Water Resources Audit Report

Arctic Gold and Silver

Water Science and Stewardship
December 2025

Preface

The Government of Yukon's Water Science and Stewardship (WSS) works together with various partners to foster a healthy relationship with Yukon's waters. As technical experts in water science, we provide advice for compliance and inspection purposes and conduct reviews of projects undergoing water licensing and environmental assessment processes.

One of WSS's responsibilities is to conduct investigations at various undertakings that use or deposit waste to water. These investigations, called audits, are undertaken to improve our knowledge and understanding of a project's effects on the receiving water environment. Through the audit process we aim to identify emerging issues and build enhanced understanding of water quality and quantity conditions to support input into assessment, licensing and post-licensing processes. The opinions and recommendations expressed in this report are based on relevant data, reports, field observations, interpretation/analyses of scientific information available to WSS and is subject to evolve as further information becomes available. While most of the findings are based on western science, we strive to recognize diverse ways of knowing and being and intend to create space to learn from both Indigenous and western perspectives side-by-side.

While WSS provides support to inspectors on enforcement and compliance matters related to water licences, it is not WSS's role to determine or enforce compliance. As such, the findings of this report should not be considered as a determination of compliance with any existing permit or licence.

Executive summary

The Arctic Gold and Silver abandoned mine site (AGS) is located four kilometres south of the community of Carcross on Montana Mountain on Carcross/Tagish First Nation (C/TFN) Category 'A' Settlement Land. Carcross/Tagish Management Corporation (C/TMC) is currently leading monitoring and assessment of the site. Water Science and Stewardship (WSS) conducted an audit of AGS in 2024.

The audit involved:

1. WSS supporting C/TMC staff in the collection of stable water isotope samples in July 2024;
2. WSS conducting a site visit in September 2024; and
3. WSS conducting desktop work to;
    a. summarize the site history and current status;
    b. assess the current site water monitoring regime to support future assessment and regulatory processes; and
    c. evaluate the potential impact of groundwater discharge to Tank Creek downstream of Unnamed Lake.

In samples collected by WSS in September 2024, Tank Creek contained total cadmium and iron at concentrations exceeding the guidelines of the *Canadian Council of Ministers of the Environment – Long Term Exposure*. The elevated cadmium and iron concentrations are attributed to groundwater discharge to Unnamed Lake and subsequent surface drainage from Unnamed Lake to Tank Creek.

Measurement of flows did not yield evidence that Tank Creek is a gaining stream immediately below Unnamed Lake, where previous studies show potentially impacted groundwater discharges to the creek. That said, there were significant challenges measuring flows in Tank Creek at the Unnamed Lake Outlet.

Chemical and isotopic analysis of samples collected from Tank Creek did not show that groundwater discharge downstream of Unnamed Lake was contributing a significant load of contaminants of concern to Tank Creek at the time of the sampling events.

WSS assessed the current site water monitoring regime and has the following recommendations to improve monitoring in support of future characterization, assessment and regulatory processes.

1. We understand a seasonal water level logger was installed at AGS-4 in 2025. This should be maintained in future years to continue collecting continuous water levels in order to develop a reliable rating curve. Flow measurements should continue year-round at this location to also characterize winter flows.

2. Flow measurements at station AGS-2C are not reliable due to inadequate reach characteristics for salt dilution gauging, where incomplete mixing potential within the short culvert length is followed by braided channels in dense vegetation, thus violating the measurement's method assumptions. WSS recommends shifting efforts on flow and water level monitoring at station AGS-4 instead, where surface flow is again contained in a single channel and provides better conditions to strive for reliable and accurate data collection.
3. Establishing a snow survey course in an open area representative of the tailings, to be operated for a maximum period of two years, would facilitate calculation of relationships with existing, continuous snow survey stations. This would be beneficial as it would enable estimation of snow loads across the tailings without direct measurement in the future.
4. Name the lake/pond adjacent to the tailings area and/or the larger lake to the west of the site. This report has referred to the water body adjacent to the mill site tailings as 'Unnamed Lake' in alignment with previous use; however, this is easily confused with the larger lake located west of the site (whose name we are unaware of).

WSS was unable to introduce C/TMC's field crew to the nationally standardized protocols of the Canadian Aquatic Biomonitoring Network (CABIN) and collaboratively develop a snapshot of the aquatic health of Tank Creek at the mouth. This objective was not fulfilled because WSS's capacity was unexpectedly and severely limited by our response to the June 24, 2024 Eagle Gold heap leach failure. WSS remains committed to supporting C/TMC and is able to offer CABIN training to their field staff. This will ensure that C/TMC is well-equipped to fulfill this objective next year, contributing to the long-term monitoring and assessment of Tank Creek's health.

1 Introduction

The Arctic Gold and Silver abandoned mine site is located four kilometres south of Carcross on Montana Mountain (known as Gopher Mountain to Carcross/Tagish First Nation (C/TFN)) at an elevation of 1,025 metres above sea level (masl; see Figure 1). The site is located on Category 'A' Settlement Land (Figure 1). Gopher Mountain holds great cultural significance for Carcross/Tagish First Nation (C/TFN) and has traditionally been used as a camp for hunting moose, trapping ground squirrels and collecting plant-based traditional foods and medicines (Patrick James personal communication as cited in Jacobs, 2018).

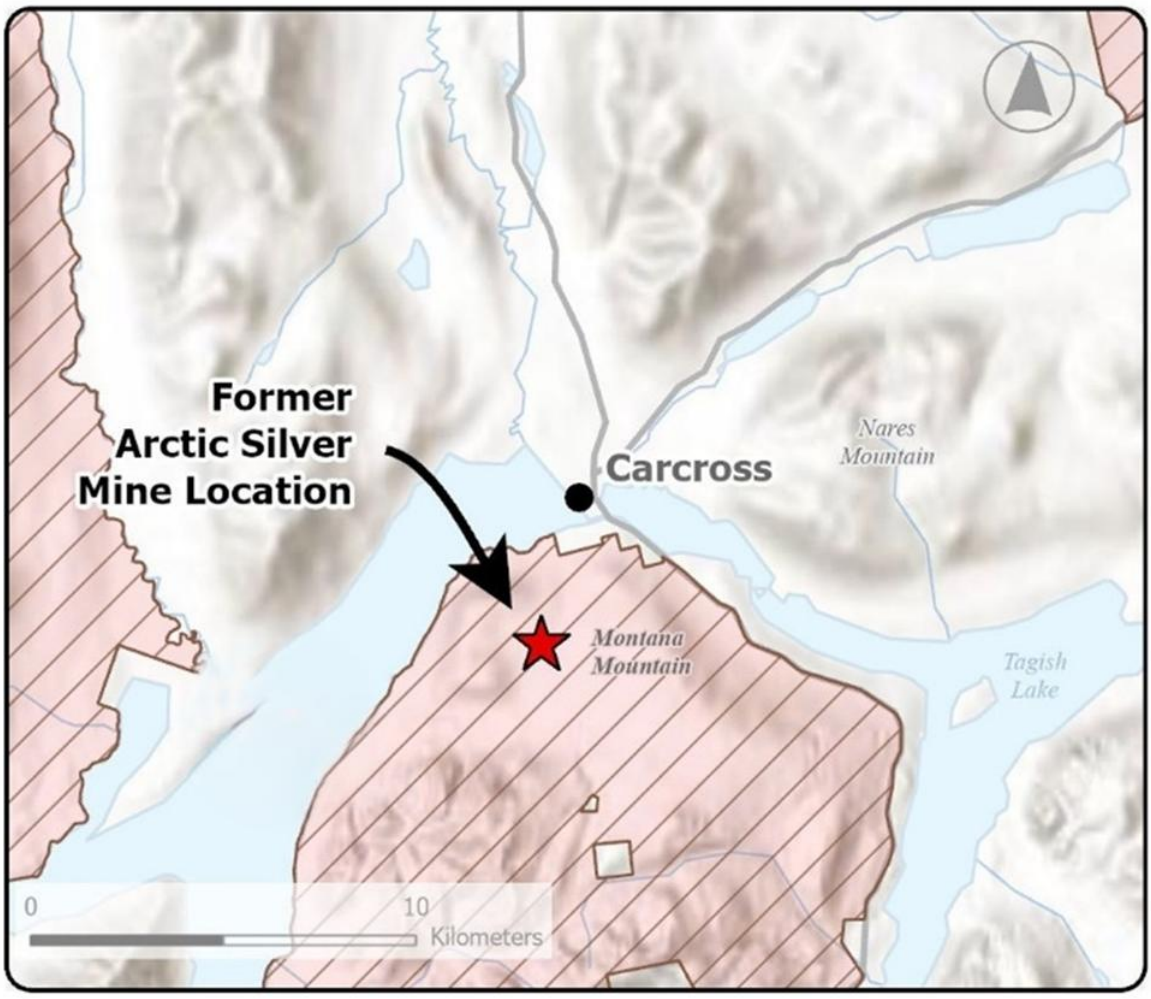

Figure 1: Site Location

Mining activities at the site occurred over a 4-year period from 1965 to 1969 (Jacobs 2019). Overall, 47,000 tonnes of ore were processed (Figure 2), creating over 23,000 m^3 of tailings before production ceased (EBA, 2011). The mine tailings are contained within a 1.8 ha impoundment referred to as the Tailings Storage Facility (TSF; see Figure 2). The TSF was created by constructing berms along the western extent of a localized topographic low. The berms were constructed to contain the tailings on the upland, preventing their migration into a marshy area, located approximately 80 m west of the TSF (Figure 2). A decant pipe extended through the tailings, enabling drainage of liquid from the tailings. However, due to beaver damming activity at the south end of the marshy area, a significant portion of the tailings (approximately 12,700 m^3) were submerged in what is now referred to as "Unnamed Lake," located 80 m west of the TSF (EBA, 2001; see Figure 2). Unnamed Lake receives inflow at its southern extent from a large wetland/lake system west of the site (Figure 2). The system, including the Unnamed Lake, discharges to Tank Creek at its northern extent (Figure 3). Tank Creek, in turn, discharges to Bennett Lake, the drinking water source and a major source of subsistence for the Village of Carcross (PWGSC, 1998; see inset on Figure 3). Previous studies have shown impacted groundwater flowing towards Unnamed Lake but also directly towards Tank Creek. Part of this audit was to evaluate the impact of direct discharge of groundwater on water quality in Tank Creek. WSP Canada Inc.'s 2023 Conceptual Site Model summarizes the work of many previous assessments.

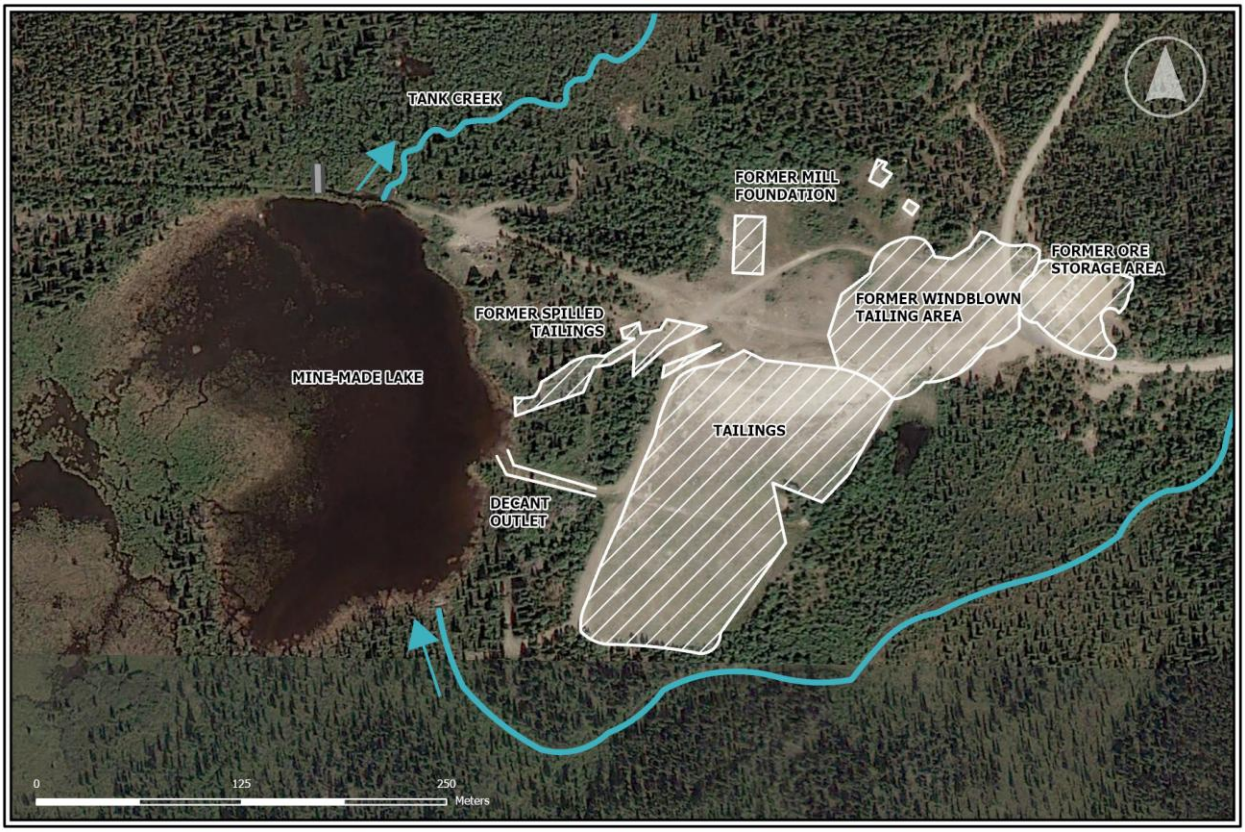

Figure 2: Site plan

A summary of the site chronology is provided below.

