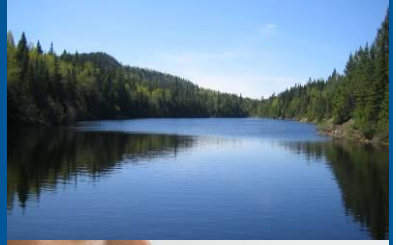







Real-Time Water Quality Report

Tata Steel Minerals Canada

Elross Lake/Joan Brook/Goodream Creek Network

Deployment Period

2024-06-18 to 2024-08-14

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Environment & Climate Change
Water Resources Management Division

TATA Steel Minerals Canada, Schefferville, QC

Prepared by:

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TABLE OF CONTENTS

GENERAL

The Water Resources Management Division (WRMD), in partnership with Tata Steel Minerals Canada (TSMC) and Water Survey of Canada - Environment and Climate Change Canada (WSC-ECCC), maintain real-time water quality and water quantity monitoring stations on Joan Brook, Elross Creek and Goodream Creek.

The real-time network at these stations serves the purpose of monitoring, processing, and disseminating water quality and quantity data to TSMC, ECC and ECCC, for the evaluation and management of water resources. It also functions to provide early warnings of any potential or emerging water issues, enabling timely implementation of mitigative measures.

To ensure the success of the RTWQ program, it is crucial to stay acquainted with the latest advancements in water quality monitoring technology. In the network's history, OTT DS5X instrumentation has been deployed for both short and long-term deployment. However, due to the aging condition of the DS5X sondes, both Joan Brook and Elross Creek instrumentation has been upgraded to YSI EXO3 instruments.

This deployment report discusses water quality related events occurring at Joan Brook and Elross Creek stations from the instrument's deployment on June 18, 2024, until removal on August 14, 2024, 58 days later. It was necessary to remove instrumentation from these stations due to low water level conditions and the prevention of instrument and/or sensor damage. Goodream Creek deployment data is not included in this report as water levels are acceptable and the instrument remains deployed at the new future station location above Triangle Lake.

JOAN BROOK AT OUTLET OF JOAN LAKE

ELROSS CREEK BELOW PINETTE LAKE INFLOW

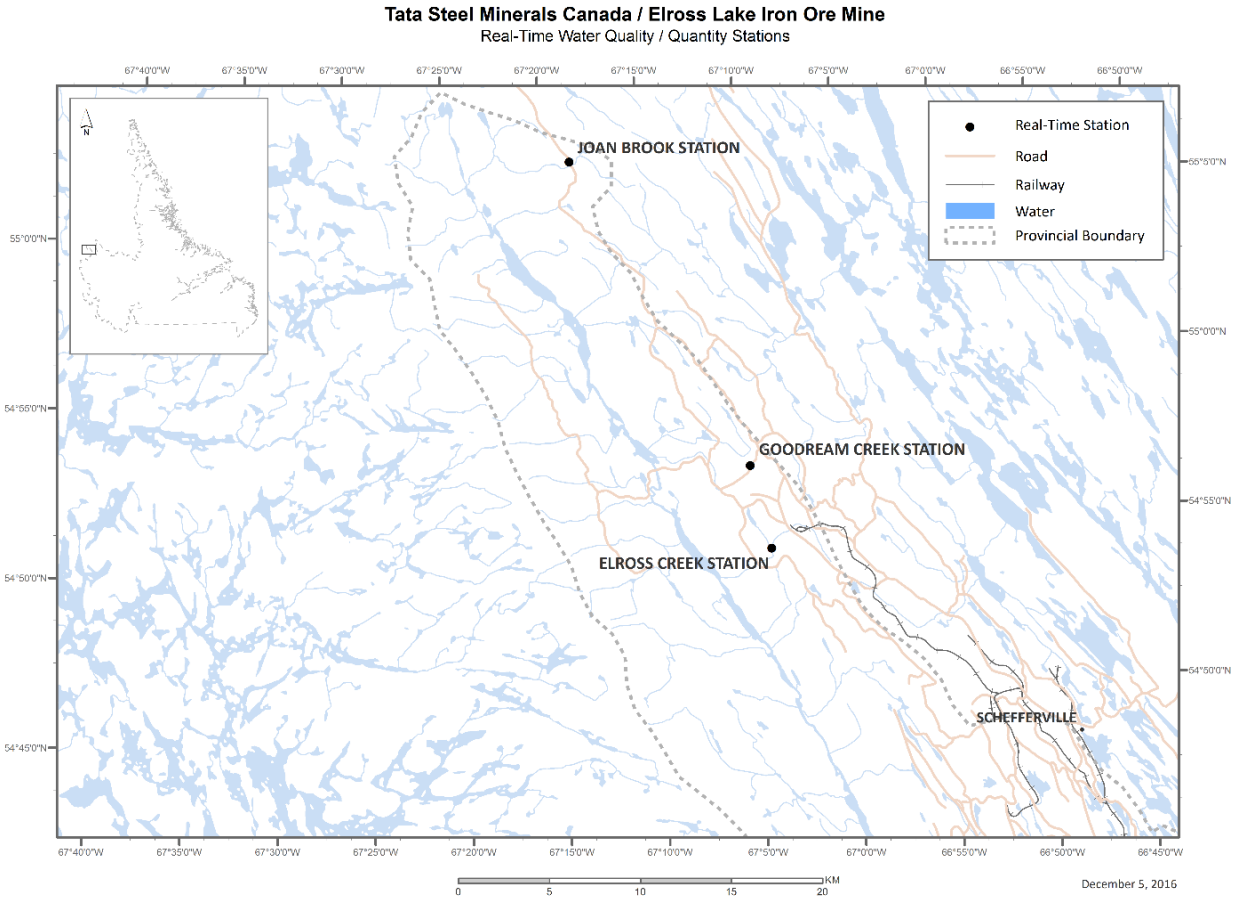


Figure 1: Map of real-time water quality/quantity stations in the vicinity of Elross Lake Iron Ore Mine in Western Labrador.

QUALITY ASSURANCE AND QUALITY CONTROL

As part of the Quality Assurance and Quality Control protocol (QA/QC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of the deployment period. The procedure is based on the approach used by the United States Geological Survey (Table 1).

At deployment and removal, a QA/QC Sonde is temporarily deployed adjacent to the Field Sonde. Values for temperature, pH, conductivity, dissolved oxygen, and turbidity are compared between the two instruments**.** Based on the degree of difference between the parameters on the Field Sonde and QA/QC Sonde at deployment and at removal, a qualitative statement is made on the data quality (Table 2).

WRMD staff at the Department of Environment & Climate Change (ECC) with the assistance of TSMC staff are responsible for maintaining and calibrating the water quality instrument, as well as grooming, analyzing, and reporting on water quality data recorded at the station.

WSC staff are responsible for the data logging/communication aspect of the network and maintenance of the water quantity monitoring equipment. WSC staff visit the site regularly to ensure the data logging and data transmitting equipment are working properly and are responsible for handling stage and streamflow data issues. The water quantity data is transmitted via satellite and published online with the water quality data on the WRMD website. Water quantity

data has not been corrected or groomed when published online or used in the monthly reports for the stations. While WSC oversees the hydrometric component of these stations, due to differences in protocols, quality control for WSC hydrometric data occurs less frequently than for water quality data.

The hydrometric data presented in this report is provisional and has not undergone quality control checks. Accurate hydrometric data can be accessed at https://wateroffice.ec.gc.ca/ or by request to Water Survey Canada.

Table 1: Instrument Performance Ranking classifications for deployment and removal.

	Rank				
Parameter	**Excellent**	**Good**	**Fair**	**Marginal**	**Poor**
Temperature (°C)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	<+/-1
pH (unit)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Sp. Conductance (µS/cm)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Sp. Conductance > 35 µS/cm (%)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Dissolved Oxygen (mg/L) (% Sat)	<=+/-0.3	>+/-0.3 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Turbidity <40 NTU (NTU)	<=+/-2	>+/-2 to 5	>+/-5 to 8	>+/-8 to 10	>+/-10
Turbidity > 40 NTU (%)	<=+/-5	>+/-5 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20

Table 2: Instrument performance rankings for Joan Brook and Elross Creek, TSMC Network.

Station	**Date**	**Action**	**Comparison Ranking**				
			Temperature	**pH**	**Conductivity**	**Dissolved Oxygen**	**Turbidity**
Joan Brook	**June 18, 2024**	**Deployment**	Excellent	Excellent	Excellent	Excellent	Excellent
		Grab Sample # 2024-1709-00-SI-SP	N/A	Good	Good	N/A	Excellent
	August 14, 2024	**Removal**	--	--	--	--	--
Elross Creek	**June 18, 2024**	**Deployment**	Excellent	Good	Excellent	Excellent	Excellent
		Grab Sample # 2024-1707-00-SI-SP	N/A	Pooraci	Poor	N/A	Excellent
	August 14, 2024	**Removal**	--	--	--	--	--

At Joan Brook, during the deployment on June 18, 2024, the field sonde exhibited excellent performance across all measured parameters (Temperature, pH, Conductivity, Dissolved Oxygen, and Turbidity), indicating strong reliability in comparison to the QA/QC sonde. The grab sample showed slight discrepancies, with pH and Conductivity ranked "Good," while Turbidity remained "Excellent." Grab sample analysis of Temperature and Dissolved Oxygen are not completed as per standard procedure as such comparison rankings could not be conducted.

At Elross Creek, deployment rankings were similarly strong for the field sonde, with most parameters rated "Excellent," except for pH, which was ranked "Good." This may be the result of inadequate time provided for the instrumentation to acclimate to the current conditions. Grab samples for Elross Creek showed more significant discrepancies, with pH and

Conductivity ranked "Poor," while Turbidity remained "Excellent." For less than desirable grab sample rankings observed in Table 2, acknowledgement of the inherent challenges posed by transportation delays in sample submission to the analytical laboratory for testing must be considered. Specifically, the method of transportation via charter plane from the collection site to St. John's introduces potential temperature fluctuations, impacting the pH, conductivity, and turbidity of grab samples. Furthermore, environmental factors such as exposure to air, biological activity, chemical reactions, and physical disturbances further complicate the preservation of sample integrity.

