Spiked Blank	COD	2021/11/03		98	%
2247807	DY3	Spiked Blank DUP	COD	2021/11/03		96	%
2247807	DY3	Method Blank	COD	2021/11/03	<5.0		mg/L
2247918	AT7	Spiked Blank	Aluminum (Al)	2021/11/12		96	%
			Antimony (Sb)	2021/11/12		93	%
			Silver (Ag)	2021/11/12		85	%
			Arsenic (As)	2021/11/12		82	%
			Barium (Ba)	2021/11/12		94	%
			Boron (B)	2021/11/12		94	%
			Cadmium (Cd)	2021/11/12		88	%
			Calcium (Ca)	2021/11/12		96	%
			Chromium (Cr)	2021/11/12		78 (1)	%
			Cobalt (Co)	2021/11/12		87	%
			Copper (Cu)	2021/11/12		90	%
			Tin (Sn)	2021/11/12		93	%
			Iron (Fe)	2021/11/12		88	%
			Magnesium (Mg)	2021/11/12		94	%
			Manganese (Mn)	2021/11/12		92	%
			Mercury (Hg)	2021/11/12		109	%
			Molybdenum (Mo)	2021/11/12		89	%
			Nickel (Ni)	2021/11/12		83	%
			Lead (Pb)	2021/11/12		89	%

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Potassium (K)	2021/11/12		89	%
			Selenium (Se)	2021/11/12		80	%
			Sodium (Na)	2021/11/12		93	%
			Thallium (Tl)	2021/11/12		89	%
			Titanium (Ti)	2021/11/12		86	%
			Uranium (U)	2021/11/12		84	%
			Vanadium (V)	2021/11/12		82	%
			Zinc (Zn)	2021/11/12		120	%
2247918	AT7	Method Blank	Aluminum (Al)	2021/11/12	<5.0		ug/L
			Antimony (Sb)	2021/11/12	<0.0050		ug/L
			Silver (Ag)	2021/11/12	<0.0030		ug/L
			Arsenic (As)	2021/11/12	<0.080		ug/L
			Barium (Ba)	2021/11/12	<0.030		ug/L
			Boron (B)	2021/11/12	<0.30		ug/L
			Cadmium (Cd)	2021/11/12	<0.0060		ug/L
			Calcium (Ca)	2021/11/12	<20		ug/L
			Chromium (Cr)	2021/11/12	<0.040		ug/L
			Cobalt (Co)	2021/11/12	<0.0080		ug/L
			Copper (Cu)	2021/11/12	0.050, RDL=0.050		ug/L
			Tin (Sn)	2021/11/12	<0.050		ug/L
			Iron (Fe)	2021/11/12	<0.50		ug/L
			Magnesium (Mg)	2021/11/12	<10		ug/L
			Manganese (Mn)	2021/11/12	<0.030		ug/L
			Mercury (Hg)	2021/11/12	<0.0020		ug/L
			Molybdenum (Mo)	2021/11/12	<0.010		ug/L
			Nickel (Ni)	2021/11/12	<0.030		ug/L
			Lead (Pb)	2021/11/12	<0.010		ug/L
			Potassium (K)	2021/11/12	<10		ug/L
			Selenium (Se)	2021/11/12	<0.050		ug/L
			Sodium (Na)	2021/11/12	<10		ug/L
			Thallium (Tl)	2021/11/12	<0.010		ug/L
			Titanium (Ti)	2021/11/12	<0.40		ug/L
			Uranium (U)	2021/11/12	<0.0010		ug/L
			Vanadium (V)	2021/11/12	<0.050		ug/L
			Zinc (Zn)	2021/11/12	<0.50		ug/L
			Total Hardness (CaCO3)	2021/11/12	<40		ug/L
2248194	YAZ	Spiked Blank	Fluoride (F)	2021/11/04		105	%
2248194	YAZ	Method Blank	Fluoride (F)	2021/11/04	<0.10		mg/L
2248331	EMT	Matrix Spike	Reactive silica (SiO2)	2021/11/03		72 (2)	%
2248331	EMT	Spiked Blank	Reactive silica (SiO2)	2021/11/03		94	%
2248331	EMT	Method Blank	Reactive silica (SiO2)	2021/11/03	<0.50		mg/L
2248344	AJ1	Spiked Blank	TKN Total Kjeldahl Nitrogen	2021/11/04		105	%
2248344	AJ1	Method Blank	TKN Total Kjeldahl Nitrogen	2021/11/04	<0.40		mg/L
2248779	HZU	QC Standard	Hexavalent Chromium (Cr 6+)	2021/11/05		97	%
2248779	HZU	Spiked Blank	Hexavalent Chromium (Cr 6+)	2021/11/05		100	%
2248779	HZU	Method Blank	Hexavalent Chromium (Cr 6+)	2021/11/05	<0.0080		mg/L
2248907	LI	Spiked Blank	pH	2021/11/05		101	%
2248919	LI	Spiked Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/11/05		98	%
			Carbonate (CO3 as CaCO3)	2021/11/05		98	%
2248919	LI	Method Blank	Alkalinity Total (as CaCO3) pH 4.5	2021/11/05	<1.0		mg/L
			Bicarbonates (HCO3 as CaCO3)	2021/11/05	<1.0		mg/L

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units
			Carbonate (CO3 as CaCO3)	2021/11/05	<1.0		mg/L
2248921	LI	Spiked Blank	Conductivity	2021/11/05		99	%
2248921	LI	Method Blank	Conductivity	2021/11/05	<0.0010		mS/cm
2249026	BAG	Spiked Blank	Dissolved organic carbon	2021/11/05		97	%
2249026	BAG	Method Blank	Dissolved organic carbon	2021/11/05	<0.20		mg/L
2249039	BAG	Spiked Blank	Dissolved organic carbon	2021/11/05		97	%
2249039	BAG	Method Blank	Dissolved organic carbon	2021/11/05	<0.20		mg/L
2249171	CLO	Spiked Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/11/06		114	%
2249171	CLO	Method Blank	Nitrogen ammonia (N-NH4+ and N-NH3)	2021/11/06	<0.020		mg/L
2249238	AJ1	QC Standard	Phenols-4AAP	2021/11/06		96	%
2249238	AJ1	Spiked Blank	Phenols-4AAP	2021/11/06		101	%
2249238	AJ1	Method Blank	Phenols-4AAP	2021/11/06	<0.0020		mg/L
2249247	AJ1	Spiked Blank	Phenols-4AAP	2021/11/06		97	%
2249247	AJ1	Method Blank	Phenols-4AAP	2021/11/06	<0.0020		mg/L
2249359	JHW	Spiked Blank	Sulfides (S2-)	2021/11/07		96	%
2249359	JHW	Method Blank	Sulfides (S2-)	2021/11/07	<0.020		mg/L
2249411	AEB	Spiked Blank	1-Chlorooctadecane	2021/11/09		116	%
			Petroleum Hydrocarbons (C10-C50)	2021/11/09		96	%
2249411	AEB	Spiked Blank DUP	1-Chlorooctadecane	2021/11/09		101	%
			Petroleum Hydrocarbons (C10-C50)	2021/11/09		97	%
2249411	AEB	Method Blank	1-Chlorooctadecane	2021/11/09		77	%
			Petroleum Hydrocarbons (C10-C50)	2021/11/09	<100		ug/L
2249575	VCH	Spiked Blank	Total Organic Carbon	2021/11/08		97	%
2249575	VCH	Method Blank	Total Organic Carbon	2021/11/08	<0.20		mg/L
2262048	RWO	Spiked Blank	Radium-226	2021/12/24		109	%
			Radium-226	2021/12/24		109	%
			Radium-226	2021/12/24		109	%
2262048	RWO	Method Blank	Radium-226	2021/12/24	<0.005		Bq/L
			Radium-226	2021/12/24	<0.005		Bq/L
			Radium-226	2021/12/24	<0.005		Bq/L