- 1964 – AGS property development starts at Big Thing.
- 1965 – Tunnel that connects Big Thing to the 1906 Peerless Mine from the opposite side of Montana Mountain completed.
- 1967 – Access road from Carcross is built, underground and surface drilling in the new AGS development complete.
- 1968 – Mill constructed in May 1968; production starts mid-May at 200 tons per day. Production shipped to a smelter in Sweden. Mill shuts down in December for mill adjustments and refinancing.
- 1969 – Mill restarts in March at 100 tons per day. Mill ceases production end of October after operating for 16 months of production. Overall, 47,000 tonnes of ore was processed, resulting in over 23,000 m^3 of tailings.
- 1975 – Environment Canada studies AGS tailings.
- 1986 – OMNI Resources stakes claim and produces evaluation report on the Big Thing and other properties.
- 1993 – PWGSC visits site for Phase 1 report. DIAND visits for vegetation sampling for internal memo.

- 1995 – Montana Mountain Research and Inventory report produced by Midnight Arts for Yukon Heritage Branch.
- 1997 – Public Works and Government Services Canada (PWGSC) was retained by the DIAND to complete a Phase III ESA at the site to identify potential environmental and health risks associated with the abandoned AGS tailings and mill site and provided recommendations for reclamation of the site. The findings of the Phase III ESA led to implementing a consolidation and cap remediation strategy.
- 1997 - PWGSC visits site and produces Phase II report. DIAND visits site and produces summary report for CTFN. AGS Working Group established with PWGSC, CTFN and DIAND as members.
- 1998 – PWGSC visits site for Phase III study. Produces Geology map and Water map for Montana Mountain. Acid rock drainage potential report released. Reclamation plan developed by PWGSC.
- 1998: Closure design implemented to cap and isolate the tailings (Government of Canada).
- 1999 – Reclamation work commences (Government of Canada) under supervision by EBA. The Unnamed Lake was partially drained; spilled tailings within the lake were retrieved and placed in a wet tailings storage cell at the northeast corner of the tailings impoundment. An attempt was made to re-vegetate the tailings cap and landfill site with Russian Wild Rye.
- 2000 – Low permeability cover installed on the site with monitoring wells under supervision of EBA and SRK. DIAND visits site and produces summary report. PWGSC, DIAND and SRK present a Case Study at Mine Reclamation Symposium highlighting the work.
- 2000-2002, and 2009: Tailings cap performance monitoring. Persistent contamination in tailings porewater since 1998, paired with inconsistent oxygen profiles and visible signs of cracking on the low permeability cap, suggest the cap was not performing as engineered.
- 2000 - CIRNAC conducted annual monitoring of groundwater wells and some groundwater seep and surface water sampling at various locations around the site.
- 2001 - The site was transferred to the Government of Yukon and subsequently to the C/TFN through a Settlement Agreement as originally enacted via the Yukon Northern Affairs Program Devolution Transfer Agreement (OTA). When the site was transferred via the Devolution Transfer Process, it was considered Contained where Contained is defined as a site where an impact was remediated by containment only.
- 2001 – EBA releases Summary Report on the site. Heather Nicholson from University of British Columbia visits site working with C/TFN to evaluate arsenic contamination in traditional foods.
- 2011 – EBA produces assessment of the low permeability cover.
- 2013 – Hemmera produces report on monitoring of the site programs to date; the review identified that by 2005, groundwater seeps on the shoreline of the Unnamed Lake contained dissolved arsenic concentrations at concentrations exceeding the CCME guidelines for the protection of freshwater aquatic life. Conclusions in this report indicated that contaminants were migrating towards receiving environment.
- 2015-2016 - Site characterization and risk evaluation studies at site by various consultants. The preliminary assessment indicated that direct contact with soil and seeps were likely risks to human and amphibians respectively and recommended further investigations be

completed to develop a closure plan that addressed the potential risks associated with the site.

- 2017 - A preliminary, qualitative human health and ecological risk assessment was conducted, by SRK, involving bird, fish, benthic and frog surveys, as well as berry sampling.
- 2017 – Azimuth produces report on risk-based soil criteria for the site for DIAND. SNC-Lavalin produces report on detailed soil testing for C/TFN and DIAND. SRK completes site assessment.
- 2018 – Jacobs Engineering begins studies on the site for C/TMC. Data gap analysis reviewed existing site-specific data and outlined data gaps in four technical areas: hydrogeology, geochemistry, geotechnical engineering and risk assessment. Based on the identified data gaps, Jacobs developed a work plan which was implemented in November 2018.
- 2018 – Jacobs' field program included installing nine new monitoring wells, including three wells installed within the TSF.
- 2019 - CH2M HILL installed drive points, drilled boreholes and installed monitoring wells. Two surface water gauge locations were added. Single-well hydraulic response testing was completed at all newly installed wells.
- 2019 - The monitoring network at the site includes 29 groundwater monitoring wells (11 from past years, eight (8) installed in 2018, and 10 installed in 2019), 15 drive points and six (6) surface water monitoring locations. The wells and surface water locations are located up-gradient and down-gradient of the tailings impoundment.
- 2019 - Human Health and Ecological Risk Assessment for the Arctic Gold and Silver Tailings Site (Azimuth).
- 2020 – Interim Site Risk Management Human Health Risk Assessment (Azimuth).
- 2021 – Environmental Monitoring Data Summary Report / May 2019 to March 2020 (Tetra Tech).
- 2021 - Environmental Monitoring Summary Report / August 2020 to March 2021 (Hemmera).
- 2022 – Annual Environmental Monitoring Summary Report / April 2021 to March 2022 (Hemmera).
- 2023 – Environmental Monitoring Summary Report / April 2022 to March 2022 (Hemmera).
- 2023 – Conceptual Site Model (WSP Canada Inc.).
- 2023 – Technical Memorandum (WSP Canada Inc.).

2 Purpose and objectives

The objectives of this audit were to:

1. Assess the current site water monitoring regime to support future assessment and regulatory processes such as development of water quality objectives (WQOs), a site-wide water balance and an adaptive management plan (AMP).
   - To achieve this objective, WSS reviewed the Hemmera 2022/23 monitoring plan (Hemmera 2023) and considered it within the context of other findings of the audit.
2. Strengthen understanding of water sources and flow:
   - To achieve this objective, WSS:
     a. conducted a site visit in September 2024 that involved the collection of surface water quality samples and the measurement of water levels and flows from select stations;
     b. assessed potential loading to Tank Creek, which drains the catchment that includes the site;
     c. supported C/TMC staff in the collection of stable water isotope samples from stations regularly sampled by C/TMC; and
     d. interpreted the stable water isotope data collected by C/TMC to understand the flow paths from the Unnamed Lake to Unnamed Lake and Tank Creek.
3. Provide a snapshot of the aquatic health of Tank Creek at the mouth.
4. Introduce C/TMC's field crew to the nationally standardized protocols of the Canadian Aquatic Biomonitoring Network (CABIN).
   - Objective 4 could not be met this year because WSS's capacity was unexpectedly and severely limited by our response to the June 24, 2024 Eagle Gold heap leach failure. WSS remains committed to supporting C/TMC and can offer CABIN training to their field staff. This will ensure that C/TMC is well-equipped to fulfill this objective next year, contributing to the long-term monitoring and assessment of Tank Creek's health.

3 Methods

3.1 Surface water quality sampling

Surface water samples were collected from the following stations by Norbert Botca and Alexander Mischler, of WSS on September 11, 2024.

Table 3.1.1 Field notes relevant to sampling stations (September 2024)

Station Code	Station Description	Field Notes
Background	Wetland area and lake at the outflow towards the Unnamed Lake (station coordinates: 60.13509; -134.73710)	Clear water; mainly bare bottom, with some reed-like vegetation.
AGS-4	On Tank Creek, approximately 300 m downstream of Unnamed Lake	Clear water; a staff gauge was AGS-4 was noted to be secured to an adjacent boulder in the creek using galvanized steel strapping.
AGS-2C	At the mouth of Tank Creek, north side of the Unnamed Lake	Clear water; numerous boulders in the creek and overgrowth vegetation.
Tributary	Approximately 1.7 km down the access road to the site. Adjacent to the west of Montana Mt. Rd, downstream of the culvert (by the Wolverine bike trail)	Small creek, reduced flow, clear water, lots of fallen debris (trees) in the creek.

A map showing the sampling locations is presented below:

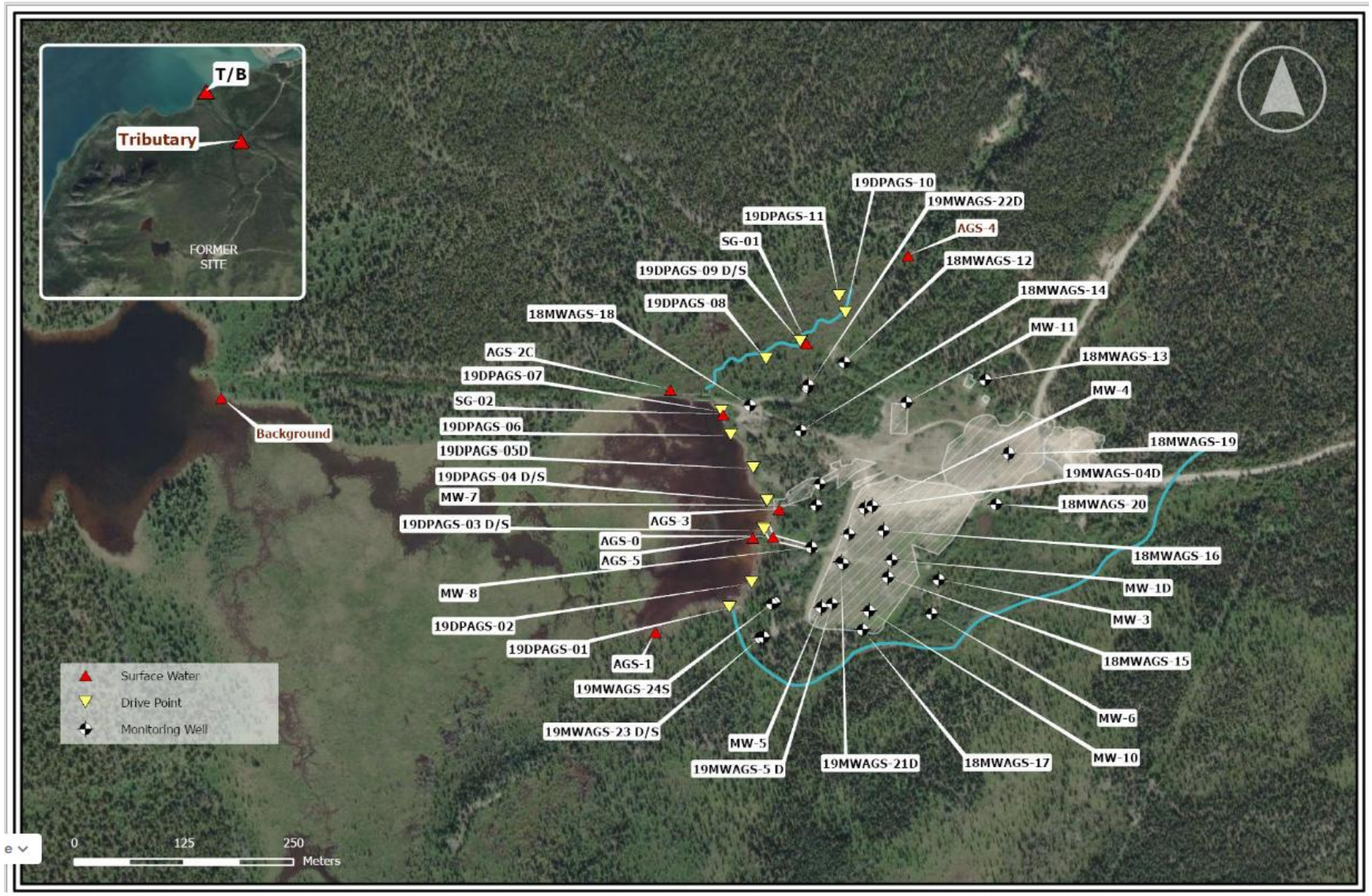

Figure 3: Surface water and groundwater stations monitored by C/TMC in July 2024 (as indicated by black font) and by WSS in September 2024 (as indicated by red font).