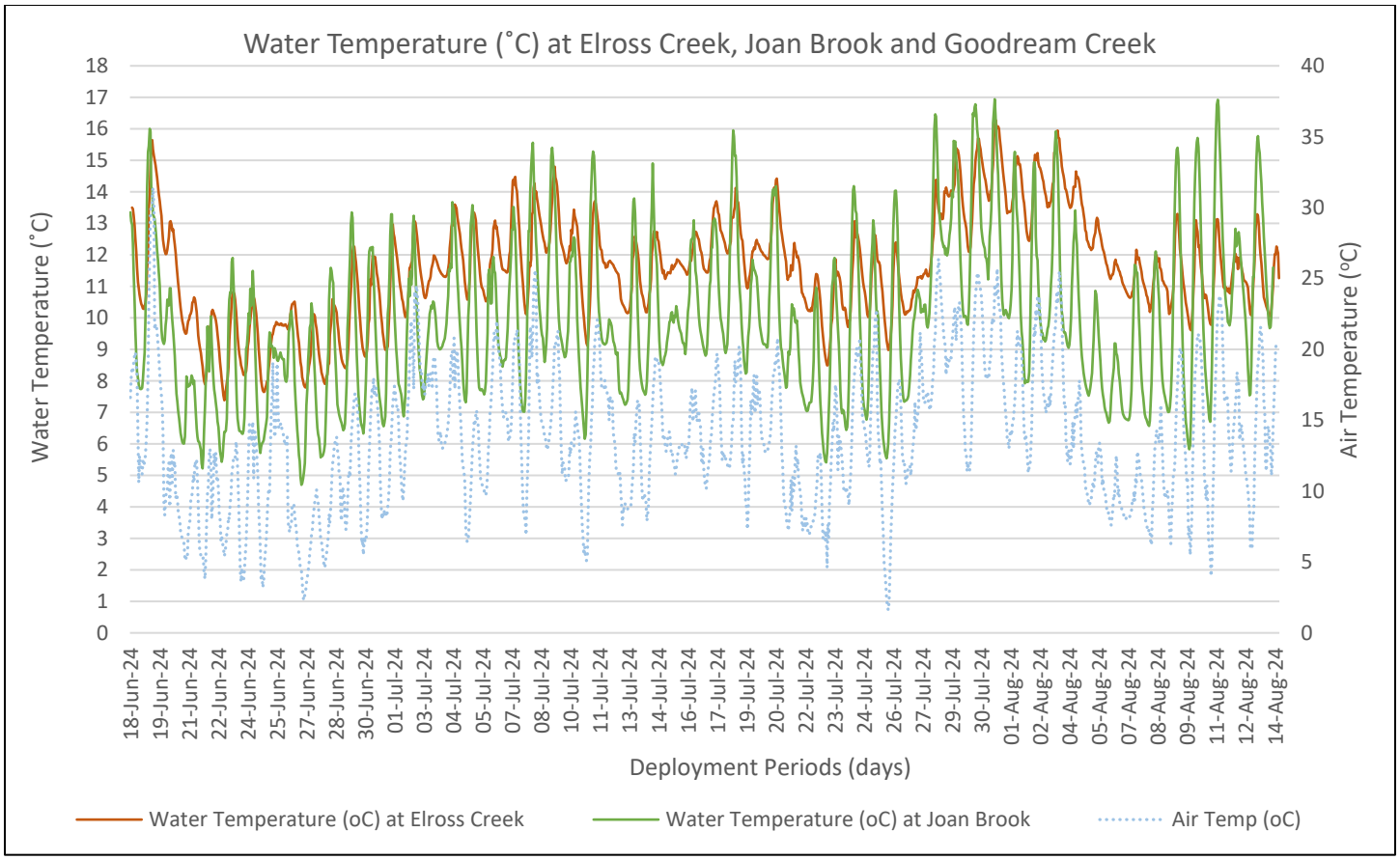
During the removal on August 14, 2024, no comparison rankings were available for any parameters, due to extreme low water levels. Overall, the field sonde generally performed well during deployment, though grab sample comparisons revealed some inconsistencies, particularly at Elross Creek.

DATA INTERPRETATION

Water Temperature

Water Temperature is a major factor used to describe water quality. Temperature has major implications on both the ecology and chemistry of a water body, governing processes such as the metabolic rate of aquatic plants and animals and the degree of dissolved oxygen saturation. Variations in water temperature can influence biological processes, aquatic habitats, and water chemistry, making it a crucial parameter to monitor in understanding ecosystem dynamics. Additionally, tracking temperature trends over time can provide valuable information for assessing the impacts of climate change, seasonal variations, and anthropogenic influences on aquatic ecosystems.

It should be noted that the temperature sensor on any sonde is the most important. All other parameters can be broken down into three groups: temperature dependent, temperature compensated and temperature independent. As the temperature sensor is not isolated from the rest of the sonde, the entire sonde must be at the same temperature before the sensor will stabilize. The values may take some time to climb to the appropriate reading; if a reading is taken too soon it may not accurately portray the water body.



Station	JOAN BROOK	ELROSS CREEK
MAX	16.94	16.29
MIN	4.7	7.38
MEDIAN	9.64	11.57
MEAN	9.93	11.62

Figure 2: Hourly Water temperature (°C) and Stage (m) values at Joan Brook and Elross Creek RTWQ Stations.

The water temperature at Joan Brook shows significant variability throughout the deployment period. With a maximum temperature of 16.94°C and a minimum of 4.7°C, the range of temperatures is broader compared to Elross Creek. The median temperature at Joan Brook is 9.64°C, and the mean temperature is slightly higher at 9.93°C. Throughout the deployment period, Joan Brook's water temperatures fluctuate more dramatically, especially in early July when it drops below 6°C at night and climbs to nearly 17°C during the day. These fluctuations indicate that Joan Brook is more exposed to environmental factors or lacks thermal buffering, possibly due to low water levels and lack of any nearby vegetation/canopy cover making Joan Brook more reactive to daily weather conditions.

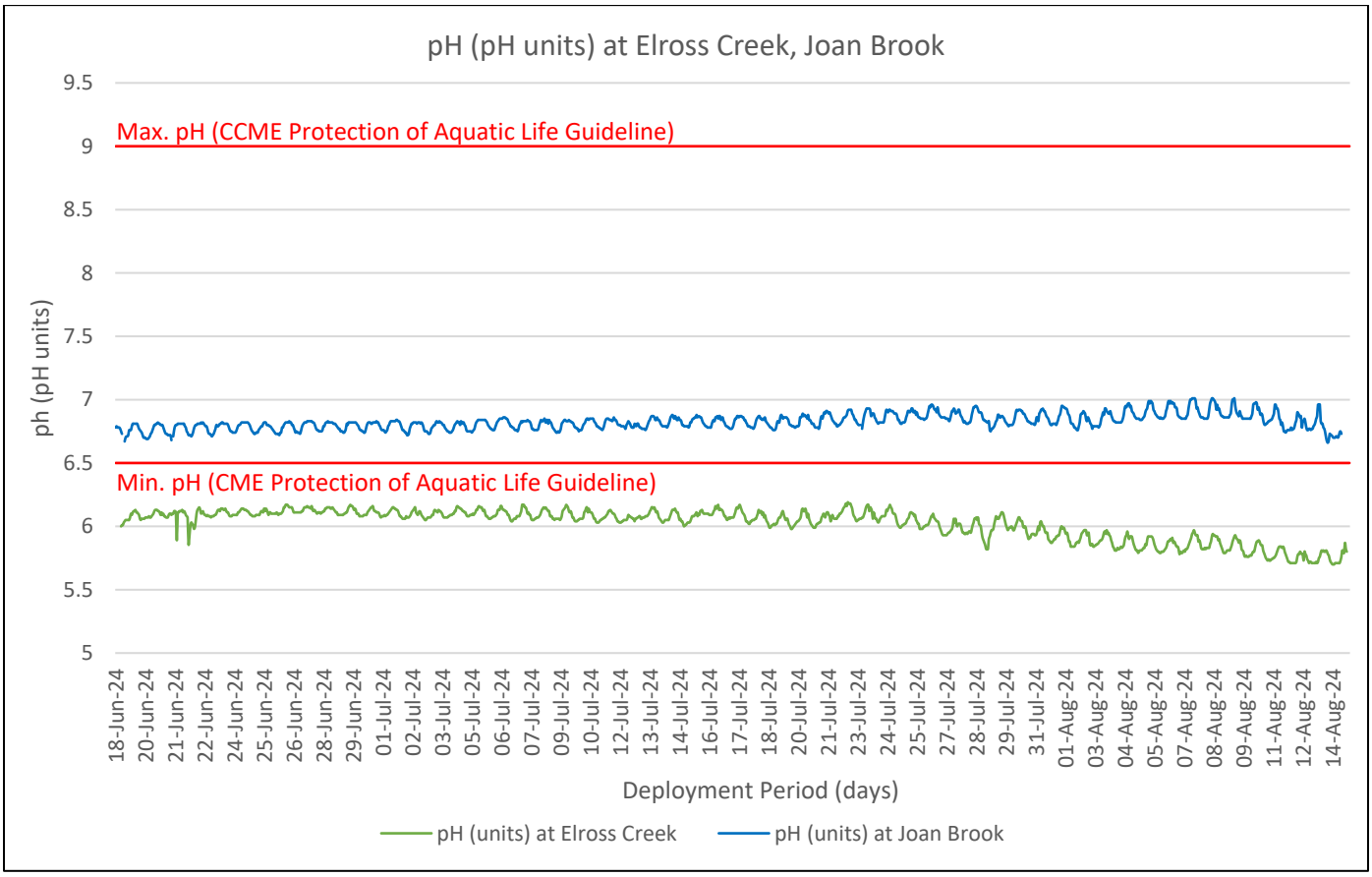
In contrast, Elross Creek exhibits a more stable and warmer trend temperature. The maximum temperature at Elross Creek is 16.29°C, slightly lower than that at Joan Brook, while the minimum temperature is notably higher at 7.38°C. This higher baseline suggests that Elross Creek might be influenced by factors such higher water levels or reduced exposure due to shoreline vegetation canopy, allowing for a more consistent heat retention. The median water temperature of 11.57°C and the mean of 11.62°C both indicate that Elross Creek maintains a generally warmer temperature throughout the period. Elross Creek exhibits a moderate upward trend in water temperature as the summer progresses, with

noticeable diurnal fluctuations that generally follow the air temperature pattern. However, these changes are less significant compared to Joan Brook. During the early part of the deployment, water temperatures are lower, hovering between 8°C and 13°C in late June. By mid-July, temperatures regularly peak near or slightly above 15°C, but rarely go beyond that, indicating more stable conditions. Elross Creek shows some sensitivity to air temperature fluctuations, particularly during the hottest periods (mid-July to early August), but overall, it appears more resistant to extreme changes.