RDL = Reportable Detection Limit

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

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

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

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

(1) Recovery or relative percent difference (RPD) for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria

(2) Poor spike recovery due to probable sample matrix interference.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

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Frédéric Arnau, B.Sc., Chemist, Montreal, Scientific Service Specialist

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Miryam Assayag, B.Sc. Chemist, Montréal, Team Leader

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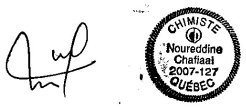
VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by:



Noureddine Chafiaai, B.Sc., Chemist, Montreal, Team leader

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Appendix VIII. Benthic communities report

Montréal, le 17 mars 2022

Jocelyn Bertrand
Corporate Environmental Manager
Environment Department
TATA Steel Minerals Canada Limited
1000, rue Sherbrooke Ouest, Suite 1120
Montréal (Québec) H3A 3G4

Objet : Identification des invertébrés benthiques — projet Goodwood — 2021

Monsieur Bertrand,

Nous avons le plaisir de vous transmettre le rapport relatif aux analyses menées par notre firme pour le projet mentionné en rubrique.

1 Introduction

Le programme de suivi des sédiments prévoit également un échantillonnage annuel pour effectuer un suivi des communautés d'invertébrés benthiques (CIB). Les sites d'échantillonnages se trouvent en cours d'eau permanents, le plus près des sites d'échantillonnage des sédiments. L'échantillonnage est effectué au mois de septembre. Les descripteurs analysés sont :

- Densité totale des invertébrés
- Richesse
- Équitabilité de Simpson
- Dissimilarité de Bray-Curtis
- Diversité de Simpson
- Densité de chaque taxon
- Densité relative des taxons
- Absence/présence de taxons

TATA Steel Minerals Canada (TSMC) a rencontré des difficultés lors du développement du programme d'échantillonnage des CIB au site du projet Goodwood. Ceci est dû au fait qu'il n'y a pas de cours d'eau permanent dans les environs. L'exutoire du lac Fra (« Lac de la Frontière ») est un cours d'eau intermittent sur la majeure partie de son tracé. Il se jette dans un autre cours d'eau, qui coule par la suite dans un milieu humide. Le suivi des CIB aurait donc lieu en aval du point de jonction, ce qui pourrait être peu représentatif des conditions dans le cours d'eau du lac Fra.

2 Méthodologie

2.1 Échantillonnage de la communauté benthique

L'échantillonnage a été réalisé par les employés de la firme Groupe Hémisphères ainsi que les techniciens en environnement de TSMC.

L'échantillonnage des CIB a eu lieu dans trois aires d'études présentées à la Figure 1 de l'Annexe I. La section permanente de la décharge du lac Fra est considérée comme aire exposée (BEE), bien qu'elle soit située à 1,2 km en aval du lac Fra. Une aire de référence située à la décharge du lac Migration (BER2) a aussi été faite et a servi de comparaison au site exposé. L'aire de référence BER1 est situé dans un cours d'eau parallèle et adjacent à la décharge du lac Fra. Un reportage photographique est présenté en Annexe II.

À chaque aire, trois sites ont été échantillonnés. Pour chacun de ces sites, cinq sous-échantillons ont été prélevés à l'aide d'un échantillonneur Hess d'une superficie de 0,086 m^2 possédant un filet de 500 µm de maillage. La méthode consiste à frotter tout le substrat à l'intérieur de l'échantillonneur pendant 1 minute avec une brosse douce ou à la main pour permettre au matériau de s'écouler en aval dans le filet de l'échantillonneur. Les sous-échantillons sont ensuite combinés sur place pour former un échantillon composite. Cet échantillon composite est ensuite transféré dans un pot en plastique hermétique et conservé avec une solution d'alcool à 70 % pour une identification ultérieure en laboratoire.

2.2 Identification des invertébrés benthiques en laboratoire

L'identification des invertébrés est réalisée par les biologistes de Groupe Hémisphères. Elle est réalisée à l'aide des clés d'identification détaillées dans Merritt et coll. (2008) et s'arrête à la famille pour les insectes (Hexapoda), à l'ordre pour les crustacés (Crustacea), à la sous-classe pour les oligochètes, sangsues (Clitellata) et acariens (Arachnida), et au phylum pour les nématodes (Nematoda).

Une méthode de sous-échantillonnage a été appliquée lorsque l'échantillon présentait un gros volume ou des débris en grande quantité. Dans ce cas-ci, l'échantillon est séparé en quatre sous-échantillons de volume identique. Un minimum de 200 organismes doit être compté afin de pouvoir ensuite appliquer une méthode de standardisation visant à appliquer un facteur de conversion équivalent à l'inverse de la fraction de l'échantillon qui a été sous-échantillonné (si le sous-échantillon correspond à un quart de l'échantillon total, le nombre total identifié dans le sous-échantillon devrait être multiplié par 4). Si le décompte de 200 organismes n'est pas atteint, alors un deuxième sous-échantillon est trié et identifié et ce jusqu'à atteindre 200 organismes.

Le site BER1 a été supprimé du jeu de données pour l'année 2021 car le cours d'eau disparaissant ne correspondait pas aux critères admissibles prévus par le certificat d'autorisation.

Il est à noter que les organismes appartenant aux taxons Copepoda, Cladocera et Ostracoda ont été éliminés du jeu de données pour les analyses statistiques étant donné leur mode de vie pélagique et leur appartenance à la catégorie des organismes planctoniques. Cependant, ces données sont tout de même présentées dans les tableaux d'abondance, d'abondance relative et de présence/absence (section 3.5.2-3.5.3-3.5.4). En ce qui concerne les taxons inconnus ou non-identifiés (individus immatures ou endommagés), ceux-ci ont été éliminés du jeu de données pour le calcul de dissimilarité de Bray-Curtis afin de ne pas introduire de biais liés à la redondance de certains taxons inconnus entre échantillons.

2.3 Analyses statistiques

Afin de respecter le critère de normalité des données nécessaire aux analyses statistiques, les densités ont été transformées à l'aide de la logarithmique naturelle (Legendre et Gallagher, 2001).

Trois indices ont été utilisés pour analyser les CIB : la densité totale, l'équitabilité de Simpson et la richesse du genre. Pour chaque paramètre, la moyenne, la médiane, l'écart-type, l'erreur type, le minimum et le maximum ont été calculés pour chaque aire.