All samples were collected as grab samples following WSS's water sampling protocol (Environment Yukon - Water Resources Branch: *Water Quality Sampling Protocol for Government of Yukon Monitoring Programs*) which is based on the Canadian Council Ministries of Environment's (CCME) Manual for Water Quality Sampling in Canada. Field parameters were measured using an YSI instrument calibrated on the day of sampling. Samples were collected from all points designated in the Audit Plan (Table 3.1.1).

All water samples were preserved and filtered in the field as per laboratory directions, then placed on ice within five minutes of sample collection for transport to the lab. If samples were being stored overnight at the WSS facility, they were kept at 4°C and delivered to the lab in the morning. Water quality samples were analyzed by Canadian Association for Laboratory Accreditation (CALA) accredited laboratory Bureau Veritas Laboratories (BV Lab). Isotope samples were analyzed by the University of Waterloo Environmental Isotopes Lab (UWEIL).

Analytical parameters for surface water samples are compared to the Canadian Council of Ministers of the Environment – Protection of Freshwater Aquatic Life (CCME-PAL) guidelines. Where guidelines do not exist for dissolved constituents, guidelines for total concentrations are used in place.

3.2 Hydrometric monitoring

Water Science and Stewardship conducted discharge measurements on September 11, 2024 concurrent with the water samples collection at two locations along Tank Creek: at the Unnamed Lake outlet and 300 m downstream at AGS-4 (Figure 1).

Tank Creek is narrow and has turbulent channel conditions as well as poor channel containment (braiding into dense willow patches) in the upper reaches above AGS-4; therefore, the salt dilution gauging method was employed. Site selection criteria for salt dilution discharge measurements include turbulent flows, steep gradient, minimal pools and other backwater areas, no tributary inflows in the gauging reach, and the ability to perform a clean injection at a point that favours complete mixing of the brine slug with the flow at the point where electric conductivity is measured in the channel.

A Fathom Scientific Ltd. QiQuac salt dilution specific conductivity meter was used to collect salt dilution measurements following Water Science and Stewardship's Salt Dilution Gauging Standard Operating Procedurel (Government of Yukon, 2021b). The QiQuac uses two separate, high resolution conductivity probes simultaneously, reducing background noise and allowing

real-time quality assurance, results and uncertainties calculations. Calculation of the calibration factor was conducted at the measurement locations before each reading with 1L of stream water and four 1mL injections of a 5g/L NaCl solution. The probes were then deployed on opposite sides of the stream as well as different distances along the reach to confirm complete mixing.

Dry salt (184g at AGS-4 and 172g at AGS-2C) was mixed in a 20L pail with 5-10L of water from the creek, stirred in a random fashion to keep the mixing turbulent and prevent salt sludge from accumulating at the bottom of the pail. The QiQuac was set up to log in 2 second intervals.

The audit team reviewed the field discharge results using a post-processing spreadsheet template developed by Fathom Scientific (2015). This report presents the post-processed discharge results and quality assurance/quality control (QAQC) comments.

3.3 Stable water isotope sampling

Isotopes are atoms of the same element that have different numbers of neutrons but the same number of protons. Stable isotopes have nuclei that do not decay to other isotopes on geologic timescales but may themselves be produced by the decay of radioactive isotopes. Two stable isotopes of hydrogen (^{1}H and ^{2}H) and three of oxygen (^{16}O, ^{17}O and ^{18}O) occur naturally in waters. We use the phrase “stable water isotopes” to refer to ^{1}H, ^{2}H, ^{16}O, and ^{18}O, which are relatively abundant and can be easily measured by mass spectrometry.

Samples for analysis of stable water isotopes were filtered in the field (0.45 micron) and collected in new, clean, 15 mL HDPE plastic bottles filled to the top with no head space and air-tight to prevent evaporation. Sample filtration and collection was led by C/TMC staff, who submitted the samples to WSS on September 11, 2024. WSS, in turn, submitted the samples to the University of Waterloo Environmental Isotope Laboratory (UWEIL). UWEIL measured the isotopic ratios using a Los Gatos Research, Liquid Water Isotope Analyser, model T-LWIA-45-EP instrument with a precision (2σ) of $\delta^{2}H = \pm 0.8$ ‰ and $\delta^{18}O = \pm 0.2$ ‰. UWEIL’s methods measure variations in stable isotope concentrations rather than actual abundances of stable water isotopes. In this case, water samples collected during the July and September 2024 sampling events were compared to the international reference material VSMOW (Vienna Standard Mean Ocean Water). The variations in isotope concentrations are relatively small and so are expressed in δ–values as the parts per thousand (per mil; ‰) difference between the sample and the reference.

According to Kendall & Doctor (2005), stable water isotopes can be used as tracers of waters in shallow, low-temperature environments because:

i. Waters that were recharged at different times, in different locations, or that followed different flow paths are often isotopically distinct; in other words, they have distinctive "fingerprints."

ii. Unlike most chemical tracers, stable water isotopes are relatively conservative, retaining their distinctive fingerprints until they mix with other waters.

Typically, groundwater samples plot approximately along a local meteoric water line (LMWL) and have stable water isotope compositions similar to that of weighted average precipitation (Kendall & Doctor, 2005).

Water that has evaporated from open surfaces typically plots below the LMWL, along a local evaporation line (LEL) with a slope between two and five (Kendall & Doctor, 2005).

4 Results

4.1 Surface water sampling results

A comparison between field and laboratory parameter measurement results for the surface water sampling program are presented in Table 4.1.1 below.

Table 4.1.1 Field and laboratory parameters – surface water sampling

Station Code	Field T (°C)	Field pH	Lab pH	RDP %	Field SPC (µS/cm)	Lab SPC (µS/cm)	RDP %	Field DO (mg/L)	Stream Flow (m^3/sec)
Background	5.6	6.87	6.7	2.5	85.3	83	2.7	10.66	n.a.
AGS-4	5.5	6.88	6.7	2.7	85.3	87	2.0	10.66	0.186
AGS-2C	7.9	6.73	6.62	1.7	83.7	85	1.5	9.98	0.182
Tributary	Field parameters not collected at this location								

RDL= Reportable Detection Limit

Three surface water samples were collected and analyzed, with all results reported below the Yukon Contaminated Sites Regulation (YT CSR Schedule 3 Fresh Aquatic Life) standards.

Concentrations of total cadmium and iron exceeded the Canadian Council of Ministers of the Environment/Probable Effects Level for Long-Term Exposure (CCME PAL) guidelines at stations AGS-4 and AGS-2C. Table 4.1.2 below compares the measured values from the three surface water samples collected by WSS staff against the CCME guidelines.

Table 4.1.2 Summary of analytical results compared against CCME guidelines

Stn.Code	Cd-T (mg/L)	Fe-T (mg/L)
CCME PAL Long Term Exposure (L)	*	0.3
BGRD	<0.000005	0.234
AGS-4	***0.000131 L***	***0.419 L***
AGS-2C	***0.000146 L***	***0.408 L***

* = hardness dependent

4.2 Flow measurements

The average flow measured at 12:20 on September 11, 2024 on Tank Creek at AGS-4 was 0.186 m^3/sec. The water surface level on the staff gauge ranged from 0.545 m to 0.550 m at that time. WSS technologists have a moderate-high confidence in measurement quality. No edits of probe

readings in post-processing were necessary. Discharge measurement parameters and details are presented in Appendix B – Table 4.2.1.

The average flow measured at 13:15 on September 11, 2024 on Tank Creek at AGS-2C, (the Unnamed Lake Outlet station), was 0.182 m^3/sec. WSS technologists have a low confidence in measurement quality. Complete mixing of the brine slug within the short gauging reach was not achieved: only an 8 m reach was available to use, from the lake outlet/culvert inlet (brine input location) to the culvert outlet (conductivity probes location) before the single channel lost its containment, braiding into three. This distance was too short and not turbulent enough to ensure good vertical and lateral mixing of the brine slug in the stream. Peak above background was excessive for each probe (above 100%) and too short in duration. The shape of the curves (rise and fall of conductivity above background) between each probe is not comparable (steep slopes and narrow peaks instead of a normal distribution with a tail when complete mixing occurs). The right downstream probe background specific conductance pre-injection readings were adjusted to match post-injection return to background readings (from 81 µS/cm to 83 µS/cm). The left upstream probe background specific conductance readings were consistent at 83 µS/cm pre- and post-injection. Discharge measurement parameters and details are presented in Appendix B – Table 4.2.2.

Photo 4.2.1 Tank Creek at AGS-4 site (QiQuac conductivity probes location, with salt injection 50m upstream)

Photo 4.2.2 Tank Creek at Unnamed Lake Outlet site (AGS-2C), left: salt injection site above culvert inlet, right: QiQuac conductivity probes location at culvert outlet.

4.3 Stable water isotope sampling results

Stable water isotope samples were collected by C/TMC at 50 stations and analyzed for this audit. The existing sampling locations provide baseline data for the isotopic composition of water at these points. Collection of stable water isotopes - both upstream and downstream - enhances the ability to track water sources and movement within the watershed. These isotope samples enable the identification of different water inputs and assist in evaluating water flow dynamics. Similar to geochemical water types, isotope samples appear to cluster in visually distinct groups based on sample source. Samples collected from the groundwater wells and drive-points show smaller $\delta^{18}O$ ratios, meaning the samples contain relatively less O^{18} compared to the samples from the Unnamed lake and Tank Creek. All samples appear to follow with the local meteoric water line (LMWL).

Stable water isotope results are presented in Figures 4.3.1 and 4.3.2 and Appendix C.

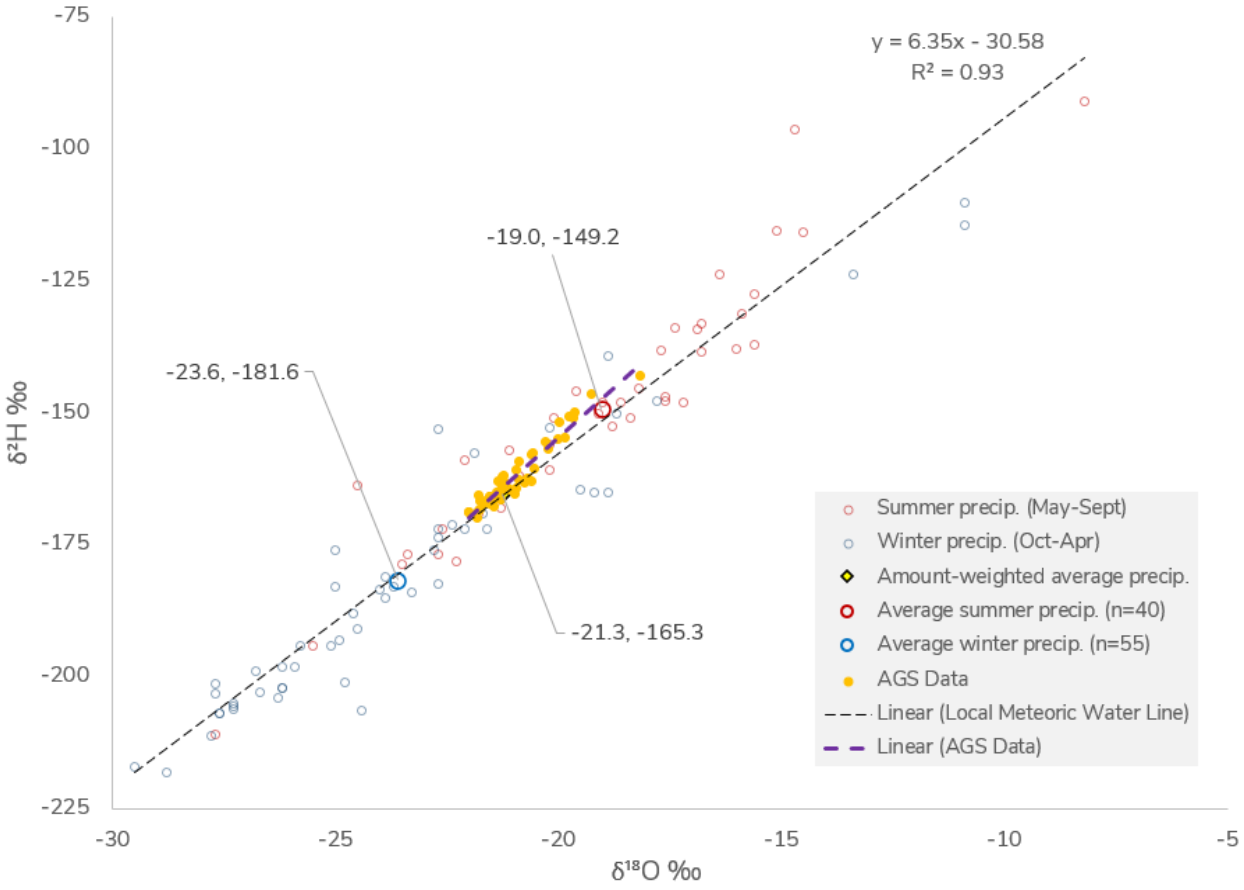

Figure 4.3.1- Stable water isotope compositions for samples collected at the AGS mine site