pH

pH is used to give an indication of the acidity or basicity of a solution. A pH of seven (7) denotes a neutral solution while lower values are acidic and higher values are basic. Technically, the pH of a solution indicates the availability of protons to react with molecules dissolved in water. Such reactions can affect how molecules function chemically and metabolically.

pH values are temperature dependant as well as influenced by photosynthesis and respiration by aquatic organisms. The concentration of dissolved carbon dioxide in the water throughout the day, especially overnight when oxygen production is reduced relative to carbon dioxide levels. Carbon dioxide dissolved in water yields a slightly acidic solution.



Station	JOAN BROOK	ELROSS CREEK
MAX	7.01	6.19
MIN	6.66	5.7
MEDIAN	6.82	6.06
MEAN	6.83	6.02

Figure 3: Hourly pH (pH units) level (m) values at Joan Brook and Elross Creek RTWQ Stations.

The water pH statistics for the Joan Brook and Elross Creek provide valuable insight into the acidity or alkalinity levels of the river water during the monitoring period.

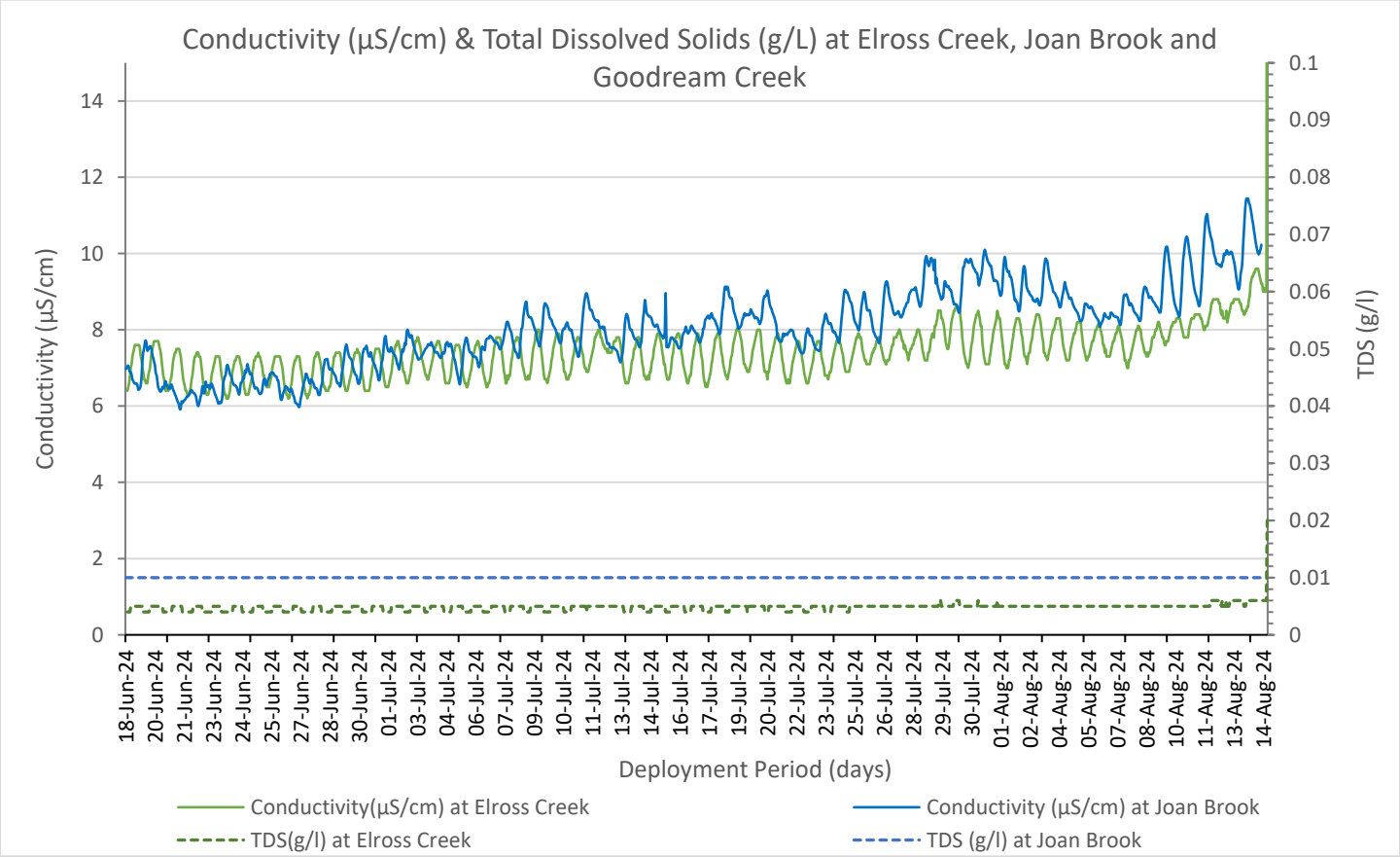
The pH at Joan Brook ranges from a minimum of 6.66 to a maximum of 7.01, with a median of 6.82 and a mean of 6.83. This indicates that the water at Joan Brook is mostly neutral, occasionally leaning slightly acidic. The graph shows relatively small daily fluctuations around this neutral pH, with minimal deviation. The slight oscillations in the pH data suggest natural diurnal cycles, where the pH rises during daylight due to photosynthesis (which removes CO2 from the water, increasing pH) and drops slightly at night due to respiration. Joan Brook maintains a stable pH close to neutral (around 6.8–6.9) over the entire deployment period. This suggests a well-buffered system, possibly influenced by the stream's surrounding geology or minimal organic input that would otherwise cause acidity. The slight increasing trend observed to start in mid-July may be the result of decreasing stage as seen in Figure 7.

Elross Creek's pH fluctuates between a minimum of 5.7 and a maximum of 6.19, with a median of 6.06 and a mean of 6.02. These values indicate that the water at Elross Creek is consistently slightly acidic. The data for Elross Creek shows a more pronounced diurnal fluctuations compared to Joan Brook, but the overall trend remains stable within the slightly acidic range. The dip in pH during early August reflect natural changes, possibly linked to decreased rainfall, hence lower stage or organic input that temporarily increases the acidity. Elross Creek exhibits more variability than Joan Brook, with occasional dips below 6.0, indicating it is more sensitive to environmental factors such as runoff, water flow changes, or biological activity.

pH values for Joan Brook were above the CCME Protection of Aquatic Life minimum pH guideline of 6.5 units and below the maximum pH CCME Protection of Aquatic Life guideline (horizontal dashed lines), however, Elross Creek pH remained consistently below the minimum guideline. It must be noted that this correlates with historical baseline pH at this location and that these are national guidelines and do not reflect the peculiarities of Newfoundland and Labrador geology. This guideline provides a basis for the overall health of the waterbody. Other pH reducing influences include lower water temperatures and the addition of more acidic rainwater and/or runoff during precipitation events.

Specific Conductivity & Total Dissolved Solids

Conductivity relates to the ease of passing an electric charge – or resistance – through a solution. Conductivity is highly influenced by the concentration of dissolved ions in solution: distilled water has zero conductivity (infinite resistance) while salty solutions have high conductivity (low resistance). Specific Conductivity is corrected to 25°C to allow comparison across variable temperatures. Monitoring specific conductivity is crucial for assessing water quality, identifying potential sources of contamination, and ensuring the health of aquatic ecosystems. Deviations from expected conductivity levels may signal the need for further investigation and management actions to maintain water quality and ecosystem integrity.



Variable	JOAN BROOK		ELROSS CREEK	
	SP. COND	**TDS**	**SP. COND**	**TDS**
MAX	11.44	0.010	31.3	0.02
MIN	5.91	0.010	6.2	0.004
MEDIAN	8.04	0.010	7.4	0.005
MEAN	8.06	0.010	7.43	0.005

Figure 4: Hourly Specific conductivity (µS/cm), and TDS (g/mL) values at Joan Brook and Elross Creek RTWQ Stations.

The provided data in Figure 4 outlines conductivity measurements from June to August. For Joan Brook, the data reveals relatively stable specific conductivity with a mean of 8.06 µS/cm and 8.04 µS/cm median, indicating consistency within the data set. A minimum specific conductance of 5.91 µS/cm and maximum of 11.44 µS/cm was observed and low detectable total dissolved solids throughout the monitoring period at 0.010 g/L.