L'ANOVA est l'analyse utilisée dans le cadre de cette étude. Le seuil (a) établi pour déterminer si une différence est significative est établi à 0,05. Pour déterminer si un résultat significatif est biologiquement important, la taille d'effet critique, ou « *critical effect size* » (CES) est utilisé. Un minimum de deux fois l'écart-type du site de référence est requis pour que l'effet soit considéré d'importance (Environnement Canada, 2012). Finalement, pour déterminer si un résultat non significatif est dû à un trop petit échantillonnage, une analyse de la puissance à l'aide de la taille d'effet de Cohen (*d*) tel que présenté à l'Équation 1 où μ est la moyenne et σ est l'écart-type (Cohen, 1988).

Équation 1

$$d = \frac{|\mu_{BEE} - \mu_{BER2}|}{\sqrt{(\sigma_{BER2} + \sigma_{BEE})/2}}$$

2.3.1 Densité et abondance

La densité totale est la somme de tous les invertébrés benthiques récoltés au site d'échantillonnage divisée par la surface d'échantillonnage. Puisque tous les échantillons composites couvrent la même superficie, l'abondance totale est utilisée.

2.3.2 Richesse

La richesse (S) est le nombre total de taxons identifiés dans la communauté d'un site.

2.3.3 Équitabilité de Simpson

L'indice d'équitabilité Simpson (*E*) est le ratio de l'indice de diversité Simpson (*D*) sur le maximum mathématique *D* d'un site donnée (D_{max}), comme le montre Équation 2. Pour calculer *D*, les proportions (*p*) des espèces (*i*) dans une communauté de richesse (*S*) sont mises au carré, additionnées puis divisées de 1 (Simpson, 1949).

Équation 2

$$E = \frac{D}{D_{max}} = \left(\sum_{i=1}^{S} p_i^2\right)^{-1} \times S^{-1}$$

2.3.4 Dissimilarité de Bray-Curtis

L'indice de dissimilarité de Bray-Curtis (*BC*) a également été utilisé pour représenter la différence entre toutes les communautés échantillonnées (Bray et Curtis, 1957). La dissimilarité entre les sites *a* et *b* est calculée à l'aide de Équation 3 où y_i est l'abondance des taxons en commun (*i*) entre les deux sites.

Équation 3

$$BC = \frac{\sum_{i=1}^{n} |y_{ia} - y_{ib}|}{\sum_{i=1}^{n} (y_{ib} + y_{ib})}$$

Dans le cadre de cette analyse, les sites d'exposition (BEE) sont comparés à une CIB hypothétique médiane où l'abondance des taxons est la médiane d'abondance dans les échantillons de BER2.

Les ordinations sont des outils utiles pour représenter des données complexes (Legendre et Legendre, 2012).

2.3.5 Autres indicateurs

2.3.5.1 Diversité de Simpson

L'indice de diversité Simpson (*D*) représente à la fois la proportion d'espèces (*p*) dans une communauté et le nombre d'espèces (*S*) dans celle-ci (Krebs, 1985). Comme pour les autres critères, la moyenne, la médiane, l'écart-type, l'erreur type, le minimum et le maximum ont été calculés. *D* est calculé en utilisant l'Équation 4.

Équation 4

$$D = 1 - \sum_{i=1}^{S} p_i^2$$

2.3.5.2 Présence, densité et proportion des taxons

La présence de taxons peut être utilisée dans plusieurs analyses lorsque le plan d'échantillonnage ne permet pas une approche basée sur la densité. Il peut être utile d'illustrer la richesse et les amalgames d'espèces dans une communauté.

La densité des taxons représente le nombre d'individus de chaque taxon à chaque site par m^2 et la proportion des taxons est la proportion de chaque taxon dans la communauté.

3 Résultats

Le suivi de la communauté benthique a été effectué le 2 et 5 septembre 2021.

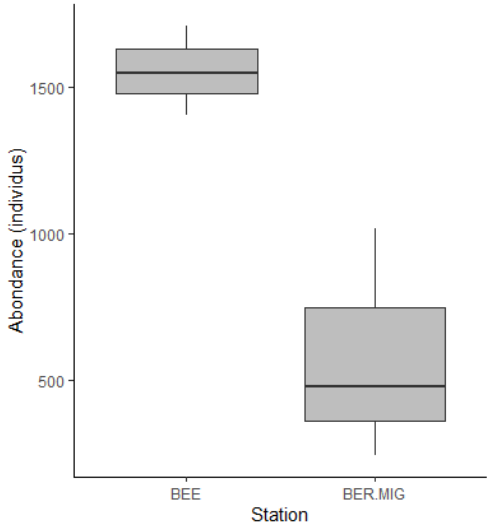
3.1 Densité et abondance

La densité totale des invertébrés est plus élevée dans l'aire d'échantillonnage BEE avec 1 553 ± 153 individus comparativement à celui de BER2 avec 596 ± 391 individus. La différence est marginalement significative puisque l'aire BER2 présente des échantillons dont l'abondance est très variable. En effet, un écart-type élevé suggère que le cours d'eau à l'étude ainsi que le cours d'eau de référence possèdent des habitats hétérogènes, avec certaines zones supportant une communauté plus abondante que d'autres (

Tableau 1).

Les résultats vont à l'encontre des résultats des années précédentes (Groupe Hémisphères, 2019, 2020) qui présentaient des densités plus élevées au site BER2 comparativement au site BEE.

Tableau 1. Densité totale des invertébrés benthiques

	Aire	Moyenne	Médiane	Écart-type	Erreur type	Minimum	Maximum
	BEE	1 553	1 548	88	153	1 403	1 708
	BER2	580	478	395	228	245	1 016
ANOVA	***p***	0,05					
	CES	± 790					
	Puissance (*d*)	>0,8 (fort)					

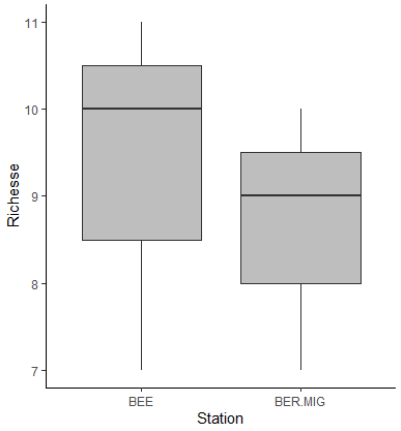
* Résultat significatif, $p < 0,05$

Selon le *d* de Cohen, la significativité de cette différence ne s'expliquerait pas par un trop faible échantillonnage (i.e probabilité d'erreur faible).

3.2 Richesse

La richesse est similaire dans les deux aires d'échantillonnages avec des plages de données qui se superposent considérablement (Tableau 2). Il n'est pas possible de déterminer si ces résultats sont dus à une représentation de la réalité ou au faible nombre d'échantillons.

Tableau 2. Richesse des invertébrés benthiques

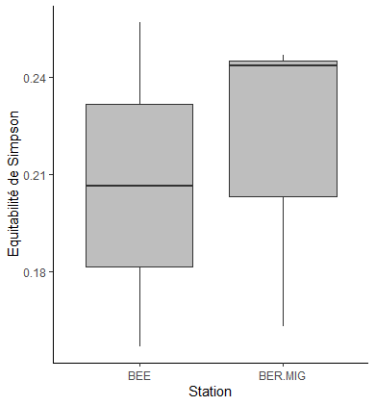
	Aire	Moyenne	Médiane	Écart-type	Erreur type	Minimum	Maximum
	BEE	9,3	10	1,2	2,1	7	11
	BER2	8,7	9	0,9	1,5	7	10
ANOVA	***p***	0,7					
	CES	±1,8					
	Puissance (*d*)	0,6 (modéré)					

Selon le *d* de Cohen, la non-significativité de cette différence pourrait être modérément expliquée par un trop faible échantillonnage.