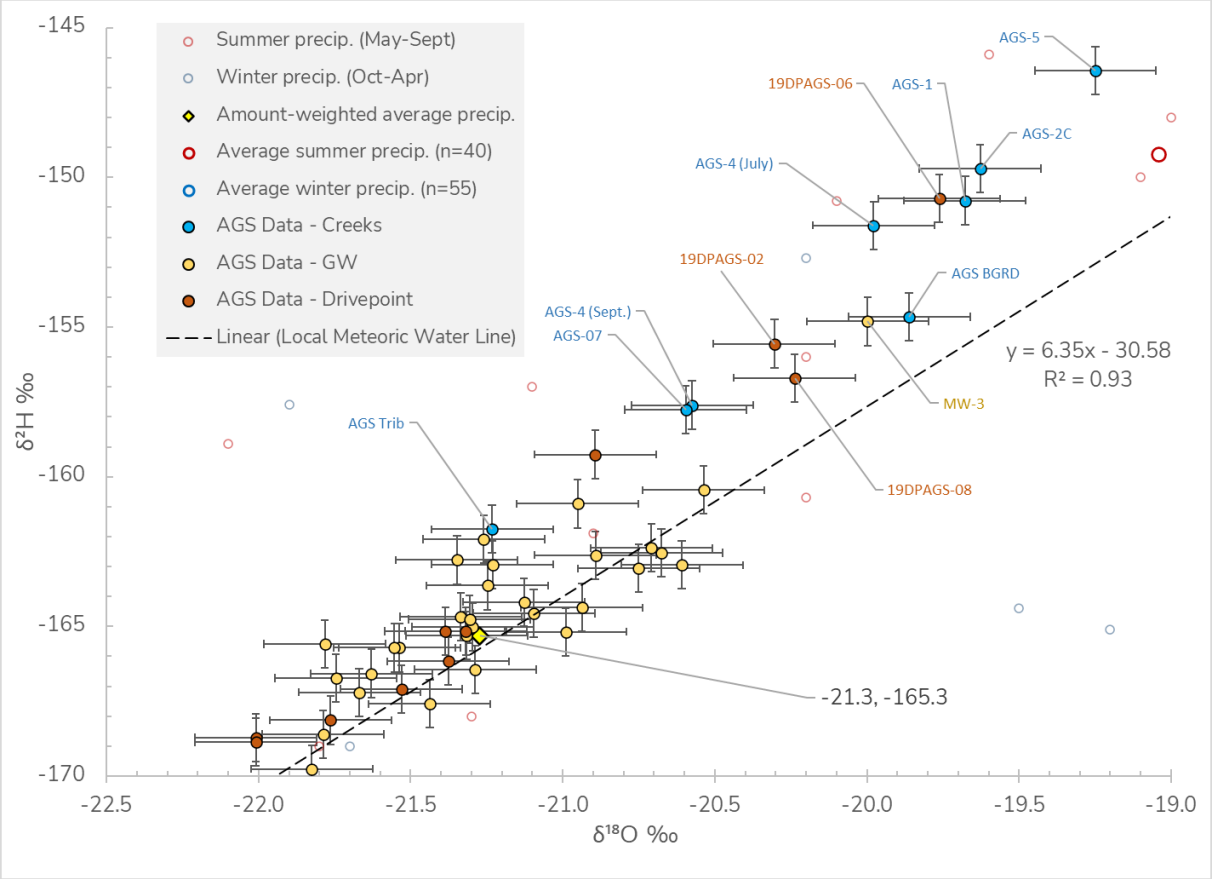

Figure 4.3.2- Stable water isotopes presented alongside the LMWL. Error bars in solid lines are presented for each sample

Figure 4.3.2 shows δ^2H and $\delta^{18}O$ ratios for surface water and groundwater samples (coloured circles) collected during the July and September 2024 monitoring events and precipitation (hollow circles) collected in Whitehorse from 1960-1990 via the Global Network of Isotopes in Precipitation (GNIP; IAEA 2021). Precipitation that fell between May and September is inferred to be rain (red hollow circles) whereas precipitation that fell between October and April is inferred to be snow (blue hollow circles). A LMWL was generated based on the stable water isotope ratios for precipitation samples collected from the Whitehorse GNIP station. The LMWL is a line of best fit (R^2 = 0.93) that represents the site-specific long-term covariation of hydrogen and oxygen stable isotope ratios.

The following points are identified as outliers:

- 19DPAGS-06 (Northeast edge of Unnamed Lake). Based on 2020 Jacobs report titled *Site Characterization and Conceptual Site Model Report / Table 1: Drive point Installation Details*, 19DPAGS-06 was the shallowest drive-point installed resulting in water sampled at this location to have the characteristics of surface water.

- 19DPAGS-08 (Northeast of the Unnamed Lake close to Tank Creek) and 19DPAGS-02 (East edge of the Unnamed Lake). Although these two drive-points do not show the same level of bias as 19DPAGS-06, they may also represent the isotope characteristics of surface water rather than groundwater.
- MW-3 (East side of the tailings area). The borehole log for MW-3 indicates the screen being installed in gravel, sand and silt matrix. It is unclear why the sample collected at MW-3 have the characteristics of surface water. A potential cause could be that the annular seal around the well casing might be incomplete or improperly installed, allowing surface water to flow down along the outside of the casing into the screened interval, or due to sand and gravel, which surface water can rapidly infiltrate, causing water in the well to reflect surface water characteristics.

Three drive points show characteristics more akin to surface water than groundwater based on $\delta^{18}O$ or $\delta^{2}H$ concentrations because these isotopic signatures are influenced by the source and processes affecting the water cycle. Surface water tends to exhibit more variable and enriched isotopic values due to direct interaction with atmospheric conditions, evaporation and precipitation, which fractionate the isotopes. In contrast, groundwater typically has more stable and depleted $\delta^{18}O$ and $\delta^{2}H$ values, reflecting longer residence times and minimal exposure to evaporative processes. The isotopic composition of the drive points may indicate recent recharge from precipitation or direct surface water infiltration, suggesting a connection to surface hydrological processes rather than the deeper, isolated flow systems typical of true groundwater. Hence, their isotopic similarity to surface water reveals limited interaction with the aquifer system or greater vulnerability to surface influences. These shallow samples are likely to be directly impacted by surface water runoff, precipitation and temperature fluctuations, leading to water that is more variable and subject to short-term changes.

Location AGS-4 was sampled in July and September 2024. The results show different isotope concentrations ($\delta^{18}O$ and $\delta^{2}H$) for the two sampling events due to seasonal climatic variations in the Yukon, which influence the hydrological cycle. The Yukon experiences drier summers with reduced rainfall, leading to increased evaporation during July. Evaporation preferentially removes lighter isotopes (^{1}H and ^{16}O), enriching the remaining water in heavier isotopes (^{2}H and ^{18}O), thus raising the $\delta^{18}O$ and $\delta^{2}H$ concentrations. In contrast, by September, cooler temperatures and reduced evaporation slow this fractionation process. Additionally, high snowmelt and spring rain events earlier in the season contribute isotopically lighter water to the system, lowering the concentrations of heavy isotopes. Over time, mixing with isotopically distinct groundwater or rainwater further alters the isotopic signature. Therefore, seasonal shifts in evaporation rates,

precipitation inputs and water source contributions driven by the Yukon's climatic characteristics explain the observed differences in isotope concentrations between July and September.

Typically, groundwater samples plot approximately along the LMWL and have stable water isotope compositions similar to that of weighted average precipitation (Kendall & Doctor, 2005). A weighted average is a calculation that takes into account the varying degrees of importance of the numbers in a data set. It is useful to compare $\delta^{18}O$ and $\delta^{2}H$ values in groundwater to amount-weighted average $\delta^{18}O$ and $\delta^{2}H$ values in precipitation. This is because larger precipitation events typically contribute disproportionately to groundwater recharge. To calculate amount-weighted average $\delta^{18}O$ or $\delta^{2}H$ values in precipitation, $\delta^{18}O$ or $\delta^{2}H$ values from individual precipitation events are multiplied by the amount of precipitation in the events (expressed in millimetres) before the average is calculated. Note that, in certain circumstances, $\delta^{18}O$ and $\delta^{2}H$ values in groundwater differ from those in annual precipitation due to seasonal biases in recharge. This appears to be true across much of the Yukon, where infiltration of snowmelt (and possibly cool spring rains) recharges aquifers when losses to evapotranspiration are low.

5 Discussion

5.1 Objective 1: Assessment of the current site water monitoring regime to support future assessment and regulatory processes

Envisioning a future scenario where the site undergoes further remediation activity that may involve assessment and licensing processes, we reviewed current monitoring from the perspective of potential future uses such as developing water quality objectives (WQOs), site water balance, and adaptive management. At a high level, Government of Yukon guidelines for WQOs (Government of Yukon, 2021a) and adaptive management plans (Government of Yukon, 2021b) provide high level concepts relevant to this site.

5.1.1 Future development of water quality objectives (WQOs)

The primary challenge with future water quality objective development is likely to be the lack of baseline data prior to potential mine impacts. Current water quality conditions downstream of the Unnamed Lake appear to be well characterized at AGS-4. Based on Hemmera's 2022/23 monitoring plan, there is additional monitoring of inflow to the Unnamed Lake at station 'AGS-1'.

Future WQO's will also need to consider local values in determining the location and approach to developing objectives (Government of Yukon, 2021a). This process could, for example, result in multiple WQO locations that may be downstream of current monitoring. This may eventually require monitoring of water quality further downstream than currently exists, but it is challenging to identify such locations prior to undertaking such engagement.

5.1.2 Feasibility of a site-wide water balance

The site will present challenges in developing a site water balance due to the following factors:

- There is a poorly confined flow path between the wetland area and lake located west of the site, immediately upstream of the Unnamed Lake, making it nearly impossible to monitor flows upstream of the site that are entering Unnamed Lake.
- Further upstream, Tincup Creek splits, with a portion of the creek flowing towards McDonald Creek and a portion flowing towards the mill site. This complicates any regional drainage area analysis that would be typically conducted to utilize nearby hydrometric data.

Given these challenges, flow measurements downstream of Unnamed Lake are important for establishing a site water balance. AGS-4 is a suitable location for stream gauging. To improve monitoring, a seasonal water level logger should be installed to track open water levels at this location, and used to develop a continuous flow record through application of a reliable rating curve. Additionally, manual flow measurements should continue year-round at this location to characterize winter flows.

A Government of Yukon snow course within a half kilometre of the site provides historical and ongoing snow data back to 1975. Additionally, a newly installed meteorological station will be equipped with precipitation and continuous snow on the ground data. The snow course is located in a forested area, and the meteorological station in a partially open area.

Given the importance of characterizing water flows through the tailings, there would also be value in conducting short-term snow surveys (i.e. one year) near the tailings area to be able to correlate the open tailings environment to the other sources of snow data.

5.1.3 Development of an Adaptive Management Plan (AMP)

From a water perspective, the current mechanisms of impacts from the site mean that a future AMP would likely develop triggers related to deteriorating groundwater and downstream surface water quality. The surface water quality discussion above is also relevant for adaptive management. Additionally, there is significant past and current groundwater monitoring to facilitate future adaptive management. As such we have no additional recommendations.

5.2 Objective 3: Water chemistry, sources and flow

5.2.1 Surface water quality interpretations

The three surface water samples collected on September 11, 2024, represent a limited temporal snapshot within the context of numerous comprehensive sampling events conducted previously. All measured concentrations were below the thresholds set by the Yukon Contaminated Sites Regulation (YT CSR Schedule 3 Fresh Aquatic Life) standards. Nonetheless, total cadmium and iron concentrations at stations AGS-4 and AGS-2C exceeded the Canadian Council of Ministers of the Environment (CCME) Probable Effects Level for Long-Term Exposure (PAL), indicating a risk of adverse effects to aquatic life in these areas. Table 4.1.2 provides a detailed comparison of the observed concentrations against the relevant CCME guidelines, underscoring the importance of ongoing monitoring despite overall compliance with regional regulatory criteria.