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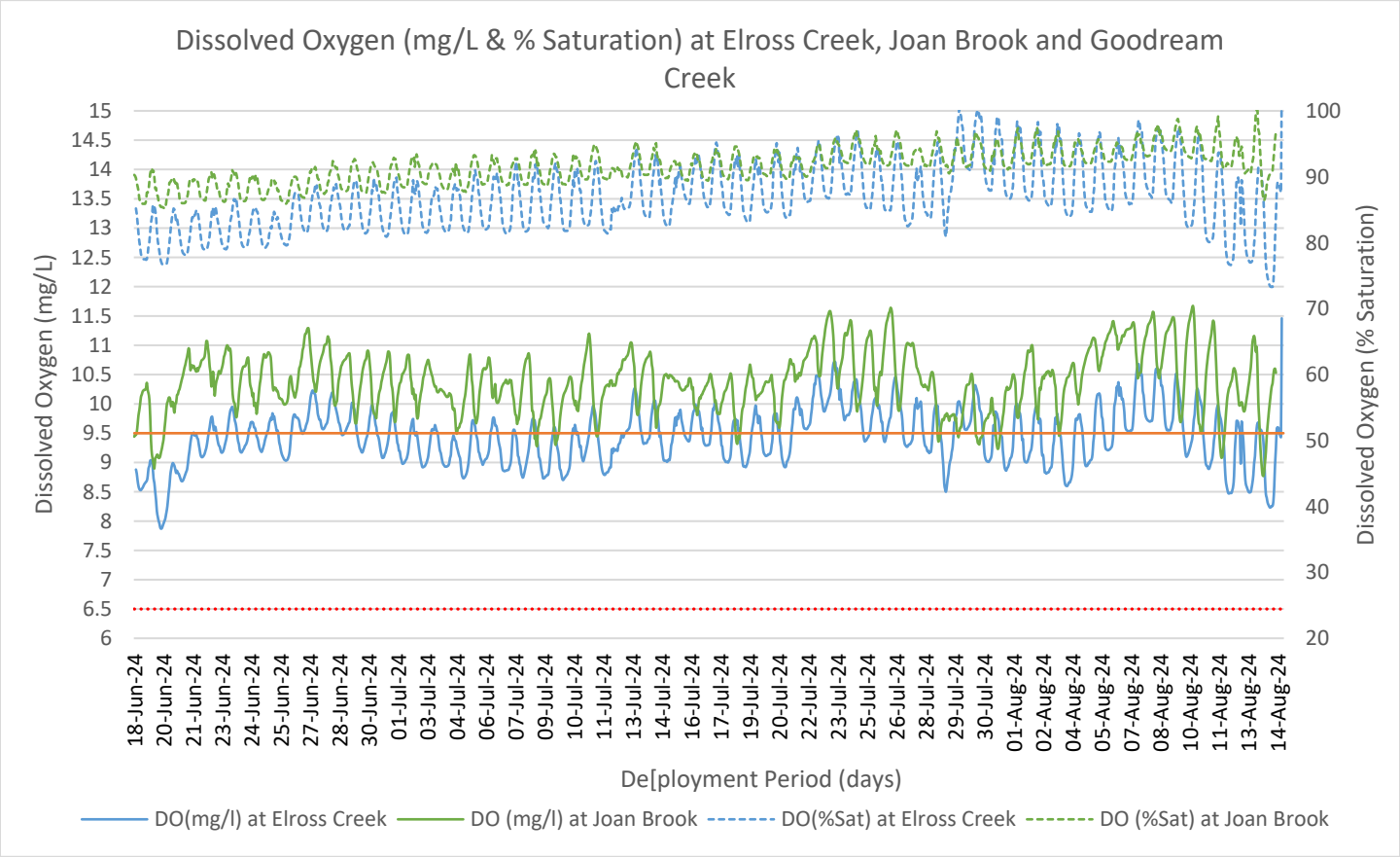
Elross Creek exhibits higher specific conductance yet slightly lower TDS values compared to Joan Brook, with a range in specific conductance of 6.2 to 31.3 µS/cm and mean TDS of 0.005 g/L. These values indicate slightly higher levels of dissolved ions and minerals compared to Joan Brook, possibly influenced by local geological conditions.

As summer progressed, specific conductivity in both waterbodies increased due to evaporation, lower water levels, and natural geochemical processes. Higher temperatures cause more evaporation, concentrating dissolved ions like calcium and sodium. In June, higher water levels allow for better dilution of these ions due to spring runoff, but as water levels drop by July and August, the reduced flow limits this capacity. Additionally, as water levels recede, the water interacts more with surrounding rocks and sediments, releasing more minerals. These combined factors result in rising specific conductivity as water becomes more concentrated with dissolved substances as observed by the continuous increasing conductivity trend in both Joan Brook and Elross Creek.

Significant diurnal fluctuations observed at all stations are characteristic of shallow water streams and ponds, where the water responds swiftly to changes in ambient air temperatures. This disparity likely stems from various factors including differences in water depth, flow dynamics, and surrounding vegetation cover, all of which can impact the rate of temperature change within the water body.

Dissolved Oxygen

Dissolved oxygen is a metabolic requirement of aquatic plants and animals. The concentration of oxygen in water depends on many factors, especially temperature – the saturation of oxygen in water is inversely proportional to water temperature. Oxygen concentrations also tend to be higher in flowing water compared to still, lake environments. Low oxygen concentrations can give an indication of excessive decomposition of organic matter or the presence of oxidizing materials.



Variable	JOAN BROOK		ELROSS CREEK	
	mg/L	**%Sat**	**mg/L**	**% Sat**
MAX	11.67	100.2	10.72	100.1
MIN	8.77	85.2	7.87	73.3
MEDIAN	10.37	91.7	9.47	86.8
MEAN	10.38	91.6	9.44	86.5

Figure 5: Dissolved Oxygen (mg/L & Percent Saturation) values at Joan Brook and Elross Creek RTWQ Stations.

The statistical data for dissolved oxygen (DO) concentrations (mg/L) and percent saturation (% Sat) offers valuable insights into the water quality dynamics of each freshwater river within the monitoring period. Data collected for Joan Brook from June to August reveals a wide range of DO concentrations, with a maximum of 11.67 mg/L (100.2%) and a minimum of 8.77 mg/L (85.2%), indicating variability in oxygen levels. Despite this variability, the median and mean DO concentrations of 10.38 mg/L (91.6%) and 10.37 mg/L (91.7%), respectively, suggest relatively stable oxygen levels on average.

Conversely, Elross Creek exhibits lower DO concentrations with a wider range compared to Joan Brook with a maximum of 11.46 mg/L (100.1%) and a minimum of 7.87 mg/L (73.3%). The median and mean DO concentrations of 9.47 mg/L (86.8%) and 9.44 mg/L (86.5%) respectively, indicate consistent oxygen levels overall.

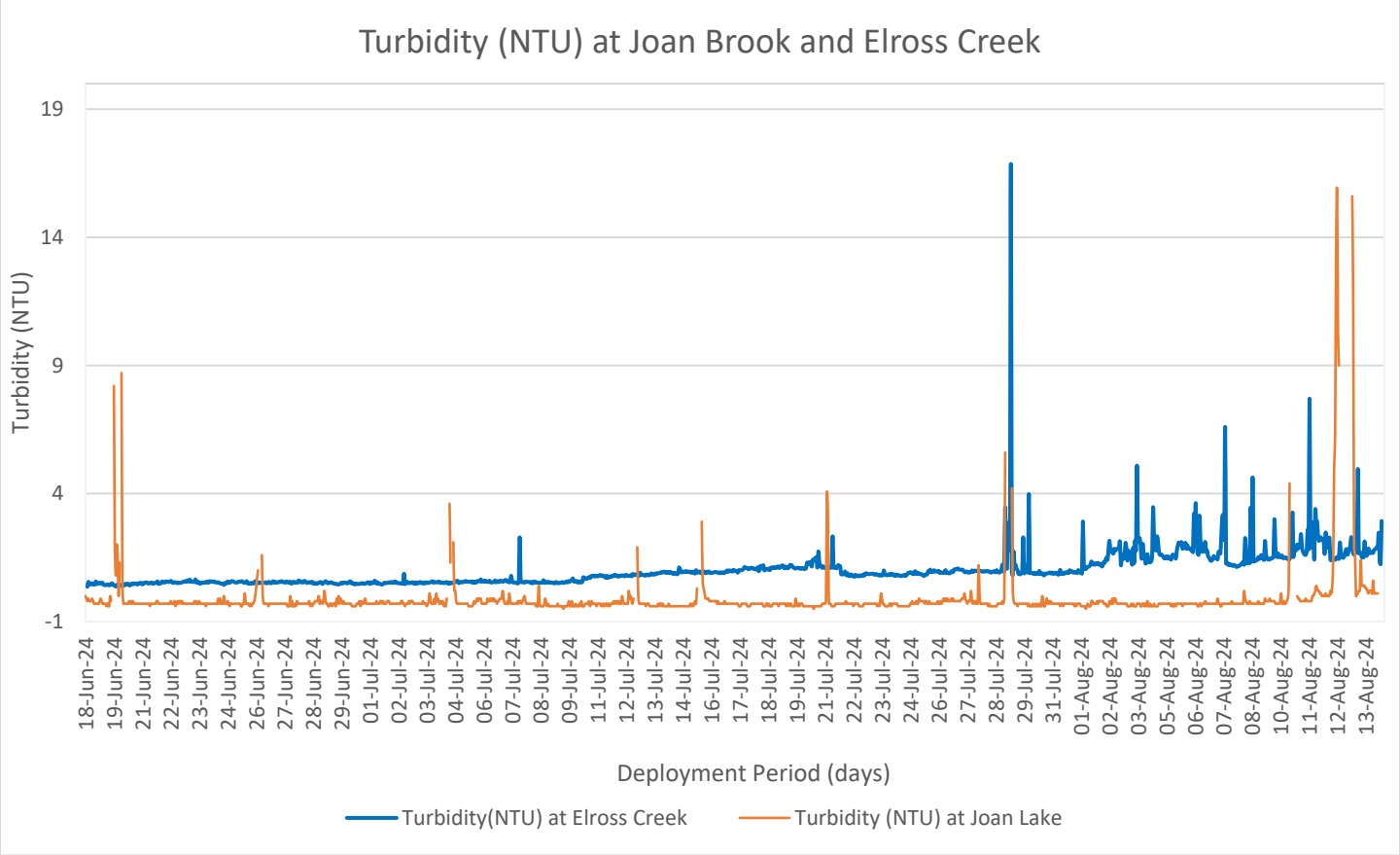
The observed increase in dissolved oxygen percent saturation (DO%) levels from June to August. Although warmer water temperatures typically reduce oxygen solubility, it also increases photosynthesis by aquatic plants and algae during the summer months compensates for this, as longer days and more sunlight boost their oxygen production. Additionally, lower water levels often lead to reduced turbidity, allowing more sunlight to penetrate and enhance photosynthetic activity. With decreased water levels, wind can also more effectively mix the water, promoting surface aeration and increasing DO. Furthermore, in shallower water bodies, reduced stratification means that mixing throughout the water column helps maintain higher oxygen levels. Overall, these factors collectively contribute to the observed increase in dissolved oxygen during the summer despite lower water levels.