3.3 Équitabilité de Simpson

L'équitabilité des communautés benthiques entre le site référence et le site exposé est très similaire (Tableau 3) avec une valeur de 0,22 ± 0,04 pour BEE et une valeur de 0,22 ± 0,05 pour BER2. Ainsi, l'équitabilité de Simpson dans les deux aires demeure très basse : un résultat prévisible et sûrement dû à la dominance des chironomidés (Diptera) dans tous les échantillons.

Tableau 3. Équitabilité de Simpson

	Aire	Moyenne	Médiane	Écart-type	Erreur type	Minimum	Maximum
	BEE	0,22	0,23	0,04	0,03	0,17	0,26
	BER2	0,22	0,24	0,05	0,03	0,16	0,25
ANOVA	***p***	0,8					
	CES	±0,10					
	Puissance (*d*)	0,01 (faible)					

Selon le *d* de Cohen, la non-significativité de cette différence pourrait s'expliquer par un trop faible échantillonnage.

3.4 Dissimilarité de Bray-Curtis

En comparant BEE avec une communauté médiane calculée à partir de l'aire de référence BER2, une moyenne pour l'indice de dissimilarité de Bray-Curtis de 0,71 ± 0,02 a été calculée indiquant que les deux communautés sont particulièrement dissimilaires l'une de l'autre. En revanche et comme attendu, les trois sites de l'aire BER2 sont proche de la communauté médiane avec une moyenne pour l'indice de dissimilarité de BC de 0,26 ± 0,11.

Tableau 4. Dissimilarité de Bray-Curtis

Aire	Moyenne	Médiane	Écart-type	Erreur type	Minimum	Maximum
BEE	0,71	0,70	0,02	0,01	0,69	0,73
BER2	0,26	0,37	0,11	0,13	0,01	0,41

3.5 Autres indicateurs

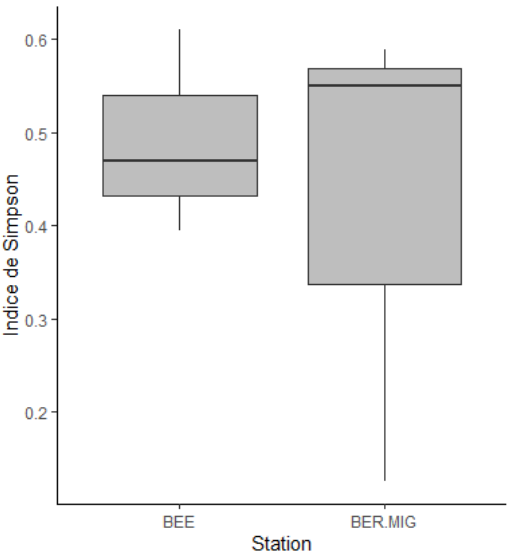
Cette section présente les autres indicateurs permettant de décrire les CIB des aires BEE et BER2.

3.5.1 Diversité de Simpson

Les aires BEE et BER2 ne sont pas significativement différente selon l'indice de diversité de Simpson (Tableau 5). Ces deux aires ont des indices de diversité de Simpson proche de 0,5 suggérant que la diversité est modérée et que la probabilité que deux individus soient de la même espèce est modérée également. À l'instar de l'équitabilité de Simpson, ce résultat s'explique par la dominance des chironomidés dans tous les sites, mais particulièrement dans ceux de l'aire BER2.

Selon le *d* de Cohen, la non-significativité de cette différence pourrait s'expliquer par un trop faible échantillonnage.

Tableau 5. Index de diversité Simpson

	Aire	Moyenne	Médiane	Écart-type	Erreur type	Minimum	Maximum
Diversité	**BEE**	0,49	0,47	0,11	0,06	0,39	0,61
	BER2	0,42	0,55	0,26	0,15	0,13	0,59
ANOVA	***p***	0,55					
	CES	±0,32					
	Puissance (*d*)	0,2 (faible)					

* Résultat significatif, $p < 0,05$

3.5.2 Abondance de chaque taxon

Les plus hautes abondances observées sont pour la famille des Chironomidae aux deux aires échantillonnées même si aux sites de BER2, les abondances de cette famille sont bien plus basses qu'aux sites d'exposition (Tableau 6). Les taxons sous dominants aux sites de BEE sont les Simuliidae et les Nemouridae. Aux sites de BER2, ce sont les Amphipoda qui dominent le reste des CIB, mais de manière très hétérogène comme reflété par l'écart-type très élevé.

Les taxons tels que les cladocères, ostracode et copépodes (Crustacea) qui peuvent avoir un mode de vie planctonique ou benthiques ont été regroupés dans une catégorie « organismes non benthiques » afin de ne pas perdre de l'information brute concernant les communautés présentes.

Tableau 6. Abondance de chaque taxon

	Taxon		BEE		BER2	
			Moyenne	Écart-type	Moyenne	Écart-type
Organismes benthiques	**Insecta**					
	Diptera	Chironomidae	1 073,7	216,3	371,0	190,9
		Ceratopogonidae	-	-	21,0	15,5
		Tipulidae	28,3	15,0	-	-
		Simuliidae	119,7	60,3	1,3	2,3
		Empididae/Athericidae	1,3	2,3	-	-
		Diptère non identifié (1)	0,3	0,6	0,7	1,2
		Diptère non identifié (2)	6,0	10,4	-	-
	Plecoptera	Perlodidae	2,7	4,6	-	-
		Perlidae	4,0	5,7	-	-
		Nemouridae	85,7	33,9	-	-
		Chloroperlidae	6,0	10,4	-	-
		Plecoptère non identifié	1,7	2,9	-	-
	Tricoptera	Limnephililidae	-	-	0,7	1,2
		Polycentropodidae	-	-	1,3	1,2
		Molanidae	-	-	1,3	2,3
	Odonata	Corduliidae	-	-	1,3	2,3
		Odonata non identifiée	-	-	2,7	4,6
	Hemiptera	Corixidae	-	-	2,7	4,6
	Lepidoptera	Lepidoptere non identifié	24,0	41,6	-	-
	Autres	Insecte non identifié (1)	2,3	4,0	-	-
		Insecte non identifié (2)	21,3	27,2	-	-
	Crustacea					
	Amphipoda	Amphipode non identifié	-	-	126,7	130,1
	Arachnida					
	Trombidiformes	Acarien non identifié	174,3	120,5	2,3	3,2
	Annelida					
	Clitellata	Oligochète non identifié	-	-	38,3	50,4
	Nematoda					
	Nematoda	Nematode non identifié	3,0	2,6	1,3	2,3
	Mollusca					
	Bivalvia	Sphaeriidae	-	-	7,0	3,6
		Total	**1 554,3**	-	**579,7**	-
Organismes non benthiques	**Crustacea**					
	Copepoda	Copépode non identifié	-	-	10,7	18,5
	Cladocera	Cladocère non identifié	-	-	105,0	109,8
	Ostracoca	Ostracode non identifié	**-**	**-**	5,3	9,2
		Total	**-**	**-**	**121,0**	**-**

3.5.3 Abondance relative

Le Tableau 7 présente les abondances relatives de chaque taxon.