5.2.2 Assessment of flows and potential loading to Tank Creek

Location AGS-2C, at the mouth of the Unnamed Lake, is lacking a viable flow gauging reach. Using the culvert length as the mixing reach violates assumptions inherent to the salt dilution gauging methods, i.e. a distance too short between the salt injection spot and the conductivity probe locations to assume complete mixing of the brine within the stream. Tank Creek being uncontained past the culvert outlet, with braiding and water leaving the channel to flow through vegetation, makes it impossible to extend the mixing reach to increase accuracy of salt dilution gauging. Lack of accurate flow data restricts calculation of geochemical loading rates.

5.2.3 Stable water isotopes interpretations

Stable isotope analysis of water samples from the AGS site reveals key insights into water sources and hydrological dynamics. The data establish baseline isotopic compositions distinguishing surface water from groundwater. Groundwater wells show depleted $\delta^{18}O$ values compared to surface waters like the Unnamed Lake and Tank Creek, indicating recharge primarily from isotopically lighter precipitation, such as snowmelt, consistent with regional patterns in the Yukon. All samples align closely with the local meteoric water line (LMWL), suggesting meteoric origins and minimal evaporative effects during sampling. The isotopic differences reflect seasonal recharge patterns: groundwater integrates precipitation over time, especially spring snowmelt, while surface waters respond more rapidly to recent precipitation, showing more variability. This seasonal recharge bias is evident in the isotopic signatures and supports existing knowledge of northern hydrology. The strong correlation ($R^2 = 0.93$) with historical precipitation data and the clear clustering of groundwater and surface water samples confirm distinct water sources and hydrological pathways within the watershed.

6 Conclusions and recommendations

- WSS conducted a site visit in September 2024 that involved the collection of four surface water quality samples and the measurement of water levels and flows from two hydrometric stations on Tank Creek.
- WSS supported C/TMC staff in the collection of fifty stable water isotope samples in July 2024 from stations regularly monitored by C/TMC.

- Key findings from the site visit and isotopic data include:
    1. Measurement of flows did not yield evidence that Tank Creek gains water from groundwater downstream of Unnamed Lake, where previous studies (SRK Consulting, 2016; Jacobs, 2020; Tetra Tech, 2020; Hemmera, 2021, 2022 and 2023) show potentially impacted groundwater discharges to the creek. That said, there were significant challenges measuring flows in Tank Creek at the Unnamed Lake Outlet.
    2. Chemical and isotopic analysis of samples collected from Tank Creek did not show that groundwater discharge downstream of Unnamed Lake was contributing a significant load of contaminants of concern directly to Tank Creek at the time of the sampling events.
- WSS assessed the current site water monitoring regime and has the following recommendations to improve monitoring in support of future characterization, assessment and regulatory processes:
    1. We understand a seasonal water level logger was installed at AGS-4 in 2025. This should be maintained in future years to continue collecting continuous water levels in order to develop a reliable rating curve. Flow measurements should continue year-round at this location to also characterize winter flows.
    2. Flow measurements at station AGS-2C are not reliable due to inadequate reach characteristics for salt dilution gauging, where incomplete mixing potential within the short culvert length is followed by braided channels in dense vegetation, thus violating the measurement's method assumptions. WSS recommends shifting efforts on flow and water level monitoring at station AGS-4 instead, where surface flow is again contained in a single channel and provides better conditions to strive for reliable and accurate data collection.
    3. Establishing a snow survey course in an open area representative of the tailings, to be operated for a maximum period of two years, would facilitate calculation of relationships with existing, continuous snow survey stations. This would be beneficial as it would enable estimation of snow loads across the tailings without direct measurement in the future.
    4. Name the lake/pond adjacent to the tailings area and/or the larger lake to the west of the site. This report has referred to the water body adjacent to the mill site tailings as 'Unnamed Lake' in alignment with previous use; however, this is easily confused with the larger lake located west of the site (whose name we are unaware of).

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Appendix A – Field notes and site conditions

Table 1. Site visit dates and conditions.

Date	Weather	Site Conditions
Sept. 11, 2024	Clear skies, 4°C at the time of the site visit	• Site was accessible by truck and on foot. Accessed the Unnamed lake and the two sampling stations at Tank Creek. • Checked the area east of the site for evidence of creeks or seeps feeding into the Unnamed Lake. Moss-covered ground observed, but no evident flow-path to the mine site at the time of the site visit. • Drove and walked to the sampling station at the Tank Creek tributary.

Table 2. Field notes.

Station Code	Station Description	Field Notes
Background	Wetland area and lake, at the outflow towards the Unnamed Lake	Clear water; mainly bare bottom, with some reeds-like vegetation.
AGS-4	On Tank Creek, approximately 300 m downstream of Unnamed Lake	Clear water; a staff gauge was AGS-4 was noted to be secured to an adjacent boulder in the creek using galvanized steel strapping.
AGS-2C	At the mouth of Tank Creek, north side of the Unnamed Lake	Clear water; numerous boulders in the creek and overgrowth vegetation.
Tributary	Approximately 1.7 km down the access road to the site. Adjacent to the west of Montana Mt. Rd, downstream of the culvert (by the Wolverine bike trail).	Small creek, clear water, lots of fallen debris (trees) in the creek.

In-situ field data was compared against lab data as a check of quality assurance. pH of samples is known to vary any time after 15 minutes and therefore likely the reason for an RPD over 10%.

The specific chemistry of a single water sample will cause changes to the pH, but this change is not always linear or predictable.

Table 3. Results of in-situ and lab data comparison from September 2024 water samples.

Sample Location	**Field pH** (pH Units)	**Lab pH** (pH Units)	**RPD** Should be below 10%	**Field Conductivity** (µS/cm)	**Lab Conductivity** (µS/cm)	**RDP** Should be below 20%
Background	7.27	6.70	8.16	81.2	83	2.19
AGS-4	6.88	6.70	2.65	85.3	87	1.97
AGS-2C	6.73	6.62	1.64	83.7	85	1.54

.

Appendix B – Discharge Measurements Results

Table 4.2.1 Discharge measurement results at AGS-4 Tank Creek DS (Staff Gauge)

Station ID & Name:	**AGS-4**	**Tank Creek DS (Staff Gauge)**	
GPS (WGS 84 Lat Long D.D)	60.1367	-134.7231	
Salt Dilution - Slug Injection			
Parameter	**Value**	**Unit**	**Instrument - S/N**
Date	2024-09-11	YYYY-MM-DD	QiQuac
Weather	Dry - Clear		QM5.88
Mass of salt (dry)	0.184	kg	**Firmware Version**
Mixing reach length	50	m	QQF0.3.92
Mixing potential	good	Y/N	**NaCl Brand**
Field Calibration? [NaCl] 5.0 g/l	Y	[NaCl](g/l)	Sifto (Pool)
POST-PROCESSING	**Ch0 - TM7.445**	**Probe - S/N**	**Ch1 - TM7.446**
Start Trace Time	12:20:48	HH:MM:SS	12:20:59
End Trace Time	12:28:26	HH:MM:SS	12:28:25
Salt pulse log duration	00:07:38	HH:MM:SS	00:07:26
Discharge	**0.181**	**m^3/sec**	**0.191**
CF.T (post-processed Cal. result)	0.474	(mg/L)/(µS/cm)	0.476
Std Dev (95% conf.)	4.3	%	4.7
Background EC.T (avg, n=40)	85.20	µS/cm	85.12
Peak EC.T	106.04	µS/cm	103.37
Peak above BG EC.T in %	+ 24 %	%	+ 21 %
Area under the curve	1019	mg/l*s	965
% Difference in area	5.6 %	%	-5.3 %
Water temperature (mean)	6.04	°C	6.06
Results Summary	**Value**	**Unit**	**Processing**
Discharge	**0.186**	m^3/sec	simple average
Std Dev (95% conf.) as Uncert.	4.5	%	simple average
Specific Conductance	85.16	µS/cm	simple average
Water temperature	6.05	°C	simple average

Table 4.2.2 Discharge measurement results at AGS-2C (Unnamed Lake Outlet)

Station ID & Name:		**Tank Creek US (Lake Outlet)**	
GPS (WGS 84 Lat Long D.D)	60.1353	-134.7279	
Salt Dilution - Slug Injection			
Parameter	**Value**	**Unit**	**Instrument - S/N**
Date	2024-09-11	YYYY-MM-DD	QiQuac
Weather	Dry - Clear		QM5.88
Mass of salt (dry)	0.172	kg	**Firmware Version**
Mixing reach length	8	m	QQF0.3.92
Mixing potential	poor - too short	Y/N	**NaCl Brand**
Field Calibration? [NaCl] 5.0 g/l	Y	[NaCl](g/l)	Sifto (Pool)
POST-PROCESSING	**Ch0 - TM7.445**	**Probe - S/N**	**Ch1 - TM7.446**
Start Trace Time	13:15:04	HH:MM:SS	13:14:50
End Trace Time	13:19:07	HH:MM:SS	13:19:10
Salt pulse log duration	00:04:03	HH:MM:SS	00:04:20
Discharge	**0.175**	**m^3/sec**	**0.188**
CF.T (post-processed Cal. result)	0.486	(mg/L)/(µS/cm)	0.488
Std Dev (95% conf.)	6.3	%	4.8
Background EC.T (avg, n=40)	83.55	µS/cm	83.21
Peak EC.T	181.86	µS/cm	241.80
Peak above BG EC.T in %	+ 118 %	%	+ 191 %
Area under the curve	980	mg/l*s	916
% Difference in area	7.1 %	%	-6.6 %
Water temperature (mean)	8.39	°C	8.53
Results Summary	**Value**	**Unit**	**Processing**
Discharge	**0.182**	m^3/sec	simple average
Std Dev (95% conf.) as Uncert.	5.5	%	simple average
Specific Conductance	83.38	µS/cm	simple average
Water temperature	8.46	°C	simple average