Dissolved oxygen level remained consistently above the Canadian Council of Ministers of the Environment (CCME) Guideline for the Protection of the Other Life Stages (6.5 mg/L), and at or above the CCME guideline of 9.5 mg/l for the protection of early life stages for coldwater biota for most of the deployment period.

A diurnal variation pattern was evident. The extent of this variation is linked to the daily range of water temperature, duration of daylight, and fluctuations in rates of photosynthesis and respiration. Consequently, the observed attenuation of the diurnal pattern is expected, given the decrease in aquatic biotic activity, and narrowing daily temperature ranges during the early to late summer season.

Turbidity

Water turbidity is characterized by the cloudiness or haziness caused by suspended particles and can significantly impact water quality. High turbidity reduces light penetration, hindering photosynthesis and affecting aquatic vegetation growth and habitat suitability. It can lead to temperature fluctuations, oxygen depletion from microbial decomposition of organic matter, and sedimentation, smothering benthic habitats and compromising biodiversity. Turbidity can also transport nutrients and pollutants, contributing to eutrophication, algal blooms, and contamination of drinking water sources. Furthermore, it highlights the significance of monitoring and managing turbidity levels to uphold the health and functionality of aquatic ecosystems.



Variable	JOAN BROOK	ELROSS CREEK
MAX	15.9	16.86
MIN	-0.5	0.36
MEDIAN	-0.3	0.87
MEAN	-0.14	1.0

Figure 6: Hourly turbidity (NTU) and stage (m) statistical values at Joan Brook and Elross Creek RTWQ Stations.

The provided turbidity data in Figure 6, for Joan Lake and Elross Creek across the months of June to August, illustrates varying levels of water clarity in these freshwater bodies.

Throughout the observation period, both locations consistently registered minimal turbidity, with some sporadic instances of elevated readings, particularly in late July and August. Joan Lake recorded the lowest maximum turbidity value of 15.9 NTU on July 29, indicating a temporary increase in suspended particles, most likely due to the precipitation event where

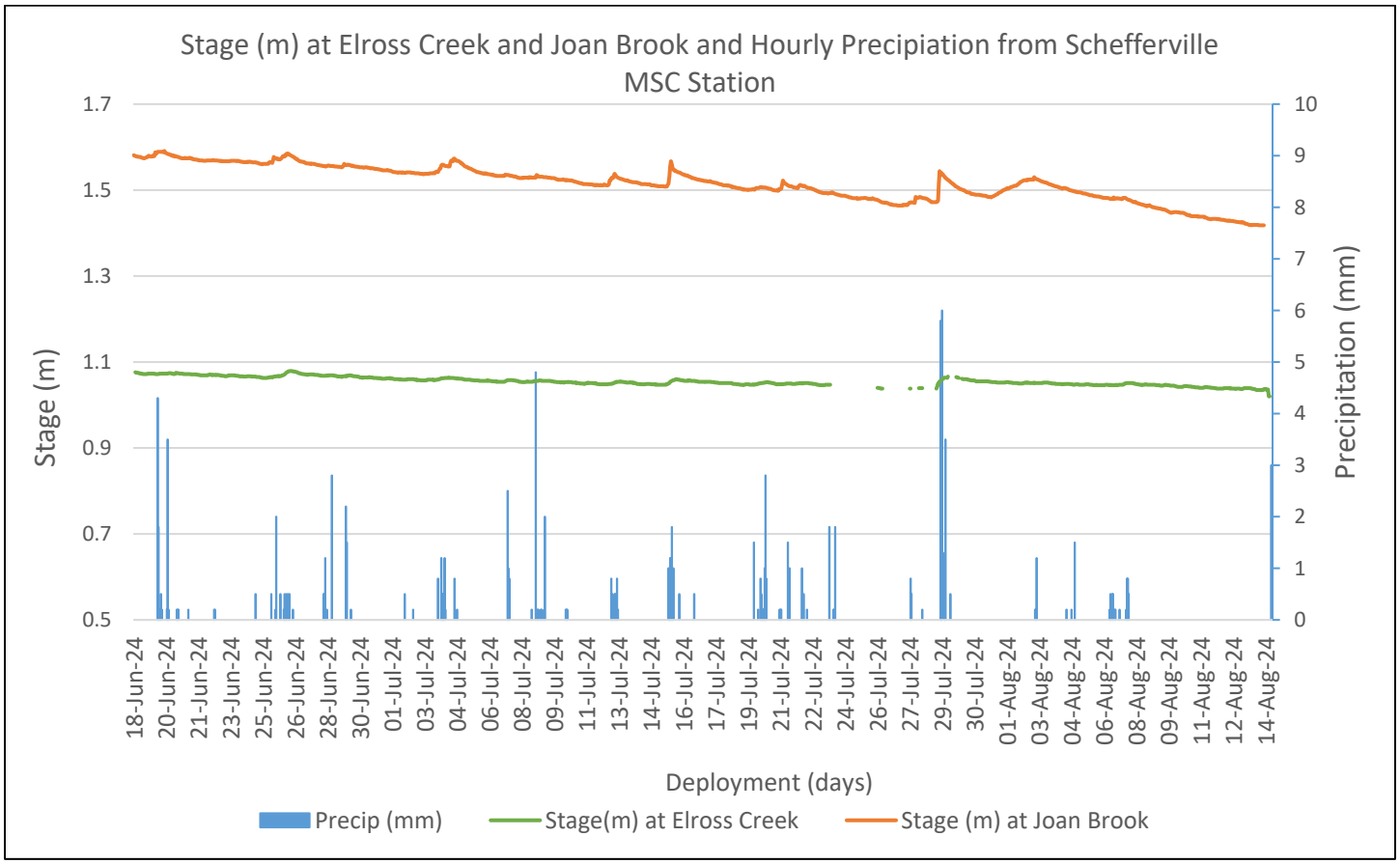
11.3mm of rainfall was received. Elross Creek showed higher turbidity levels, with maximum readings of 16.86 NTU. Despite variations in maximum turbidity levels, both Joan Brook and Elross Creek consistently record minimum and median turbidity readings of less than 1.0 NTU, suggesting periods of relatively clear water. The mean turbidity values, however, show slight differences, with Joan Brook having the lowest mean turbidity of -0.14 NTU, followed by Elross Creek at 1.0 NTU. These variations may be indicative of differences in sedimentation rates, flow dynamics, or land use practices within each waterbody. A slight increase in baseline turbidity is observed for both waterbodies post the July 29th precipitation event. This is likely due to the build up of sediments or organic matter within the sonde casing or biofouling of the sensor.

Negative turbidity values are most likely to happen when measuring low-level turbidity. Natural variations in all measurements, instrument, and non-instrument related, can lead to a negative result. Some other turbidimeters are designed to round up a negative number to 0.00 NTU, since a result less than 0.00 NTU is theoretically impossible. However, in practice, these results are actually quite meaningful. The problem could be operator technique or sonde error. It could also indicate a problem with the low turbidity/turbidity -free water used for a blank or a problem with calibration. If the meter rounds the negative result to 0.00 NTU, the user will not be alerted to the potential problem.

Overall, despite occasional fluctuations, the turbidity levels remained relatively low across all locations, suggesting good water quality conditions in these freshwater ecosystems during the observation period. Ongoing monitoring and further investigation into the factors influencing turbidity spikes are essential to ensure the continued health and sustainability of these water bodies.

Stage and Precipitation

Stage values are determined by a vertical reference and serves as an approximation of the water level at the monitoring station. In addition, stage plays a vital role in understanding various environmental parameters like specific conductivity, dissolved oxygen (DO), and turbidity. It typically rises in response to rainfall events, reflecting the influx of water into the river system. However, during snowfall, the increase in stage may not be as pronounced due to factors such as snow accumulation, which takes time to melt and contribute significantly to the water level. By tracking stage variations, we gain valuable insights into the impact of precipitation on river dynamics, helping us assess water quantity, quality, and potential environmental implications.



Variable	JOAN BROOK	ELROSS CREEK
MAX	1.591	1.079
MIN	1.418	1.02
MEAN	1.1516	1.053
MEDIAN	1.1515	1.055

Figure 7: Hourly stage (m) values recorded at Joan Brook and Elross Creek and daily total precipitation (mm) from Schefferville A climate station.

The provided data in Figure 9, offers insights into the stage measurements of two freshwater rivers, Joan Brook and Elross Creek, within the TATA mine site. Both waterbodies appear to maintain relatively consistent measurements, as indicated by its mean and median values being closely clustered together. This suggests minimal variability or outliers within the data set.

The stage data for Joan Brook shows a maximum value of 1.591, a minimum of 1.418, a mean of 1.1516, and a median of 1.1515. This indicates a relatively stable water stage with only minor fluctuations. The maximum stage is notably higher than the mean and median, suggesting occasional peaks in water levels that exceed typical conditions. The close alignment of the mean and median values implies that the distribution of the stage data is fairly symmetrical, with few extreme outliers influencing the overall trend. The variation in the stage values, while present, does not suggest any dramatic changes in water levels.