Tableau 7. Abondance relative de chaque taxon

Taxon		BEE		BER2	
		Moyenne (%)	Écart-type (%)	Moyenne (%)	Écart-type (%)
Organismes benthiques					
Insecta					
Diptera	Chironomidae	68,9	9,7	59,5	16,3
	Ceratopogonidae	-	-	2,9	1,2
	Tipulidae	1,9	1,2	-	-
	Simuliidae	7,7	3,6	0,1	0,2
	Empididae/Athericidae	0,1	0,1	-	-
	Diptère non identifié (1)	0,02	0,04	0,2	0,4
	Diptère non identifié (2)	0,4	0,7	-	-
Plecoptera	Perlodidae	0,2	0,3	-	-
	Perlidae	0,2	0,3	-	-
	Nemouridae	5,5	2,0	-	-
	Chloroperlidae	0,4	0,7	-	-
	Plecoptère non identifié	0,1	0,2	-	-
Tricoptera	Limnephililidae	-	-	0,1	0,2
	Polycentropodidae	-	-	0,3	0,3
	Molanidae	-	-	0,1	0,2
Odonata	Corduliidae	-	-	0,2	0,4
	Odonata non identifiée	-	-	0,2	0,4
Hemiptera	Corixidae	-	-	0,2	0,4
Lepidoptera	Lepidoptere non identifié	1,6	2,7	-	-
Autres	Insecte non identifié (1)	0,2	0,3	-	-
	Insecte non identifié (2)	1,4	1,8	-	-
Crustacea					
Amphipoda	Amphipode non identifié	-	-	14,2	12,3
Arachnida					
Trombidiformes	Acarien non identifié	11,4	7,8	0,5	0,6
Annelida					

Taxon		BEE		BER2	
		Moyenne (%)	Écart-type (%)	Moyenne (%)	Écart-type (%)
Organismes benthiques					
Insecta					
Clitellata	Oligochète non identifié	-	-	3,9	3,4
Nematoda					
Nematoda	Nematode non identifié	0,2	0,2	0,1	0,2
Mollusca					
Bivalvia	Sphaeriidae	-	-	1,2	0,6

Comme c'est le cas pour l'abondance absolue présentée dans la section précédente, la famille des Chironomidae est la plus abondante relative aux autres taxons, suivi par les Hydracarina, Simulidae et Nemouridae (aux sites de BEE) et Amphipoda et Cladocera (aux sites BER2).

3.5.4 Présence/absence de taxons

Le Tableau 8 présente les différents taxons de la communauté benthique présente à chacun des sites d'échantillonnage : 11 taxons ont été identifiés aux sites BEE et 16 ont été identifiés aux sites BER2.

Tableau 8. Présence de chaque taxon

Taxon		BEE	BER2
Insecta			
Diptera	Chironomidae	✓	✓
	Ceratopogonidae		✓
	Tipulidae	✓	
	Simuliidae	✓	✓
	Empididae/Athericidae	✓	
	Diptère non identifié (1)	✓	✓
	Diptère non identifié (2)	✓	
Plecoptera	Perlodidae	✓	
	Perlidae	✓	
	Nemouridae	✓	
	Chloroperlidae	✓	
	Plecoptère non identifié	✓	
Tricoptera	Limnephililidae		✓
	Polycentropodidae		✓
	Molanidae		✓
Odonata	Corduliidae		✓
	Odonata non identifiée		✓
Hemiptera	Corixidae		✓
Lepidoptera	Lepidoptere non identifié	✓	

Taxon		BEE	BER2
Crustacea			
Amphipoda	Amphipode non identifié		✓
Arachnida			
Trombidiformes	Acarien non identifié	✓	✓
Annelida			
Clitellata	Oligochète non identifié		✓
Nematoda			
Nematoda	Nematode non identifié	✓	✓
Mollusca			
Bivalvia	Sphaeriidae		✓

4 Conclusions

Une abondance significativement plus élevée a été observée au site BEE comparé au site BER2. Les autres indices de diversité pour le site exposé BEE, ne montre pas de différence significative avec le site BER2. Ceci reflète de bonnes conditions pour les CIB dans la décharge du lac Fra lors de la campagne d'échantillonnage. Le Tableau 9 présente un résumé des résultats des derniers suivis.

Tableau 9. Résumé des derniers suivis

Indice	Année de suivi		
	2019*	2020**	2021
Principaux			
Densité/abondance	Biologiquement significatif	Non significatif	Biologiquement significatif
Richesse	Significatif	Non significatif	Non significatif
Équitabilité de Simpson	Biologiquement significatif	Biologiquement significatif	Non significatif
Dissimilarité de Bray-Curtis	Non significatif	-	Non significatif
Autre indicateur			
Diversité de Simpson	Biologiquement significatif	Biologiquement significatif	Non significatif

Rouge = Effet significatif présentant de moins bonnes conditions dans le site exposé
Bleu = Effet significatif présentant de meilleures conditions dans le site exposé

*Groupe Hémisphères (2019) ; **Groupe Hémisphères (2020)

5 Portée et limitations de l'étude

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Ce rapport fait état des observations et données recueillies par Groupe Hémisphères dans le but d'analyser les impacts environnementaux du projet Goodwood. Nous rappelons l'importance de conserver l'intégralité des faits et propos rapportés, de même que de l'analyse et des conclusions présentées dans ce rapport.

Lors de la préparation de ce document, Groupe Hémisphères a suivi une méthodologie et des procédures et pris les précautions appropriées au degré d'exactitude visé, en se basant sur ses compétences professionnelles en la matière et avec les précautions qui s'imposent. Groupe Hémisphères est d'opinion que les recommandations issues de ce rapport doivent être considérées comme valides avec une marge d'erreur raisonnable pour ce type d'étude. À moins d'indication contraire, Groupe Hémisphères n'a pas contrevérifié les hypothèses, données et renseignements en provenance de TSMC et autres sources sur lesquels peuvent être fondés son opinion. Groupe Hémisphères n'en assume nullement l'exactitude et décline toute responsabilité à leur égard.

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Groupe Hémisphères dispose d'un système interne de contrôle de la qualité basé sur la vérification et l'approbation de tout concept et production de documents par un professionnel senior. Il tient notamment compte de la responsabilité du management, du contrôle de la documentation et des données, de la formation continue du personnel, ainsi que de l'assurance qualité pour les produits livrables. Ce système inclut également un contrôle assidu des travaux de terrain et des mesures de prévention et de sécurité spécifiques au projet.