Appendix C – Water Isotopes Sampling Results

#	Sample	Date	Lab#	$\delta^{18}O$	Result	Repeat	$\delta^{2}H$	Result	Repeat		pH	EC
				H_2O	VSMOW	± 0.2‰	H_2O	VSMOW	± 0.8‰			uS/cm
1	W29	2024-09-26	543395	X	-21.03	-20.99	X	-162.14	-162.98	15ml	7.7	293.9
2	W45	2024-09-26	543396	X	-21.18		X	-166.72		15ml	7.95	653
3	W22	2024-09-26	543397	X	-20.96		X	-162.94		15ml	7.68	293.6
4	W4-MIX	2024-09-26	543398	X	-21.30		X	-162.84		15ml	7.7	278.3
5	DG1-POND	2024-09-26	543399	X	-21.78		X	-166.83		15ml	7.23	385.9
6	DG-SEEP-3	2024-09-26	543400	X	-20.95	-21.12	X	-165.77	-165.96	15ml	7.41	1758
7	DUP-1	2024-09-26	543401	X	-21.16		X	-161.19		15ml	7.23	385.9
8	MW24-11	2024-10-03	543402	X	-21.79		X	-167.55		15ml	6.8	1112
9	MW24-09	2024-10-03	543403	X	-21.63		X	-167.53		15ml	6.68	995
10	MW24-04	2024-10-05	543404	X	-21.33		X	-167.14		15ml	7.01	1218
11	MW24-01S	2024-10-01	543405	X	-21.99	-21.96	X	-168.52	-169.04	15ml	7.15	545
12	MW24-01D	2024-10-01	543406	X	-22.03		X	-170.35		15ml	7.28	547
13	MW24-02D	2024-10-02	543407	X	-21.99		X	-169.25		15ml	6.97	892
14	MW24-06S	2024-10-08	543408	X	-21.98		X	-169.55		15ml	6.75	852
15	MW24-03D	2024-10-04	543409	X	-21.92	-21.97	X	-168.69	-168.80	15ml	7.77	8.3
16	MW24-06D	2024-10-06	543410	X	-22.04		X	-172.06		15ml	7.53	1193
17	MW24-10	2024-10-03	543411	X	-21.31		X	-166.93		15ml	6.53	755
18	MW24-12	2024-10-03	543412	X	-21.64		X	-167.29		15ml	6.7	931
19	MW24-07S	2024-10-07	543413	X	-21.18		X	-166.15		15ml	7.15	1335
20	MW24-01D-R	2024-10-01	543414	X	-21.90	-21.93	X	-170.29	-170.04	15ml	7.28	547
21	W8	2024-07-04	543415	X	-22.01		X	-167.26		15ml	7	<500
22	19DPAGS-04S	2024-07-26	543416	X	-21.76		X	-168.13		15ml	7	<500
23	MW-4	2024-07-29	543417	X	-20.68		X	-162.55		15ml	7	<500
24	19DPAGS-04D	2024-07-25	543418	X	-22.01		X	-168.71		15ml	7	<500
25	AGS Trib	2024-09-11	543419	X	-21.23	-21.27	X	-161.75	-162.25	15ml	7	<500
26	AGS-4	2024-09-11	543420	X	-20.57		X	-157.61		15ml	7	<500
27	AGS-07	2024-09-11	543421	X	-20.60		X	-157.76		15ml	7	<500
28	MW10	2024-07-25	543422	X	-21.63		X	-166.57		15ml	7	<500
29	MW-3	2024-07-26	543423	X	-20.00		X	-154.82		15ml	7	<500
30	19MWAGS-22D	2024-07-26	543424	X	-21.83	-21.87	X	-169.77	-169.82	15ml	7	<500
31	MW-6	2024-07-25	543425	X	-21.54		X	-165.71		15ml	7	<500
32	19DPAGS-07	2024-07-25	543426	X	-20.89		X	-159.26		15ml	7	<500
33	AGS-5	2024-07-24	543427	X	-19.25		X	-146.43		15ml	7	<500
34	MW-7	2024-07-26	543428	X	-20.71		X	-162.38		15ml	7	<500
35	18MWAGS-20	2024-07-25	543429	X	-21.10	-21.09	X	-164.56	-164.64	15ml	7	<500
36	19MWAGS-22S	2024-07-26	543430	X	-20.75		X	-163.06		15ml	7	<500
37	19MWAGS-04D	2024-07-24	543431	X	-20.61		X	-162.95		15ml	7	<500
38	19MWAGS-24D	2024-07-25	543432	X	-21.32		X	-165.30		15ml	7	<500
39	19MWAGS-21S	2024-07-24	543433	X	-20.94		X	-164.37		15ml	7	<500
40	MW-8	2024-07-26	543434	X	-20.99	-20.98	X	-165.18	-165.81	15ml	7	<500
41	19DPAGS-05D	2024-07-26	543435	X	-21.38		X	-166.17		15ml	7	<500
42	MW-11	2024-07-26	543436	X	-21.29		X	-166.44		15ml	7	<500
43	14DPAGS-03D	2024-07-25	543437	X	-21.53		X	-167.10		15ml	7	<500
44	19WAGS-23D*	2024-07-25	543438	X	-20.89		X	-162.62		15ml	7	<500
45	AGS BGRD	2024-09-11	543439	X	-19.86	-19.80	X	-154.66	-154.35	15ml	7	<500
46	19MWAGS-21D	2024-07-24	543440	X	-21.67		X	-167.20		15ml	7	<500
47	18MWAGS-19	2024-07-25	543441	X	-21.35		X	-162.78		15ml	7	<500
48	MW-9	2024-07-26	543442	X	-21.13		X	-164.18		15ml	7	<500
49	19DPAGS-01	2024-07-26	543443	X	-21.39		X	-165.16		15ml	7	<500
50	19DPAGS-05S	2024-07-26	543444	X	-22.01	-22.00	X	-168.87	-169.33	15ml	7	<500
51	Site: TB	2024-07-26	543445	X	-20.01		X	-152.91		15ml	7	<500
52	19DPAGS-06	2024-07-25	543446	X	-19.76		X	-150.71		15ml	7	<500
53	AGS-2C	2024-07-25	543447	X	-19.63		X	-149.71		15ml	7	<500
54	AGS-0	2024-07-24	543448	X	-18.17	-18.12	X	-142.86	-143.12	15ml	7	<500
55	18MWAGS-14	2024-07-26	543449	X	-21.79	-21.77	X	-168.60	-168.74	15ml	7	<500
56	19MWAGS-05D	2024-07-24	543450	X	-21.30		X	-165.02		15ml	7	<500
57	MW-1D	2024-07-25	543451	X	-21.44		X	-167.59		15ml	7	<500
58	19DPAGS-08	2024-07-24	543452	X	-20.24		X	-156.70		15ml	7	<500
59	AGS-1	2024-07-25	543453	X	-19.68		X	-150.78		15ml	7	<500
60	18MWAGS-18	2024-07-24	543454	X	-21.26	-21.22	X	-162.09	-161.92	15ml	7	<500
61	18MWAGS-1S	2024-07-25	543455	X	-21.55		X	-165.71		15ml	7	<500
62	18MWAGS-17	2024-07-25	543456	X	-21.78		X	-165.59		15ml	7	<500
63	18MWAGS-13	2024-07-25	543457	X	-21.75		X	-166.73		15ml	7	<500
64	19MWAGS-24S	2024-07-25	543458	X	-21.34		X	-164.68		15ml	7	<500
65	19MWAGS-23S	2024-07-25	543459	X	-21.23	-21.06	X	-162.93	-162.60	15ml	7	<500
66	19DPAGS-o3S	2024-07-25	543460	X	-21.32		X	-165.15		15ml	7	<500
67	MW-5	2024-07-29	543461	X	-21.25		X	-163.64		15ml	7	<500
68	AGS-4	2024-07-26	543462	X	-19.98		X	-151.61		15ml	7	<500
69	18MWAGS-16	2024-07-24	543463	X	-21.31		X	-164.76		15ml	7	<500
70	MW-2	2024-07-24	543464	X	-20.54	-20.54	X	-160.44	-160.02	15ml	7	<500
71	19DPAGS-02	2024-07-25	543465	X	-20.30		X	-155.56		15ml	7	<500
72	18MWAGS-12	2024-07-26	543466	X	-20.95		X	-160.90		15ml	7	<500
73	(EG)PW24-03	2024-10-18	543467	X	-20.99		X	-165.19		15ml	7.11	1615
74	(EG_MW24-08D	2024-10-15	543468	X	-21.50	-21.62	X	-167.89	-168.33	15mlx2	6.67	4206

Appendix D – Bureau Veritas water quality sample results

Your C.O.C. #: C#735044-01-02

Attention: Norbert Botca

Government of Yukon – Dept of ENV
Environment
Water Resources Branch (V-310)
Box 2703
Whitehorse, YT
CANADA Y1A 2C6

Report Date: 2024/09/26
Report #: R3562890
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C472102
Received: 2024/09/12, 11:25

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	N/A	2024/09/17	BBY6SOP-00026	SM 24 2320 B m
Carbonate, Bicarbonate and Hydroxide	3	N/A	2024/09/18		Auto Calc
Low level chloride/sulphate by AC	3	N/A	2024/09/18	BBY6SOP-00011 / BBY6SOP-00017	SM24-4500-Cl/SO4-E m
Cyanide WAD (weak acid dissociable) (1)	3	N/A	2024/09/18	CAL SOP-00270	SM 24 4500-CN m
Carbon (DOC) (2)	3	N/A	2024/09/26	BBY6SOP-00053	SM 24 5310 B m
Conductivity @25C	3	N/A	2024/09/17	BBY6SOP-00026	SM 24 2510 B m
Fluoride - Mining Clients	3	N/A	2024/09/17	BBY6SOP-00037	SM 24 4500-F C m
Hardness Total (calculated as CaCO3) (3)	3	N/A	2024/09/18	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	3	N/A	2024/09/18	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (4)	3	2024/09/17	2024/09/17	BBY7SOP-00032	BCMOE LM 2023 C1.1.3
Mercury (Total) by CV	3	2024/09/17	2024/09/17	BBY7SOP-00032	BCMOE LM 2023 C1.1.3
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	3	N/A	2024/09/18	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved) (4)	3	N/A	2024/09/17	BBY7SOP-00002	EPA 6020b R2 m
Elements by ICPMS Digested LL (total)	3	2024/09/17	2024/09/17	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	3	N/A	2024/09/18	BBY WI-00033	Auto Calc
Nitrogen (Total)	3	N/A	2024/09/17	BBY6SOP-00016	SM 24 4500-N C m
Ammonia-N Low Level (Preserved)	3	N/A	2024/09/18	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate+Nitrite (N) (low level)	3	N/A	2024/09/17	BBY6SOP-00010	SM 24 4500-NO3- H m
Nitrite (N) (low level)	3	N/A	2024/09/17	BBY6SOP-00010	SM 24 4500-NO2- m
Nitrogen - Nitrate (as N) Low Level Calc	3	N/A	2024/09/18	BBY WI-00033	Auto Calc
pH @25°C (5)	3	N/A	2024/09/17	BBY6SOP-00026	SM 24 4500-H+ B m
Total Dissolved Solids - Low Level (1)	3	2024/09/16	2024/09/17	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	3	N/A	2024/09/18	BBY WI-00033	Auto Calc
Carbon (Total Organic) (6)	3	N/A	2024/09/26	BBY6SOP-00053	SM 24 5310 B m
Total Phosphorus Low Level Total	3	2024/09/17	2024/09/18	BBY6SOP-00013	SM 24 4500-P E m
Total Suspended Solids (NFR)	3	2024/09/17	2024/09/18	BBY6SOP-00034	SM 24 2540 D m

Remarks:

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your C.O.C. #: C#735044-01-02

Attention: Norbert Botca

Government of Yukon – Dept of ENV
Environment
Water Resources Branch (V-310)
Box 2703
Whitehorse, YT
CANADA Y1A 2C6

Report Date: 2024/09/26
Report #: R3562890
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C472102
Received: 2024/09/12, 11:25

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, EPA, APHA or the Quebec Ministry of Environment.

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.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas endeavours to analyze samples as soon as possible after receipt.
(6) TOC present in the sample should be considered as non-purgeable TOC.

Your C.O.C. #: C#735044-01-02

Attention: Norbert Botca

Government of Yukon – Dept of ENV
Environment
Water Resources Branch (V-310)
Box 2703
Whitehorse, YT
CANADA Y1A 2C6

Report Date: 2024/09/26
Report #: R3562890
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C472102
Received: 2024/09/12, 11:25

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Atikin Hehn, Customer Solutions Representative
Email: Atikin.Hehn@bureauveritas.com
Phone# (604) 734 7276

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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 Raphael Kwan, General Manager, BC and Yukon Regions responsible for British Columbia Environmental laboratory operations.

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CVI583				CVI583			
Sampling Date		2024/09/11 11:30				2024/09/11 11:30			
COC Number		C#735044-01-02				C#735044-01-02			
	UNITS	AGS-04	MU	RDL	QC Batch	AGS-04 Lab-Dup	MU	RDL	QC Batch
Calculated Parameters									
Nitrate (N)	mg/L	0.0029	N/A	0.0020	B516269				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.21	N/A	0.020	B515626				
Bicarb. Alkalinity (calc. as CaCO3)	mg/L CaCO3	37	N/A	1.0	B516253				
Carb. Alkalinity (calc. as CaCO3)	mg/L CaCO3	<1.0	N/A	1.0	B516253				
Hydrox. Alkalinity (calc. as CaCO3)	mg/L CaCO3	<1.0	N/A	1.0	B516253				
Misc. Inorganics									
Conductivity	uS/cm	87	+/- 18	2.0	B520025				
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.00050	N/A	0.00050	B525618				
Dissolved Organic Carbon (C)	mg/L	3.1	+/- 0.57	0.20	B538339				
pH	pH	6.70	+/- 0.108	N/A	B520022				
Total Organic Carbon (C)	mg/L	3.4	+/- 0.66	0.20	B538337	3.2	+/- 0.64	0.20	B538337
Total Suspended Solids	mg/L	2.4	+/- 1.1	1.0	B524549				
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	B519986				
Alkalinity (Total as CaCO3)	mg/L	37	+/- 2.4	1.0	B519986				
Fluoride (F)	mg/L	0.025	N/A	0.020	B525284				
Chloride (Cl)	mg/L	<0.50	N/A	0.50	B525293				
Sulphate (SO4)	mg/L	4.4	N/A	0.50	B525293				
Nutrients									
Total Phosphorus (P)	mg/L	0.0069	+/- 0.0026	0.0010	B522159				
Total Ammonia (N)	mg/L	<0.0050	N/A	0.0050	B526471				
Nitrate plus Nitrite (N)	mg/L	0.0029	+/- <RDL	0.0020	B524878				
Nitrite (N)	mg/L	<0.0020	N/A	0.0020	B524879				
Total Nitrogen (N)	mg/L	0.210	+/- 0.028	0.020	B518520				
Physical Properties									
Total Dissolved Solids	mg/L	56.4	+/- 11.6	1.0	B519498				