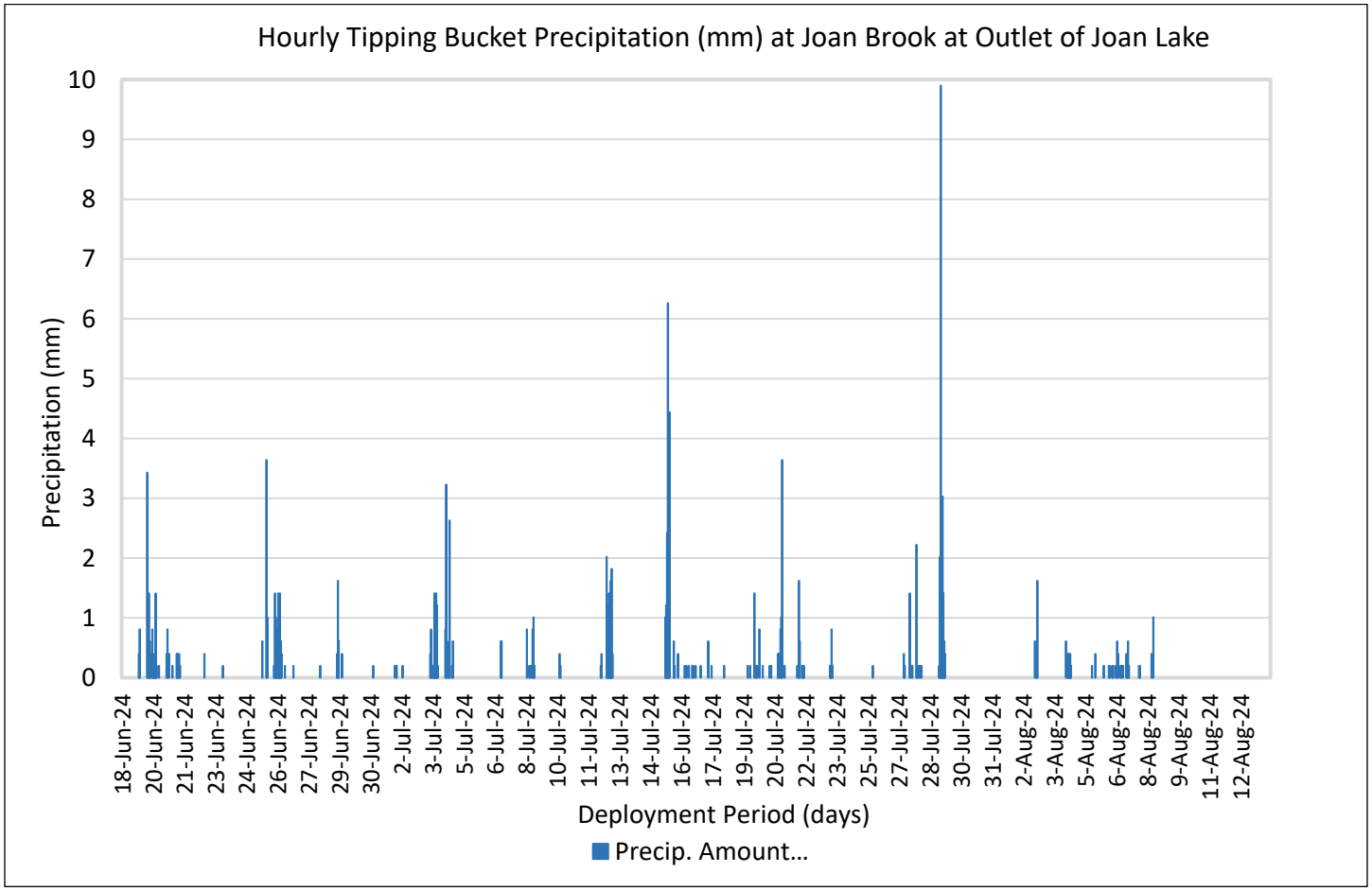
For Elross Creek, the stage data includes a maximum of 1.079, a minimum of 1.02, a mean of 1.053, and a median of 1.055. The maximum value is relatively close to the mean and median, indicating a fairly consistent water stage with minor fluctuations. The small difference between the maximum and minimum values suggests that the water levels in Elross Creek remain relatively stable with limited variation. Both the mean and median are close to each other, reinforcing the idea of a uniform distribution of data without significant outliers or deviations. Overall, Elross Creek exhibits a more stable and less variable water stage compared to Joan Brook.

As mentioned previously, while WSC oversees the hydrometric component of these stations, due to differences in protocols, quality control for WSC hydrometric data occurs less frequently than for water quality data. The hydrometric data presented in this report is provisional and has not undergone quality control checks. Accurate hydrometric data can be accessed at https://wateroffice.ec.gc.ca/ or by request to Water Survey Canada.

Tipping Bucket Precipitation

In 2023, a tipping bucket precipitation gauge was installed at Joan Brook, located at the outlet of Joan Lake, to enhance the monitoring of precipitation in the region. This site was selected due to its strategic location within the watershed, where precipitation plays a critical role in influencing water levels and flow patterns downstream. However, the gauge was not connected to telemetry until 2024, which marked a significant step forward in real-time data acquisition and monitoring capabilities.

Precipitation monitoring is crucial for understanding hydrological processes, forecasting floods, managing water resources, and studying the impacts of climate change. The installation of the tipping bucket precipitation gauge at Joan Brook supports these efforts by providing accurate, time-sensitive data on rainfall amounts and intensity.



Variable	**JOAN BROOK**
MAX	9.9
MIN	0.0
MEAN	0.0983
MEDIAN	0

Figure 9: Hourly precipitation (mm) values recorded at Joan Brook and Elross Creek from Tipping Bucket Precipitation Gauge.

The precipitation data from the tipping bucket gauge at Joan Brook reveals notable patterns in rainfall variability and frequency. The maximum recorded precipitation of 9.9 mm on July 29th, indicates that the heaviest rainfall during the monitoring period was moderate. However, both the mean precipitation (0.0983 mm) and the median precipitation (0 mm) suggest that rainfall was infrequent, with many days recording no measurable precipitation at all.

The median value of 0 mm is particularly indicative of many dry days, or days with negligible rainfall, which significantly influences the overall distribution of precipitation events. The low mean value further reinforces the fact that while there were occasional rainfall occurrences, they were generally light. Only a few instances of heavier rainfall were recorded, as indicated by the maximum precipitation.

This pattern is important for understanding the hydrological dynamics at Joan Brook. Frequent dry days punctuated by occasional moderate rainfall events suggest that water flow and levels in the brook are likely to be highly variable, conducive to drought as observed at the end of this deployment period.

APPENDIX A: QA/QC GRAB SAMPLE FIELD RESULTS

Your P.O. #: 220028978-13
Site Location: TATA MINE SITE
Your C.O.C. #: N/A

Attention: Robert Richard Harvey

NL Department of Environment, Climate Change and Municipalities
Water Resources
PO Box 8700
St. John's, NL
CANADA A1B 4J6

Report Date: 2024/07/16
Report #: R8236036
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4J9546
Received: 2024/07/02, 08:52

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2024/07/10	ATL SOP 00142	SM 24 2320 B
Alkalinity	2	N/A	2024/07/11	ATL SOP 00142	SM 24 2320 B
Anions (1)	2	N/A	2024/07/04	CAM SOP-00435	SM 23 4110 B m
Anions (1)	1	N/A	2024/07/05	CAM SOP-00435	SM 23 4110 B m
Colour	2	N/A	2024/07/10	ATL SOP 00020	SM 24 2120C m
Colour	1	N/A	2024/07/15	ATL SOP 00020	SM 24 2120C m
Organic carbon - Diss (DOC) (2)	3	N/A	2024/07/10	ATL SOP 00203	SM 24 5310B m
Conductance - water	1	N/A	2024/07/10	ATL SOP 00004	SM 24 2510B m
Conductance - water	1	N/A	2024/07/11	ATL SOP 00004	SM 24 2510B m
Conductance - water	1	N/A	2024/07/15	ATL SOP 00004	SM 24 2510B m
Fluoride	1	N/A	2024/07/10	ATL SOP 00043	SM 24 4500-F- C m
Fluoride	2	N/A	2024/07/11	ATL SOP 00043	SM 24 4500-F- C m
Hardness (calculated as CaCO3)	3	N/A	2024/07/10	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL)	3	2024/07/11	2024/07/12	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Total MS	1	2024/07/10	2024/07/10	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS	2	2024/07/09	2024/07/09	ATL SOP 00058	EPA 6020B R2 m
Nitrogen Ammonia - water	3	N/A	2024/07/11	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	2	N/A	2024/07/10	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	1	N/A	2024/07/15	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	2	N/A	2024/07/10	ATL SOP 00017	SM 24 4500-NO2- B m
Nitrogen - Nitrite	1	N/A	2024/07/15	ATL SOP 00017	SM 24 4500-NO2- B m
Nitrogen - Nitrate (as N)	2	N/A	2024/07/11	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	1	N/A	2024/07/15	ATL SOP 00018	ASTM D3867-16
pH (3)	1	N/A	2024/07/10	ATL SOP 00003	SM 24 4500-H+ B m
pH (3)	2	N/A	2024/07/11	ATL SOP 00003	SM 24 4500-H+ B m
Calculated TDS (DW Pkg)	1	N/A	2024/07/11	N/A	Auto Calc
Calculated TDS (DW Pkg)	2	N/A	2024/07/12	N/A	Auto Calc
Total Kjeldahl Nitrogen in Water (1)	3	2024/07/05	2024/07/08	CAM SOP-00938	OMOE E3516 m
Organic carbon - Total (TOC) (2)	1	N/A	2024/07/03	ATL SOP 00203	SM 24 5310B m
Organic carbon - Total (TOC) (2)	2	N/A	2024/07/04	ATL SOP 00203	SM 24 5310B m
Total Phosphorus (Colourimetric) (1)	3	2024/07/05	2024/07/09	CAM SOP-00407	SM 24 4500-P I

Your P.O. #: 220028978-13
Site Location: TATA MINE SITE
Your C.O.C. #: N/A

Attention: Robert Richard Harvey

NL Department of Environment, Climate Change and Municipalities
Water Resources
PO Box 8700
St. John's, NL
CANADA A1B 4J6

Report Date: 2024/07/16
Report #: R8236036
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4J9546
Received: 2024/07/02, 08:52