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Annexe I

Carte de localisation des sites d'échantillonnage des communautés d'invertébrés benthiques

Gisement Goodwood Deposit

QUÉBEC/QUEBEC

TERRE-NEUVE-ET-LABRADOR/
LABRADOR AND NEWFOUNDLAND

BER1

BEE

BER2

Lac de la Frontière Lake

Lac Migration Lake

Gisement/*Deposit*
Milieu humide/*Wetland*
Courbe de niveau/*Contour interval* (15 m)
Frontière provinciale/*Provincial border*

Infrastructures
Fosse/*Pit*
Halde à mort-terrain/*Overburden stockpile*
Halde à stériles/*Waste dump*
Carrière inactive/*Inactive quarry*

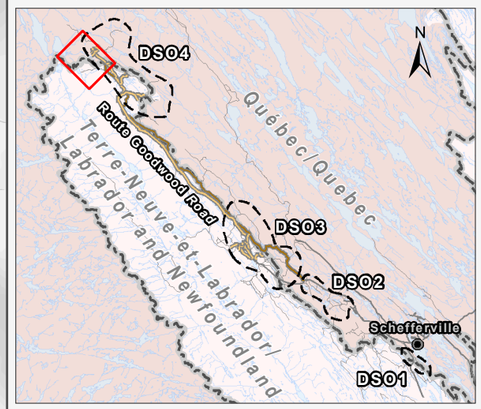
Routes d'accès/*Access roads*
Route de halage/*Haul Road*
Route de contournement/*Bypass road*
Route d'accès/*Access road*

Hydrographie/*Hydrography*
Cours d'eau permanent/*Permanent watercourse*
Cours d'eau intermittent/*Intermittent watercourse*
Chenal torrentiel/*Storm runoff*
Cours d'eau disparaissant/*Disappearing Stream*
Plan d'eau/*Waterbody*

Stations d'échantillonnage de benthos/*Benthos monitoring stations*
Station d'exposition/*Exposure station*
Station de référence/*Reference station*

Échelle/*Scale* : 1/15 000 Projection : NAD 1983 UTM Zone 19N

0 200 400 600 800 m



IDENTIFICATION DES INVERTÉBRÉS BENTHIQUES — PROJET GOODWOOD — 2021 /
GOODWOOD PROJECT – BENTHIC INVERTEBRATE IDENTIFICATION — 2021

TATA

Sources :
SNC Lavalin et Groupe Hémisphères, Hydrologie et milieux humides, 2010/
SNC Lavalin and Groupe Hémisphères, Hydrology and Wetlands, 2010
TATA Steel Minerals Canada Limitée, Composantes minières et routes/
TATA Steel Minerals Canada Limited, Mining Components and Roads
MERN, Limites provinciales, 2018/
MERN, Provincial Boundary, 2018

Stations d'échantillonnage de benthos (aires d'étude)/*Benthos monitoring stations (study areas)*

Groupe Hemispheres

FICHIER/*FILE*, PROJET/*PROJECT*, DATE, AUTEUR/*AUTHOR* :
GH-1511 , PR185-49-21, 2022-03-08, fxlafortune

Figure 1

W:_CartoContrats\PR185_TATASteel\PR185-49-21_Enviro_DSO_2021\Workspaces\Goodwood_Benthos\GH-1511_PR185-49-21_Fig1_StationsEchantBenthos.mxd

Annexe II

Reportage photographique

BEE		
		
Vue générale latérale du site	Amont	Aval
		
Rive droite	Rive gauche	Substrat

BER1		
		
Vue générale du site	Amont	Aval
		
Rive droite	Rive gauche	Substrat

BER 2		
		
Vue générale du site	Amont	Aval
		
Rive droite	Rive gauche	Substrat

Appendix IX. NO_2 air monitoring results and calculations

Your P.O. #: 3000000730
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/01/10 - 2021/02/15
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2021/03/01
Report #: R2991243
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C111021
Received: 2021/02/22, 14:47

Sample Matrix: Air
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	2	2021/02/23	2021/03/01	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: Levi.MANCHAK@bureauveritas.com
Phone# (780)378-8542

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Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C111021
Report Date: 2021/03/01

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

RESULTS OF CHEMICAL ANALYSES OF AIR

BV Labs ID		ZI7943	ZI7944		
Sampling Date		2021/01/10 13:40	2021/01/04 14:25		
	UNITS	AQS2-NO2	AQS4-NO2	RDL	QC Batch
Passive Monitoring					
Calculated NO2	ppb	<0.1	MISSING	0.1	A162606
RDL = Reportable Detection Limit					

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C111021
Report Date: 2021/03/01

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C111021
Report Date: 2021/03/01

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A162606	XSZ	Spiked Blank	Calculated NO2			97	%	90 - 110
A162606	XSZ	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.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C111021
Report Date: 2021/03/01

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

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

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Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Your P.O. #: 3000000730
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/01/03 - 2021/04/16
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2021/05/03
Report #: R3015303
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C126928
Received: 2021/04/27, 08:30

Sample Matrix: Air
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	6	2021/04/28	2021/04/30	PTC SOP-00148	Passive NO2 in ATM

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

Encryption Key

Levi Manchak
Project Manager SR
05 May 2021 10:38:01

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Levi Manchak, Project Manager SR
Email: Levi.MANCHAK@bureauveritas.com
Phone# (780)378-8542
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Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C126928
Report Date: 2021/05/03

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

RESULTS OF CHEMICAL ANALYSES OF AIR

BV Labs ID		ZR4090	ZR4091	ZR4096	ZR4097	ZR4098	ZR4099		
Sampling Date		2021/02/14 13:30	2021/02/15 14:30	2021/01/12 09:20	2021/01/12 09:48	2021/01/03 15:15	2021/01/12 14:55		
	UNITS	AQS2-NO2	AQS4-NO2	AQS6-NO2	AQS7-NO2	AQS8-NO2	AQS9-NO2	RDL	QC Batch
Passive Monitoring									
Calculated NO2	ppb	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	A209347
RDL = Reportable Detection Limit									

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C126928
Report Date: 2021/05/03

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

GENERAL COMMENTS

Sample ZR4096 [AQS6-NO2] : Sample exceeded hold time.

Sample ZR4097 [AQS7-NO2] : Sample exceeded hold time.

Sample ZR4098 [AQS8-NO2] : Sample exceeded hold time.

Sample ZR4099 [AQS9-NO2] : Sample exceeded hold time.

Results relate only to the items tested.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C126928
Report Date: 2021/05/03

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A209347	XSZ	Spiked Blank	Calculated NO2			95	%	90 - 110
A209347	XSZ	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.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C126928
Report Date: 2021/05/03

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000730
Sampler Initials: DH

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

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For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Your P.O. #: 3000000997
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/04/16 - 2021/05/25
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2021/06/15
Report #: R3032764
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C138190
Received: 2021/06/04, 13:16

Sample Matrix: Air
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	6	2021/06/07	2021/06/11	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

Lori Cormier
Project Manager
15 Jun 2021 08:09:38

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Levi Manchak, Project Manager SR
Email: Levi.MANCHAK@bureauveritas.com
Phone# (780)378-8542
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Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C138190
Report Date: 2021/06/15

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JFD

RESULTS OF CHEMICAL ANALYSES OF AIR

BV Labs ID		ZX5702	ZX5703	ZX5704	ZX5705	ZX5706	ZX5707		
Sampling Date		2021/04/16 12:50	2021/04/10 15:10	2021/04/04 14:57	2021/04/19 07:57	2021/04/11 17:24	2021/04/07 16:20		
	UNITS	AQS2-NO2	AQS4-NO2	AQS6-NO2	AQS7-NO2	AQS8-NO2	AQS9-NO2	RDL	QC Batch
Passive Monitoring									
Calculated NO2	ppb	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	A246431
RDL = Reportable Detection Limit									

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C138190
Report Date: 2021/06/15

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JFD

GENERAL COMMENTS

Sample ZX5707 [AQS9-NO2] : Sample start date listed on COC as 2021/07/21.
Previous sample end date was 2021/04/07.
Sample start date of 2021/04/07 used in calculation of final results.