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
MU = Measurement Uncertainty
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CVI584		CVI585			
Sampling Date		2024/09/11 12:00		2024/09/11 11:00			
COC Number		C#735044-01-02		C#735044-01-02			
	UNITS	AGS-07	MU	BGRD	MU	RDL	QC Batch
Calculated Parameters							
Nitrate (N)	mg/L	0.0021	N/A	0.0030	N/A	0.0020	B516269
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.17	N/A	0.25	N/A	0.020	B515626
Bicarb. Alkalinity (calc. as CaCO3)	mg/L CaCO3	39	N/A	35	N/A	1.0	B516253
Carb. Alkalinity (calc. as CaCO3)	mg/L CaCO3	<1.0	N/A	<1.0	N/A	1.0	B516253
Hydrox. Alkalinity (calc. as CaCO3)	mg/L CaCO3	<1.0	N/A	<1.0	N/A	1.0	B516253
Misc. Inorganics							
Conductivity	uS/cm	85	+/- 17	83	+/- 17	2.0	B520025
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.00050	N/A	0.00052	+/- <RDL	0.00050	B525618
Dissolved Organic Carbon (C)	mg/L	3.2	+/- 0.58	3.2	+/- 0.59	0.20	B538339
pH	pH	6.62	+/- 0.107	6.70	+/- 0.108	N/A	B520022
Total Organic Carbon (C)	mg/L	3.5	+/- 0.67	3.4	+/- 0.66	0.20	B538337
Total Suspended Solids	mg/L	2.0	+/- 1.1	1.2	+/- 1.0	1.0	B524549
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	<1.0	N/A	1.0	B519986
Alkalinity (Total as CaCO3)	mg/L	39	+/- 2.5	35	+/- 2.3	1.0	B519986
Fluoride (F)	mg/L	0.024	N/A	0.021	N/A	0.020	B525284
Chloride (Cl)	mg/L	<0.50	N/A	<0.50	N/A	0.50	B525293
Sulphate (SO4)	mg/L	3.5	N/A	4.4	N/A	0.50	B525293
Nutrients							
Total Phosphorus (P)	mg/L	0.0064	+/- 0.0025	0.0058	+/- 0.0025	0.0010	B522159
Total Ammonia (N)	mg/L	0.0069	N/A	<0.0050	N/A	0.0050	B526471
Nitrate plus Nitrite (N)	mg/L	0.0021	+/- <RDL	0.0030	+/- <RDL	0.0020	B524878
Nitrite (N)	mg/L	<0.0020	N/A	<0.0020	N/A	0.0020	B524879
Total Nitrogen (N)	mg/L	0.176	+/- 0.026	0.254	+/- 0.031	0.020	B518520
Physical Properties							
Total Dissolved Solids	mg/L	56.0	+/- 11.6	50.8	+/- 10.5	1.0	B519498

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		CVI583				CVI583			
Sampling Date		2024/09/11 11:30				2024/09/11 11:30			
COC Number		C#735044-01-02				C#735044-01-02			
	UNITS	AGS-04	MU	RDL	QC Batch	AGS-04 Lab-Dup	MU	RDL	QC Batch
Elements									
Dissolved Mercury (Hg)	ug/L	<0.0019	N/A	0.0019	B520031	<0.0019	N/A	0.0019	B520031
Total Mercury (Hg)	ug/L	<0.0019	N/A	0.0019	B519977				

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
MU = Measurement Uncertainty
N/A = Not Applicable

Bureau Veritas ID		CVI584		CVI585			
Sampling Date		2024/09/11 12:00		2024/09/11 11:00			
COC Number		C#735044-01-02		C#735044-01-02			
	UNITS	AGS-07	MU	BGRD	MU	RDL	QC Batch
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	N/A	<0.0019	N/A	0.0019	B520031
Total Mercury (Hg)	ug/L	<0.0019	N/A	<0.0019	N/A	0.0019	B519977

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CVI583		CVI584		CVI585			
Sampling Date		2024/09/11 11:30		2024/09/11 12:00		2024/09/11 11:00			
COC Number		C#735044-01-02		C#735044-01-02		C#735044-01-02			
	UNITS	AGS-04	MU	AGS-07	MU	BGRD	MU	RDL	QC Batch
Total Metals by ICPMS									
Total Aluminum (Al)	ug/L	63.8	N/A	58.1	N/A	24.2	N/A	3.0	B520028
Total Antimony (Sb)	ug/L	0.051	N/A	0.045	N/A	0.053	N/A	0.020	B520028
Total Arsenic (As)	ug/L	1.96	+/- 0.329	1.78	+/- 0.299	1.03	+/- 0.176	0.020	B520028
Total Barium (Ba)	ug/L	6.39	N/A	6.17	N/A	6.34	N/A	0.050	B520028
Total Beryllium (Be)	ug/L	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	B520028
Total Bismuth (Bi)	ug/L	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	B520028
Total Boron (B)	ug/L	<10	N/A	<10	N/A	<10	N/A	10	B520028
Total Cadmium (Cd)	ug/L	0.131	+/- 0.0291	0.146	+/- 0.0323	<0.0050	N/A	0.0050	B520028
Total Chromium (Cr)	ug/L	0.17	+/- <RDL	0.18	+/- <RDL	0.16	+/- <RDL	0.10	B520028
Total Cobalt (Co)	ug/L	0.194	+/- 0.031	0.227	+/- 0.035	0.046	+/- 0.013	0.010	B520028
Total Copper (Cu)	ug/L	1.23	+/- 0.19	1.26	+/- 0.19	0.50	+/- 0.10	0.10	B520028
Total Iron (Fe)	ug/L	419	+/- 38.5	408	+/- 37.6	234	+/- 21.9	5.0	B520028
Total Lead (Pb)	ug/L	0.155	+/- 0.046	0.094	+/- 0.029	0.044	+/- <RDL	0.020	B520028
Total Lithium (Li)	ug/L	<0.50	N/A	<0.50	N/A	<0.50	N/A	0.50	B520028
Total Manganese (Mn)	ug/L	40.4	+/- 3.31	42.3	+/- 3.46	8.78	+/- 0.73	0.10	B520028
Total Molybdenum (Mo)	ug/L	0.888	+/- 0.135	0.904	+/- 0.138	1.52	+/- 0.229	0.050	B520028
Total Nickel (Ni)	ug/L	0.45	+/- 0.12	0.51	+/- 0.12	0.30	+/- 0.11	0.10	B520028
Total Phosphorus (P)	ug/L	12.0	N/A	10.1	N/A	7.7	N/A	5.0	B520028
Total Selenium (Se)	ug/L	<0.040	N/A	<0.040	N/A	<0.040	N/A	0.040	B520028
Total Silicon (Si)	ug/L	3900	N/A	4010	N/A	3180	N/A	50	B520028
Total Silver (Ag)	ug/L	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	B520028
Total Strontium (Sr)	ug/L	42.5	N/A	40.8	N/A	41.7	N/A	0.050	B520028
Total Thallium (Tl)	ug/L	0.0020	N/A	0.0020	N/A	0.0020	N/A	0.0020	B520028
Total Tin (Sn)	ug/L	<0.20	N/A	<0.20	N/A	<0.20	N/A	0.20	B520028
Total Titanium (Ti)	ug/L	2.4	N/A	<2.0	N/A	<2.0	N/A	2.0	B520028
Total Uranium (U)	ug/L	0.243	N/A	0.256	N/A	0.687	N/A	0.0050	B520028
Total Vanadium (V)	ug/L	0.29	N/A	0.24	N/A	<0.20	N/A	0.20	B520028
Total Zinc (Zn)	ug/L	4.6	+/- 1.1	5.7	+/- 1.4	<1.0	N/A	1.0	B520028
Total Zirconium (Zr)	ug/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	B520028

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

LOW LEVEL D. METALS W/ CV HG-DISS (WATER)

Bureau Veritas ID		CVI583		CVI584		CVI585			
Sampling Date		2024/09/11 11:30		2024/09/11 12:00		2024/09/11 11:00			
COC Number		C#735044-01-02		C#735044-01-02		C#735044-01-02			
	UNITS	AGS-04	MU	AGS-07	MU	BGRD	MU	RDL	QC Batch
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	38.0	N/A	36.6	N/A	35.7	N/A	0.50	B515420
Dissolved Metals by ICPMS									
Dissolved Aluminum (Al)	ug/L	16.4	+/- 33.2	21.6	+/- 43.4	3.31	+/- 7.87	0.50	B518664
Dissolved Antimony (Sb)	ug/L	0.063	+/- 0.021	0.055	+/- 0.021	0.057	+/- 0.021	0.020	B518664
Dissolved Arsenic (As)	ug/L	1.55	+/- 0.173	1.60	+/- 0.177	0.958	+/- 0.114	0.020	B518664
Dissolved Barium (Ba)	ug/L	6.73	+/- 0.598	6.76	+/- 0.601	6.69	+/- 0.595	0.020	B518664
Dissolved Beryllium (Be)	ug/L	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	B518664
Dissolved Bismuth (Bi)	ug/L	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	B518664
Dissolved Boron (B)	ug/L	<10	N/A	<10	N/A	<10	N/A	10	B518664
Dissolved Cadmium (Cd)	ug/L	0.0946	+/- 0.0143	0.141	+/- 0.0197	<0.0050	N/A	0.0050	B518664
Dissolved Chromium (Cr)	ug/L	0.12	+/- 0.23	0.15	+/- 0.23	0.11	+/- 0.23	0.10	B518664
Dissolved Cobalt (Co)	ug/L	0.153	+/- 0.0192	0.205	+/- 0.0245	0.0260	+/- 0.0083	0.0050	B518664
Dissolved Copper (Cu)	ug/L	1.09	+/- 0.154	1.08	+/- 0.153	0.498	+/- 0.126	0.050	B518664
Dissolved Iron (Fe)	ug/L	245	+/- 24.1	283	+/- 27.8	111	+/- 11.2	1.0	B518664
Dissolved Lead (Pb)	ug/L	0.0340	+/- 0.0151	0.0356	+/- 0.0152	0.0138	+/- 0.0150	0.0050	B518664
Dissolved Lithium (Li)	ug/L	<0.50	N/A	<0.50	N/A	<0.50	N/A	0.50	B518664
Dissolved Manganese (Mn)	ug/L	37.8	+/- 3.70	46.3	+/- 4.53	2.14	+/- 0.240	0.050	B518664
Dissolved Molybdenum (Mo)	ug/L	0.986	+/- 0.135	0.963	+/- 0.133	1.73	+/- 0.225	0.050	B518664
Dissolved Nickel (Ni)	ug/L	0.391	+/- 0.136	0.453	+/- 0.148	0.292	+/- 0.117	0.020	B518664
Dissolved Phosphorus (P)	ug/L	4.1	+/- 5.5	6.5	+/- 5.7	3.3	+/- 5.5	2.0	B518664
Dissolved Selenium (Se)	ug/L	<0.040	N/A	<0.040	N/A	<0.040	N/A	0.040	B518664
Dissolved Silicon (Si)	ug/L	4220	+/- 626	4110	+/- 608	3440	+/- 510	50	B518664
Dissolved Silver (Ag)	ug/L	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	B518664
Dissolved Strontium (Sr)	ug/L	46.6	+/- 3.48	46.2	+/- 3.45	47.1	+/- 3.51	0.050	B518664
Dissolved Thallium (Tl)	ug/L	<0.0020	N/A	<0.0020	N/A	<0.0020	N/A	0.0020	B518664
Dissolved Tin (Sn)	ug/L	<0.20	N/A	<0.20	N/A	<0.20	N/A	0.20	B518664
Dissolved Titanium (Ti)	ug/L	<0.50	N/A	<0.50	N/A	<0.50	N/A	0.50	B518664
Dissolved Uranium (U)	ug/L	0.211	+/- 0.0283	0.235	+/- 0.0314	0.734	+/- 0.0946	0.0020	B518664
Dissolved Vanadium (V)	ug/L	0.23	+/- 0.40	0.29	+/- 0.40	0.21	+/- 0.40	0.20	B518664
Dissolved Zinc (Zn)	ug/L	3.78	+/- 1.88	4.68	+/- 1.98	0.46	+/- 1.67	0.10	B518664
Dissolved Zirconium (Zr)	ug/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	B518664
Dissolved Calcium (Ca)	mg/L	10.9	N/A	10.5	N/A	10.6	N/A	0.050	B515597

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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LOW LEVEL D. METALS W/ CV HG-DISS (WATER)

Bureau Veritas ID		CVI583		CVI584		CVI585			
Sampling Date		2024/09/11 11:30		2024/09/11 12:00		2024/09/11 11:00			
COC Number		C#735044-01-02		C#735044-01-02		C#735044-01-02			
	UNITS	**AGS-04**	**MU**	**AGS-07**	**MU**	**BGRD**	**MU**	**RDL**	**QC Batch**
Dissolved Magnesium (Mg)	mg/L	2.59	N/A	2.52	N/A	2.26	N/A	0.050	B515597
Dissolved Potassium (K)	mg/L	0.547	N/A	0.535	N/A	0.573	N/A	0.050	B515597
Dissolved Sodium (Na)	mg/L	1.94	N/A	1.91	N/A	1.87	N/A	0.050	B515597
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	N/A	<3.0	N/A	3.0	B515597

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Bureau Veritas ID		CVI583		CVI584		CVI585			
Sampling Date		2024/09/11 11:30		2024/09/11 12:00		2024/09/11 11:00			
COC Number		C#735044-01-02		C#735044-01-02		C#735044-01-02			
	UNITS	**AGS-04**	**MU**	**AGS-07**	**MU**	**BGRD**	**MU**	**RDL**	**QC Batch**
Calculated Parameters									
Total Hardness (CaCO3)	mg/L	32	N/A	32	N/A	30	N/A	0.50	B515419
Total Metals by ICPMS									
Total Calcium (Ca)	mg/L	9.30	N/A	9.27	N/A	8.90	N/A	0.25	B515753
Total Magnesium (Mg)	mg/L	2.20	N/A	2.16	N/A	1.92	N/A	0.25	B515753
Total Potassium (K)	mg/L	0.48	N/A	0.48	N/A	0.49	N/A	0.25	B515753
Total Sodium (Na)	mg/L	1.70	N/A	1.72	N/A	1.59	N/A	0.25	B515753
Total Sulphur (S)	mg/L	<3.0	N/A	<3.0	N/A	<3.0	N/A	3.0	B515753

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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GENERAL COMMENTS

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

Package 1	6.7°C

Sample CVI583 [AGS-04] : Sample was analyzed past method specified hold time for Nitrate+Nitrite (N) (low level). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) (low level).