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Suspended Solids	3	2024/07/03	2024/07/04	ATL SOP 00007	SM 24 2540D m
Turbidity	3	N/A	2024/07/15	ATL SOP 00011	EPA 180.1 R2 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) This test was performed by Bureau Veritas Mississauga, 6740 Campobello Rd , Mississauga, ON, L5N 2L8
(2) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.
(3) The APHA Standard Method requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Maryann Comeau, Customer Experience Supervisor/PM
Email: Maryann.COMEAU@bureauveritas.com
Phone# (902)420-0203 Ext:298

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK832 ELROSS CREEK BELOW PINETTE LAKE INFLOW								
Sampling Date 2024/06/18 15:16								
Matrix W								
Sample # 2024-1707-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	21	1.0	mg/L	N/A	2024/07/10		9489077
Nitrate (N)	-	0.15	0.050	mg/L	N/A	2024/07/15		9489079
Total dissolved solids (calc., EC)	-	24	1.0	mg/L	N/A	2024/07/12		9489083
Inorganics								
Conductivity	-	44	1.0	uS/cm	N/A	2024/07/11	LJV	9508580
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Sulphate (SO4)	-	2.6	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Total Alkalinity (Total as CaCO3)	-	18	2.0	mg/L	N/A	2024/07/11	LJV	9508586
Colour	-	ND	5.0	TCU	N/A	2024/07/15	EMT	9510724
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/11	LJV	9508587
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/05	2024/07/08	KJP	9497463
Nitrate + Nitrite (N)	-	0.15	0.050	mg/L	N/A	2024/07/15	EMT	9510735
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/15	MCN	9510743
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/11	MCN	9507879
Dissolved Organic Carbon (C)	-	0.63	0.50	mg/L	N/A	2024/07/10	MKY	9504862
Total Organic Carbon (C)	-	0.79	0.50	mg/L	N/A	2024/07/04	MKY	9491403
pH	-	7.43		pH	N/A	2024/07/11	LJV	9508568
Total Phosphorus	-	ND	0.004	mg/L	2024/07/05	2024/07/09	VKH	9497484
Total Suspended Solids	-	ND	1.0	mg/L	2024/07/03	2024/07/04	DME	9491508
Turbidity	-	0.18	0.10	NTU	N/A	2024/07/15	LJV	9514232
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/11	2024/07/12	JEP	9507984
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.0051	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Barium (Ba)	-	0.0033	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Boron (B)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Calcium (Ca)	-	3.9	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Magnesium (Mg)	-	2.9	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK832 ELROSS CREEK BELOW PINETTE LAKE INFLOW								
Sampling Date 2024/06/18 15:16								
Matrix W								
Sample # 2024-1707-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Manganese (Mn)	-	0.0041	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Potassium (K)	-	0.36	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Sodium (Na)	-	0.65	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Strontium (Sr)	-	0.0063	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK833 GOODREAM CREEK ABOVE TRIANGLE LAKE								
Sampling Date 2024/06/18 17:25								
Matrix W								
Sample # 2024-1708-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	2.0	1.0	mg/L	N/A	2024/07/10		9489077
Nitrate (N)	-	ND	0.050	mg/L	N/A	2024/07/11		9489079
Total dissolved solids (calc., EC)	-	4.2	1.0	mg/L	N/A	2024/07/12		9489083
Inorganics								
Conductivity	-	7.6	1.0	uS/cm	N/A	2024/07/15	M2C	9510729
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Total Alkalinity (Total as CaCO3)	-	2.4	2.0	mg/L	N/A	2024/07/11	LJV	9508586
Colour	-	10	5.0	TCU	N/A	2024/07/10	EMT	9504843
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/11	LJV	9508587
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/05	2024/07/08	KJP	9497463
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2024/07/10	EMT	9504844
Nitrite (N)	-	0.016	0.010	mg/L	N/A	2024/07/10	EMT	9504845
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/11	MCN	9507881
Dissolved Organic Carbon (C)	-	1.3	0.50	mg/L	N/A	2024/07/10	MKY	9503143
Total Organic Carbon (C)	-	1.6	0.50	mg/L	N/A	2024/07/03	MKY	9491386
pH	-	6.51		pH	N/A	2024/07/11	LJV	9508568
Total Phosphorus	-	ND	0.004	mg/L	2024/07/05	2024/07/09	VKH	9497484
Total Suspended Solids	-	6.8	1.0	mg/L	2024/07/03	2024/07/04	DME	9491508
Turbidity	-	1.4	0.10	NTU	N/A	2024/07/15	LJV	9514222
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/11	2024/07/12	JEP	9507984
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.020	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Barium (Ba)	-	0.0011	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Boron (B)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Calcium (Ca)	-	0.37	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Magnesium (Mg)	-	0.27	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK833 GOODREAM CREEK ABOVE TRIANGLE LAKE								
Sampling Date 2024/06/18 17:25								
Matrix W								
Sample # 2024-1708-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Manganese (Mn)	-	0.0020	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Potassium (K)	-	ND	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Sodium (Na)	-	0.55	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Strontium (Sr)	-	0.0022	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK834 JOAN BROOK @ OUTLET OF JOAN LAKE								
Sampling Date 2024/06/18 10:24								
Matrix W								
Sample # 2024-1709-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	3.6	1.0	mg/L	N/A	2024/07/10		9489077
Nitrate (N)	-	0.065	0.050	mg/L	N/A	2024/07/11		9489079
Total dissolved solids (calc., EC)	-	5.3	1.0	mg/L	N/A	2024/07/11		9489083
Inorganics								
Conductivity	-	9.6	1.0	uS/cm	N/A	2024/07/10	LJV	9504869
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/05	LKH	9495951
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/05	LKH	9495951
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2024/07/05	LKH	9495951
Total Alkalinity (Total as CaCO3)	-	4.4	2.0	mg/L	N/A	2024/07/10	LJV	9504870
Colour	-	ND	5.0	TCU	N/A	2024/07/10	EMT	9504843
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/10	LJV	9504871
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/05	2024/07/08	KJP	9497463
Nitrate + Nitrite (N)	-	0.065	0.050	mg/L	N/A	2024/07/10	EMT	9504844
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/10	EMT	9504845
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/11	MCN	9507881
Dissolved Organic Carbon (C)	-	0.54	0.50	mg/L	N/A	2024/07/10	MKY	9504862
Total Organic Carbon (C)	-	0.51	0.50	mg/L	N/A	2024/07/04	MKY	9491403
pH	-	6.82		pH	N/A	2024/07/10	LJV	9504868
Total Phosphorus	-	ND	0.004	mg/L	2024/07/05	2024/07/09	VKH	9497484
Total Suspended Solids	-	ND	1.0	mg/L	2024/07/03	2024/07/04	DME	9491508
Turbidity	-	0.23	0.10	NTU	N/A	2024/07/15	LJV	9514232
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/11	2024/07/12	JEP	9507984
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Aluminum (Al)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Barium (Ba)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Barium (Ba)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Boron (B)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Boron (B)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/10	2024/07/10	MTZ	9504873

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK834 JOAN BROOK @ OUTLET OF JOAN LAKE								
Sampling Date 2024/06/18 10:24								
Matrix W								
Sample # 2024-1709-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Calcium (Ca)	-	0.68	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Calcium (Ca)	-	0.68	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Magnesium (Mg)	-	0.45	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Magnesium (Mg)	-	0.45	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Manganese (Mn)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Manganese (Mn)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Potassium (K)	-	0.12	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Potassium (K)	-	0.12	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Sodium (Na)	-	0.33	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Sodium (Na)	-	0.31	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Strontium (Sr)	-	0.0028	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Strontium (Sr)	-	0.0030	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873

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GENERAL COMMENTS

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

Package 1	6.0°C

Samples received and analyzed past the 7 day recommended holding time for TSS.

Sample ZPK833 [GOODREAM CREEK ABOVE TRIANGLE LAKE] : NOX < NO2 : Both values fall within the method uncertainty for duplicates and are likely equivalent.

Results relate only to the items tested.

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

Janah Rhyno, Scientific Specialist

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Your P.O. #: 220028978-13
Site Location: TATA MINE SITE
Your C.O.C. #: N/A

Attention: Robert Richard Harvey

NL Department of Environment, Climate Change and Municipalities
Water Resources
PO Box 8700
St. John's, NL
CANADA A1B 4J6

Report Date: 2024/07/16
Report #: R8236036
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4J9546
Received: 2024/07/02, 08:52

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2024/07/10	ATL SOP 00142	SM 24 2320 B
Alkalinity	2	N/A	2024/07/11	ATL SOP 00142	SM 24 2320 B
Anions (1)	2	N/A	2024/07/04	CAM SOP-00435	SM 23 4110 B m
Anions (1)	1	N/A	2024/07/05	CAM SOP-00435	SM 23 4110 B m
Colour	2	N/A	2024/07/10	ATL SOP 00020	SM 24 2120C m
Colour	1	N/A	2024/07/15	ATL SOP 00020	SM 24 2120C m
Organic carbon - Diss (DOC) (2)	3	N/A	2024/07/10	ATL SOP 00203	SM 24 5310B m
Conductance - water	1	N/A	2024/07/10	ATL SOP 00004	SM 24 2510B m
Conductance - water	1	N/A	2024/07/11	ATL SOP 00004	SM 24 2510B m
Conductance - water	1	N/A	2024/07/15	ATL SOP 00004	SM 24 2510B m
Fluoride	1	N/A	2024/07/10	ATL SOP 00043	SM 24 4500-F- C m
Fluoride	2	N/A	2024/07/11	ATL SOP 00043	SM 24 4500-F- C m
Hardness (calculated as CaCO3)	3	N/A	2024/07/10	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL)	3	2024/07/11	2024/07/12	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Total MS	1	2024/07/10	2024/07/10	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS	2	2024/07/09	2024/07/09	ATL SOP 00058	EPA 6020B R2 m
Nitrogen Ammonia - water	3	N/A	2024/07/11	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	2	N/A	2024/07/10	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	1	N/A	2024/07/15	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	2	N/A	2024/07/10	ATL SOP 00017	SM 24 4500-NO2- B m
Nitrogen - Nitrite	1	N/A	2024/07/15	ATL SOP 00017	SM 24 4500-NO2- B m
Nitrogen - Nitrate (as N)	2	N/A	2024/07/11	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	1	N/A	2024/07/15	ATL SOP 00018	ASTM D3867-16
pH (3)	1	N/A	2024/07/10	ATL SOP 00003	SM 24 4500-H+ B m
pH (3)	2	N/A	2024/07/11	ATL SOP 00003	SM 24 4500-H+ B m
Calculated TDS (DW Pkg)	1	N/A	2024/07/11	N/A	Auto Calc
Calculated TDS (DW Pkg)	2	N/A	2024/07/12	N/A	Auto Calc
Total Kjeldahl Nitrogen in Water (1)	3	2024/07/05	2024/07/08	CAM SOP-00938	OMOE E3516 m
Organic carbon - Total (TOC) (2)	1	N/A	2024/07/03	ATL SOP 00203	SM 24 5310B m
Organic carbon - Total (TOC) (2)	2	N/A	2024/07/04	ATL SOP 00203	SM 24 5310B m
Total Phosphorus (Colourimetric) (1)	3	2024/07/05	2024/07/09	CAM SOP-00407	SM 24 4500-P I