Results relate only to the items tested.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C138190
Report Date: 2021/06/15

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JFD

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A246431	XSZ	Spiked Blank	Calculated NO2			97	%	90 - 110
A246431	XSZ	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.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

BV Labs Job #: C138190
Report Date: 2021/06/15

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JFD

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Linda Lin, Supervisor, Centre for Passive Sampling Technology

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Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bay 10, 6744 - 50 St. Edmonton AB Canada T6B 3M9

Ph (780) 378-8500, Toll free (800) 386-7247, Fax (780) 378-8699

Maxxam Job Number:

PASSIVE AIR CHAIN OF CUSTODY

Invoice To	
Company Name	TSMC
Contact Name	
Address	
Postal Code	
Phone/Fax#	Ph Fax

Report To	
Name & Email Address	TSMC usual contacts

Service Requested

- ☐ **RUSH** (Please contact for TAT)
- ☒ **REGULAR**

Company Name	**TATA Steel**
Project Name/LSD	**Timmins Passive**

ANALYTICAL INFORMATION

Analysis Required

Sample ID or Location (LSD)	Sample Start Date (DD/MM/YY)	Time (24 hrs) (HH:MM)	Sample End Date (DD/MM/YY)	Time (HH:MM)	Volume (m3) *PM/TSP Only*	SO2	H2S	NO2	O3	NOx	NH3	HNO3	VOC	PM2.5	PM10	TSP	Dustfall	
AQS2-NO2	16/04/2021	12:50	25/05/2021	14:21				X										
AQS4-NO2	10/04/2021	15:10	25/05/2021	12:57				X										
AQS6-NO2	4/04/2021	14:57	25/05/2021	9:13				X										
AQS7-NO2	19/04/2021	7:57	25/05/2021	18:27				X										
AQS8-NO2	11/04/2021	17:24	25/05/2021	7:35				X										
AQS9-NO2	21/7/2021	16:20	25/05/2021	17:51				X										
BLANK-NO2																		
					7 NO2 - R													

RECEIVED
JUN 03 2021
@ 1427

Notes/Comments: Client 12263 / Scenario 13596

7 NO2

Sampled By JFD **Phone/Email** **Received By** **Date/Time** **Project #**

Date Shipped June 2, 2021 **Signature** **PO#**

Your P.O. #: 3000000997
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/05/25 - 2021/06/30
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2022/01/25
Report #: R3125951
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C150579
Received: 2021/07/16, 09:07

Sample Matrix: Air
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	5	2021/07/16	2021/07/21	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

Kristen Sywolos
Customer Service Supervisor/Oil & Gas Division
27 Jan 2022 14:23:47

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Service Passives,
Email: PassiveAir@bureauveritas.com
Phone# (780) 378-8500
==========
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Bureau Veritas Job #: C150579
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JM

RESULTS OF CHEMICAL ANALYSES OF AIR

Bureau Veritas ID		ABW234	ABW235	ABW236	ABW238	ABW239		
Sampling Date		2021/05/25 14:21	2021/05/25 12:57	2021/05/25 09:13	2021/05/25 07:35	2021/05/25 17:51		
	UNITS	AQS2-NO2	AQS4-NO2	AQS6-NO2	AQS8-NO2	AQS9-NO2	RDL	QC Batch
Passive Monitoring								
Calculated NO2	ppb	<0.1	<0.1	0.2	<0.1	0.4	0.1	A288419
RDL = Reportable Detection Limit								

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C150579
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JM

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C150579
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JM

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A288419	OZ	Spiked Blank	Calculated NO2			99	%	90 - 110
A288419	OZ	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.

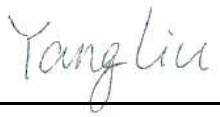
Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C150579
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Yang Liu, Analyst II

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For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Your P.O. #: 3000000997
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/06/28 - 2021/08/02
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2022/01/25
Report #: R3125955
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C156651
Received: 2021/08/06, 09:18

Sample Matrix: Air
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	4	2021/08/09	2021/08/18	PTC SOP-00148	Passive NO2 in ATM

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

Encryption Key

Kristen Sywolos
Customer Service Supervisor/Oil & Gas Division
27 Jan 2022 14:30:17

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Service Passives,
Email: PassiveAir@bureauveritas.com
Phone# (780) 378-8500
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Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C156651
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: AC

RESULTS OF CHEMICAL ANALYSES OF AIR

Bureau Veritas ID		ADG971	ADG972	ADG973	ADG975		
Sampling Date		2021/06/28 11:12	2021/06/28 14:25	2021/06/30 17:40	2021/06/28 16:36		
	UNITS	AQS2-NO2	AQS4-NO2	AQS6-NO2	AQS9-NO2	RDL	QC Batch
Passive Monitoring							
Calculated NO2	ppb	0.1	0.2	0.4	0.3	0.1	A313778
RDL = Reportable Detection Limit							

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Bureau Veritas Job #: C156651
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: AC

GENERAL COMMENTS

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Bureau Veritas Job #: C156651
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: AC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A313778	XSZ	Spiked Blank	Calculated NO2			100	%	90 - 110
A313778	XSZ	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.

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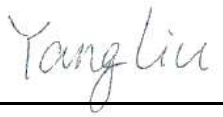
Bureau Veritas Job #: C156651
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: AC

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Yang Liu, Analyst II

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Your P.O. #: 3000000997
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/08/02 - 2021/09/09
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2022/01/25
Report #: R3125957
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C171710
Received: 2021/09/24, 13:18

Sample Matrix: Air
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	4	2021/10/04	2021/10/07	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

Kristen Sywolos
Customer Service Supervisor/Oil & Gas Division
27 Jan 2022 14:30:40

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Service Passives,
Email: PassiveAir@bureauveritas.com
Phone# (780) 378-8500
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Bureau Veritas Job #: C171710
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

RESULTS OF CHEMICAL ANALYSES OF AIR

Bureau Veritas ID		AGR850	AGR851	AGR852	AGR853		
Sampling Date		2021/08/01 09:54	2021/08/01 16:00	2021/08/01 17:15	2021/08/01 08:24		
	UNITS	AQS2-NO2	AQS4-NO2	AQS6-NO2	AQS9-NO2	RDL	QC Batch
Passive Monitoring							
Calculated NO2	ppb	0.3	0.1	0.2	0.4	0.1	A374532
RDL = Reportable Detection Limit							

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C171710
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

GENERAL COMMENTS

Sample AGR850 [AQS2-NO2] : NO2 sample lost barrier and corlor ring upon receipt. XZ 20211006

Results relate only to the items tested.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C171710
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A374532	XSZ	Spiked Blank	Calculated NO2			104	%	90 - 110
A374532	XSZ	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.