Your P.O. #: 220028978-13
Site Location: TATA MINE SITE
Your C.O.C. #: N/A

Attention: Robert Richard Harvey

NL Department of Environment, Climate Change and Municipalities
Water Resources
PO Box 8700
St. John's, NL
CANADA A1B 4J6

Report Date: 2024/07/16
Report #: R8236036
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4J9546
Received: 2024/07/02, 08:52

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Suspended Solids	3	2024/07/03	2024/07/04	ATL SOP 00007	SM 24 2540D m
Turbidity	3	N/A	2024/07/15	ATL SOP 00011	EPA 180.1 R2 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) This test was performed by Bureau Veritas Mississauga, 6740 Campobello Rd , Mississauga, ON, L5N 2L8
(2) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.
(3) The APHA Standard Method requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Maryann Comeau, Customer Experience Supervisor/PM
Email: Maryann.COMEAU@bureauveritas.com
Phone# (902)420-0203 Ext:298

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK832 ELROSS CREEK BELOW PINETTE LAKE INFLOW								
Sampling Date 2024/06/18 15:16								
Matrix W								
Sample # 2024-1707-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	21	1.0	mg/L	N/A	2024/07/10		9489077
Nitrate (N)	-	0.15	0.050	mg/L	N/A	2024/07/15		9489079
Total dissolved solids (calc., EC)	-	24	1.0	mg/L	N/A	2024/07/12		9489083
Inorganics								
Conductivity	-	44	1.0	uS/cm	N/A	2024/07/11	LJV	9508580
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Sulphate (SO4)	-	2.6	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Total Alkalinity (Total as CaCO3)	-	18	2.0	mg/L	N/A	2024/07/11	LJV	9508586
Colour	-	ND	5.0	TCU	N/A	2024/07/15	EMT	9510724
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/11	LJV	9508587
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/05	2024/07/08	KJP	9497463
Nitrate + Nitrite (N)	-	0.15	0.050	mg/L	N/A	2024/07/15	EMT	9510735
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/15	MCN	9510743
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/11	MCN	9507879
Dissolved Organic Carbon (C)	-	0.63	0.50	mg/L	N/A	2024/07/10	MKY	9504862
Total Organic Carbon (C)	-	0.79	0.50	mg/L	N/A	2024/07/04	MKY	9491403
pH	-	7.43		pH	N/A	2024/07/11	LJV	9508568
Total Phosphorus	-	ND	0.004	mg/L	2024/07/05	2024/07/09	VKH	9497484
Total Suspended Solids	-	ND	1.0	mg/L	2024/07/03	2024/07/04	DME	9491508
Turbidity	-	0.18	0.10	NTU	N/A	2024/07/15	LJV	9514232
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/11	2024/07/12	JEP	9507984
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.0051	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Barium (Ba)	-	0.0033	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Boron (B)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Calcium (Ca)	-	3.9	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Magnesium (Mg)	-	2.9	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK832 ELROSS CREEK BELOW PINETTE LAKE INFLOW								
Sampling Date 2024/06/18 15:16								
Matrix W								
Sample # 2024-1707-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Manganese (Mn)	-	0.0041	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Potassium (K)	-	0.36	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Sodium (Na)	-	0.65	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Strontium (Sr)	-	0.0063	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK833 GOODREAM CREEK ABOVE TRIANGLE LAKE								
Sampling Date 2024/06/18 17:25								
Matrix W								
Sample # 2024-1708-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	2.0	1.0	mg/L	N/A	2024/07/10		9489077
Nitrate (N)	-	ND	0.050	mg/L	N/A	2024/07/11		9489079
Total dissolved solids (calc., EC)	-	4.2	1.0	mg/L	N/A	2024/07/12		9489083
Inorganics								
Conductivity	-	7.6	1.0	uS/cm	N/A	2024/07/15	M2C	9510729
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2024/07/04	VP2	9495448
Total Alkalinity (Total as CaCO3)	-	2.4	2.0	mg/L	N/A	2024/07/11	LJV	9508586
Colour	-	10	5.0	TCU	N/A	2024/07/10	EMT	9504843
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/11	LJV	9508587
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/05	2024/07/08	KJP	9497463
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2024/07/10	EMT	9504844
Nitrite (N)	-	0.016	0.010	mg/L	N/A	2024/07/10	EMT	9504845
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/11	MCN	9507881
Dissolved Organic Carbon (C)	-	1.3	0.50	mg/L	N/A	2024/07/10	MKY	9503143
Total Organic Carbon (C)	-	1.6	0.50	mg/L	N/A	2024/07/03	MKY	9491386
pH	-	6.51		pH	N/A	2024/07/11	LJV	9508568
Total Phosphorus	-	ND	0.004	mg/L	2024/07/05	2024/07/09	VKH	9497484
Total Suspended Solids	-	6.8	1.0	mg/L	2024/07/03	2024/07/04	DME	9491508
Turbidity	-	1.4	0.10	NTU	N/A	2024/07/15	LJV	9514222
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/11	2024/07/12	JEP	9507984
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.020	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Barium (Ba)	-	0.0011	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Boron (B)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Calcium (Ca)	-	0.37	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Magnesium (Mg)	-	0.27	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK833 GOODREAM CREEK ABOVE TRIANGLE LAKE								
Sampling Date 2024/06/18 17:25								
Matrix W								
Sample # 2024-1708-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Manganese (Mn)	-	0.0020	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Potassium (K)	-	ND	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Sodium (Na)	-	0.55	0.10	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Strontium (Sr)	-	0.0022	0.0020	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/09	2024/07/09	MTZ	9502703
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/09	2024/07/09	MTZ	9502703

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK834 JOAN BROOK @ OUTLET OF JOAN LAKE								
Sampling Date 2024/06/18 10:24								
Matrix W								
Sample # 2024-1709-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	3.6	1.0	mg/L	N/A	2024/07/10		9489077
Nitrate (N)	-	0.065	0.050	mg/L	N/A	2024/07/11		9489079
Total dissolved solids (calc., EC)	-	5.3	1.0	mg/L	N/A	2024/07/11		9489083
Inorganics								
Conductivity	-	9.6	1.0	uS/cm	N/A	2024/07/10	LJV	9504869
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/05	LKH	9495951
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/05	LKH	9495951
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2024/07/05	LKH	9495951
Total Alkalinity (Total as CaCO3)	-	4.4	2.0	mg/L	N/A	2024/07/10	LJV	9504870
Colour	-	ND	5.0	TCU	N/A	2024/07/10	EMT	9504843
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/10	LJV	9504871
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/05	2024/07/08	KJP	9497463
Nitrate + Nitrite (N)	-	0.065	0.050	mg/L	N/A	2024/07/10	EMT	9504844
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/10	EMT	9504845
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/11	MCN	9507881
Dissolved Organic Carbon (C)	-	0.54	0.50	mg/L	N/A	2024/07/10	MKY	9504862
Total Organic Carbon (C)	-	0.51	0.50	mg/L	N/A	2024/07/04	MKY	9491403
pH	-	6.82		pH	N/A	2024/07/10	LJV	9504868
Total Phosphorus	-	ND	0.004	mg/L	2024/07/05	2024/07/09	VKH	9497484
Total Suspended Solids	-	ND	1.0	mg/L	2024/07/03	2024/07/04	DME	9491508
Turbidity	-	0.23	0.10	NTU	N/A	2024/07/15	LJV	9514232
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/11	2024/07/12	JEP	9507984
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Aluminum (Al)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Barium (Ba)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Barium (Ba)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Boron (B)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Boron (B)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/10	2024/07/10	MTZ	9504873

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZPK834 JOAN BROOK @ OUTLET OF JOAN LAKE								
Sampling Date 2024/06/18 10:24								
Matrix W								
Sample # 2024-1709-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Calcium (Ca)	-	0.68	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Calcium (Ca)	-	0.68	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Magnesium (Mg)	-	0.45	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Magnesium (Mg)	-	0.45	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Manganese (Mn)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Manganese (Mn)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Potassium (K)	-	0.12	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Potassium (K)	-	0.12	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Sodium (Na)	-	0.33	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Sodium (Na)	-	0.31	0.10	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Strontium (Sr)	-	0.0028	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Strontium (Sr)	-	0.0030	0.0020	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873
Dup.Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/10	2024/07/10	MTZ	9504873

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GENERAL COMMENTS

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

Package 1	6.0°C

Samples received and analyzed past the 7 day recommended holding time for TSS.

Sample ZPK833 [GOODREAM CREEK ABOVE TRIANGLE LAKE] : NOX < NO2 : Both values fall within the method uncertainty for duplicates and are likely equivalent.

Results relate only to the items tested.

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Bureau Veritas Job #: C4J9546
Report Date: 2024/07/16

NL Department of Environment, Climate Change and Municipalities
Site Location: TATA MINE SITE
Your P.O. #: 220028978-13
Sampler Initials: VH

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

Janah Rhyno, Scientific Specialist

Bureau Veritas 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 Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Suzanne Rogers, General Manager responsible for Nova Scotia Environmental laboratory operations.

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