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Bureau Veritas Job #: C171710
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Yang Liu

Yang Liu, Analyst II

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Your P.O. #: 3000000997
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/09/09 - 2021/11/31
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2022/01/25
Report #: R3125959
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C195435
Received: 2021/12/20, 09:30

Sample Matrix: Air
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	4	2021/12/23	2021/12/28	PTC SOP-00148	Passive NO2 in ATM

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Encryption Key

Kristen Sywolos
Customer Service Supervisor/Oil & Gas Division
27 Jan 2022 14:48:25

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Service Passives,
Email: PassiveAir@bureauveritas.com
Phone# (780) 378-8500
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Bureau Veritas Job #: C195435
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

RESULTS OF CHEMICAL ANALYSES OF AIR

Bureau Veritas ID		AME357	AME358	AME359	AME360		
Sampling Date		2021/09/09 10:01	2021/09/09 14:53	2021/09/09 17:32	2021/09/09 16:05		
	UNITS	AQS2-NO2	AQS4-NO2	AQS6-NO2	AQS9-NO2	RDL	QC Batch
Passive Monitoring							
Calculated NO2	ppb	0.3	<0.1	0.4	0.7	0.1	A457090
RDL = Reportable Detection Limit							

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C195435
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C195435
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A457090	XSZ	Spiked Blank	Calculated NO2	2021/12/28		97	%	90 - 110
A457090	XSZ	Method Blank	Calculated NO2	2021/12/28	<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.

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Bureau Veritas Job #: C195435
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Yang Liu

Yang Liu, Analyst II

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Your P.O. #: 3000000997
Your Project #: PASSIVE NO2 / DS03-4
Site#: 2021/11/15 - 2021/12/28
Site Location: Timmins, Newfoundland

Attention: MARIANA TRINDADE

Tata Steel Mineral Canada
1000, Sherbrooke St West
Montreal, QC
CANADA H3A 3G4

Report Date: 2022/01/25
Report #: R3125960
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C197725
Received: 2021/12/31, 09:30

Sample Matrix: Air
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NO2 Passive Analysis	4	2022/01/05	2022/01/15	PTC SOP-00148	Passive NO2 in ATM

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Encryption Key

Kristen Sywolos
Customer Service Supervisor/Oil & Gas Division
27 Jan 2022 14:48:51

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
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Bureau Veritas Job #: C197725
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

RESULTS OF CHEMICAL ANALYSES OF AIR

Bureau Veritas ID		AMP764	AMP765	AMP766	AMP767		
Sampling Date		2021/11/20 10:52	2021/11/24 09:42	2021/11/15 16:18	2021/11/24 11:43		
	UNITS	AQS2-NO2	AQS4-NO2	AQS6-NO2	AQS9-NO2	RDL	QC Batch
Passive Monitoring							
Calculated NO2	ppb	0.2	0.1	0.4	0.5	0.1	A463847
RDL = Reportable Detection Limit							

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C197725
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Laboratories Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C197725
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A463847	XSZ	Spiked Blank	Calculated NO2			100	%	90 - 110
A463847	XSZ	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.

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Bureau Veritas Job #: C197725
Report Date: 2022/01/25

Tata Steel Mineral Canada
Client Project #: PASSIVE NO2 / DS03-4
Site Location: Timmins, Newfoundland
Your P.O. #: 3000000997
Sampler Initials: JD

VALIDATION SIGNATURE PAGE

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Yang Liu, Analyst II

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SAMPLING DATE	SAMPLE ID	**UNITS**	CALCULATED NO2 **PPB**	**AVERAGE CONCENTRATION Ug/m³**
2021-01-10 13:40	AQS2		<0.1	
2021-01-04 14:25	AQS4		MISSING	
2021-02-14 13:30	AQS2		<0.1	
2021-02-15 14:30	AQS4		<0.1	
2021-01-12 09:20	AQS6		<0.1	
2021-01-12 09:48	AQS7		<0.1	
2021-01-03 15:15	AQS8		<0.1	
2021-01-12 14:55	AQS9		<0.1	
2021-04-16 12:50	AQS2		<0.1	
2021-04-10 15:10	AQS4		<0.1	
2021-04-04 14:57	AQS6		<0.1	
2021-04-19 07:57	AQS7		<0.1	
2021-04-11 17:24	AQS8		<0.1	
2021-04-07 16:20	AQS9		<0.1	
2021-05-25 14:21	AQS2		<0.1	
2021-05-25 12:57	AQS4		<0.1	
2021-05-25 09:13	AQS6		0.2	**0.376**
2021-05-25 07:35	AQS8		<0.1	
2021-05-25 17:51	AQS9		0.4	**0.752**
2021-06-28 11:12	AQS2		0.1	**0.188**
2021-06-28 14:25	AQS4		0.2	**0.376**
2021-06-30 17:40	AQS6		0.4	**0.752**
2021-06-28 16:36	AQS9		0.3	**0.564**
2021-08-01 09:54	AQS2		0.3	**0.564**
2021-08-01 16:00	AQS4		0.1	**0.188**
2021-08-01 17:15	AQS6		0.2	**0.376**
2021-08-01 08:24	AQS9		0.4	**0.752**
2021-09-09 10:01	AQS2		0.3	**0.564**
2021-09-09 14:53	AQS4		<0.1	
2021-09-09 17:32	AQS6		0.4	**0.752**
2021-09-09 16:05	AQS9		0.7	**1.316**
2021-11-20 10:52	AQS2		0.2	**0.376**
2021-11-24 09:42	AQS4		0.1	**0.188**
2021-11-15 16:18	AQS6		0.4	**0.752**
2021-11-24 11:43	AQS9		0.5	**0.94**
		SUM	**5.2000**	
		Annual average	**0.1**	**CAAQS= 17.0 PPB**

Sampling date (mm-dd)	Sample ID	Calculated NO_2 (ppb)[1]	Average concentration (µg/m³)
01-10	AQS2	<0.1	N/A
01-04	AQS4	NA	N/A
02-14	AQS2	<0.1	N/A
02-15	AQS4	<0.1	N/A
01-12	AQS6	<0.1	N/A
01-12	AQS7	<0.1	N/A
01-03	AQS8	<0.1	N/A
01-12	AQS9	<0.1	N/A
04-16	AQS2	<0.1	N/A
04-10	AQS4	<0.1	N/A
04-04	AQS6	<0.1	N/A
04-19	AQS7	<0.1	N/A
04-11	AQS8	<0.1	N/A
04-07	AQS9	<0.1	N/A
05-25	AQS2	<0.1	N/A
05-25	AQS4	<0.1	N/A
05-25	AQS6	0.2	0.376
05-25	AQS8	<0.1	N/A
05-25	AQS9	0.4	0.752
06-28	AQS2	0.1	0.188
06-28	AQS4	0.2	0.376
06-30	AQS6	0.4	0.752
06-28	AQS9	0.3	0.564
08-01	AQS2	0.3	0.564
08-01	AQS4	0.1	0.188
08-01	AQS6	0.2	0.376
08-01	AQS9	0.4	0.752
09-09	AQS2	0.3	0.564
09-09	AQS4	<0.1	N/A
09-09	AQS6	0.4	0.752
09-09	AQS9	0.7	1.316
11-20	AQS2	0.2	0.376
11-24	AQS4	0.1	0.188
11-15	AQS6	0.4	0.752
11-24	AQS9	0.5	0.94
Annual average		0.17[2]	

Notes:
1: RDL: Reportable Detection Limit is < 0.1 ppb,
2: Below the annual average recommendation limit of the Canadian Ambient Air Quality Standard (CAAQS) for NO_2 management levels of 17.00 ppb
N/A Not applicable