Sample CVI584 [AGS-07] : Sample was analyzed past method specified hold time for Nitrate+Nitrite (N) (low level). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) (low level).

Sample CVI585 [BGRD] : Sample was analyzed past method specified hold time for Nitrate+Nitrite (N) (low level). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) (low level).

The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

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	QC Limits
B518520	CBK	Matrix Spike	Total Nitrogen (N)	2024/09/17		NC	%	80 - 120
B518520	CBK	Spiked Blank	Total Nitrogen (N)	2024/09/17		100	%	80 - 120
B518520	CBK	Method Blank	Total Nitrogen (N)	2024/09/17	<0.020		mg/L	
B518520	CBK	RPD	Total Nitrogen (N)	2024/09/17	4.2		%	20
B518664	AA1	Matrix Spike	Dissolved Aluminum (Al)	2024/09/17		98	%	80 - 120
			Dissolved Antimony (Sb)	2024/09/17		NC	%	80 - 120
			Dissolved Arsenic (As)	2024/09/17		111	%	80 - 120
			Dissolved Barium (Ba)	2024/09/17		98	%	80 - 120
			Dissolved Beryllium (Be)	2024/09/17		95	%	80 - 120
			Dissolved Bismuth (Bi)	2024/09/17		90	%	80 - 120
			Dissolved Boron (B)	2024/09/17		99	%	80 - 120
			Dissolved Cadmium (Cd)	2024/09/17		98	%	80 - 120
			Dissolved Chromium (Cr)	2024/09/17		96	%	80 - 120
			Dissolved Cobalt (Co)	2024/09/17		94	%	80 - 120
			Dissolved Copper (Cu)	2024/09/17		85	%	80 - 120
			Dissolved Iron (Fe)	2024/09/17		102	%	80 - 120
			Dissolved Lead (Pb)	2024/09/17		92	%	80 - 120
			Dissolved Lithium (Li)	2024/09/17		98	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/17		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2024/09/17		NC	%	80 - 120
			Dissolved Nickel (Ni)	2024/09/17		91	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/17		103	%	80 - 120
			Dissolved Selenium (Se)	2024/09/17		104	%	80 - 120
			Dissolved Silicon (Si)	2024/09/17		115	%	80 - 120
			Dissolved Silver (Ag)	2024/09/17		92	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/17		NC	%	80 - 120
			Dissolved Thallium (Tl)	2024/09/17		97	%	80 - 120
			Dissolved Tin (Sn)	2024/09/17		107	%	80 - 120
			Dissolved Titanium (Ti)	2024/09/17		102	%	80 - 120
			Dissolved Uranium (U)	2024/09/17		100	%	80 - 120
			Dissolved Vanadium (V)	2024/09/17		103	%	80 - 120
			Dissolved Zinc (Zn)	2024/09/17		NC	%	80 - 120
			Dissolved Zirconium (Zr)	2024/09/17		117	%	80 - 120
B518664	AA1	Spiked Blank	Dissolved Aluminum (Al)	2024/09/17		102	%	80 - 120
			Dissolved Antimony (Sb)	2024/09/17		101	%	80 - 120
			Dissolved Arsenic (As)	2024/09/17		102	%	80 - 120
			Dissolved Barium (Ba)	2024/09/17		98	%	80 - 120
			Dissolved Beryllium (Be)	2024/09/17		103	%	80 - 120
			Dissolved Bismuth (Bi)	2024/09/17		98	%	80 - 120
			Dissolved Boron (B)	2024/09/17		105	%	80 - 120
			Dissolved Cadmium (Cd)	2024/09/17		101	%	80 - 120
			Dissolved Chromium (Cr)	2024/09/17		98	%	80 - 120
			Dissolved Cobalt (Co)	2024/09/17		97	%	80 - 120
			Dissolved Copper (Cu)	2024/09/17		95	%	80 - 120
			Dissolved Iron (Fe)	2024/09/17		100	%	80 - 120
			Dissolved Lead (Pb)	2024/09/17		97	%	80 - 120
			Dissolved Lithium (Li)	2024/09/17		101	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/17		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2024/09/17		106	%	80 - 120
			Dissolved Nickel (Ni)	2024/09/17		96	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/17		103	%	80 - 120
			Dissolved Selenium (Se)	2024/09/17		103	%	80 - 120
			Dissolved Silicon (Si)	2024/09/17		105	%	80 - 120
			Dissolved Silver (Ag)	2024/09/17		98	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/17		102	%	80 - 120

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2024/09/17		98	%	80 - 120
			Dissolved Tin (Sn)	2024/09/17		102	%	80 - 120
			Dissolved Titanium (Ti)	2024/09/17		103	%	80 - 120
			Dissolved Uranium (U)	2024/09/17		101	%	80 - 120
			Dissolved Vanadium (V)	2024/09/17		98	%	80 - 120
			Dissolved Zinc (Zn)	2024/09/17		106	%	80 - 120
			Dissolved Zirconium (Zr)	2024/09/17		102	%	80 - 120
B518664	AA1	Method Blank	Dissolved Aluminum (Al)	2024/09/17	<0.50		ug/L	
			Dissolved Antimony (Sb)	2024/09/17	<0.020		ug/L	
			Dissolved Arsenic (As)	2024/09/17	<0.020		ug/L	
			Dissolved Barium (Ba)	2024/09/17	<0.020		ug/L	
			Dissolved Beryllium (Be)	2024/09/17	<0.010		ug/L	
			Dissolved Bismuth (Bi)	2024/09/17	<0.0050		ug/L	
			Dissolved Boron (B)	2024/09/17	<10		ug/L	
			Dissolved Cadmium (Cd)	2024/09/17	<0.0050		ug/L	
			Dissolved Chromium (Cr)	2024/09/17	<0.10		ug/L	
			Dissolved Cobalt (Co)	2024/09/17	<0.0050		ug/L	
			Dissolved Copper (Cu)	2024/09/17	<0.050		ug/L	
			Dissolved Iron (Fe)	2024/09/17	<1.0		ug/L	
			Dissolved Lead (Pb)	2024/09/17	<0.0050		ug/L	
			Dissolved Lithium (Li)	2024/09/17	<0.50		ug/L	
			Dissolved Manganese (Mn)	2024/09/17	<0.050		ug/L	
			Dissolved Molybdenum (Mo)	2024/09/17	<0.050		ug/L	
			Dissolved Nickel (Ni)	2024/09/17	<0.020		ug/L	
			Dissolved Phosphorus (P)	2024/09/17	<2.0		ug/L	
			Dissolved Selenium (Se)	2024/09/17	<0.040		ug/L	
			Dissolved Silicon (Si)	2024/09/17	<50		ug/L	
			Dissolved Silver (Ag)	2024/09/17	<0.0050		ug/L	
			Dissolved Strontium (Sr)	2024/09/17	<0.050		ug/L	
			Dissolved Thallium (Tl)	2024/09/17	<0.0020		ug/L	
			Dissolved Tin (Sn)	2024/09/17	<0.20		ug/L	
			Dissolved Titanium (Ti)	2024/09/17	<0.50		ug/L	
			Dissolved Uranium (U)	2024/09/17	<0.0020		ug/L	
			Dissolved Vanadium (V)	2024/09/17	<0.20		ug/L	
			Dissolved Zinc (Zn)	2024/09/17	<0.10		ug/L	
			Dissolved Zirconium (Zr)	2024/09/17	<0.10		ug/L	
B518664	AA1	RPD	Dissolved Aluminum (Al)	2024/09/17	1.6		%	20
			Dissolved Antimony (Sb)	2024/09/17	1.2		%	20
			Dissolved Arsenic (As)	2024/09/17	2.5		%	20
			Dissolved Barium (Ba)	2024/09/17	0.11		%	20
			Dissolved Beryllium (Be)	2024/09/17	NC		%	20
			Dissolved Bismuth (Bi)	2024/09/17	NC		%	20
			Dissolved Boron (B)	2024/09/17	3.7		%	20
			Dissolved Cadmium (Cd)	2024/09/17	0.82		%	20
			Dissolved Chromium (Cr)	2024/09/17	NC		%	20
			Dissolved Cobalt (Co)	2024/09/17	0.84		%	20
			Dissolved Copper (Cu)	2024/09/17	1.9		%	20
			Dissolved Iron (Fe)	2024/09/17	0.33		%	20
			Dissolved Lead (Pb)	2024/09/17	1.6		%	20
			Dissolved Lithium (Li)	2024/09/17	3.4		%	20
			Dissolved Manganese (Mn)	2024/09/17	0.91		%	20
			Dissolved Molybdenum (Mo)	2024/09/17	0.30		%	20
			Dissolved Nickel (Ni)	2024/09/17	0.35		%	20
			Dissolved Phosphorus (P)	2024/09/17	8.0		%	20
			Dissolved Selenium (Se)	2024/09/17	1.4		%	20

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silicon (Si)	2024/09/17	2.0		%	20
			Dissolved Silver (Ag)	2024/09/17	1.5		%	20
			Dissolved Strontium (Sr)	2024/09/17	0.34		%	20
			Dissolved Thallium (Tl)	2024/09/17	8.0		%	20
			Dissolved Tin (Sn)	2024/09/17	NC		%	20
			Dissolved Titanium (Ti)	2024/09/17	NC		%	20
			Dissolved Uranium (U)	2024/09/17	3.1		%	20
			Dissolved Vanadium (V)	2024/09/17	13		%	20
			Dissolved Zinc (Zn)	2024/09/17	0.25		%	20
			Dissolved Zirconium (Zr)	2024/09/17	NC		%	20
B519498	DVN	Matrix Spike	Total Dissolved Solids	2024/09/17		NC	%	80 - 120
B519498	DVN	Spiked Blank	Total Dissolved Solids	2024/09/17		96	%	80 - 120
B519498	DVN	Method Blank	Total Dissolved Solids	2024/09/17	<1.0		mg/L	
B519498	DVN	RPD	Total Dissolved Solids	2024/09/17	1.5		%	20
B519977	JC8	Matrix Spike	Total Mercury (Hg)	2024/09/17		99	%	80 - 120
B519977	JC8	Spiked Blank	Total Mercury (Hg)	2024/09/17		99	%	80 - 120
B519977	JC8	Method Blank	Total Mercury (Hg)	2024/09/17	<0.0019		ug/L	
B519977	JC8	RPD	Total Mercury (Hg)	2024/09/17	NC		%	20
B519986	BTM	Spiked Blank	Alkalinity (Total as CaCO3)	2024/09/17		98	%	80 - 120
B519986	BTM	Method Blank	Alkalinity (PP as CaCO3)	2024/09/17	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2024/09/17	<1.0		mg/L	
B519986	BTM	RPD	Alkalinity (PP as CaCO3)	2024/09/17	NC		%	20
			Alkalinity (Total as CaCO3)	2024/09/17	0.39		%	20
B520022	BTM	Spiked Blank	pH	2024/09/17		100	%	97 - 103
B520025	BTM	Spiked Blank	Conductivity	2024/09/17		101	%	90 - 110
B520025	BTM	Method Blank	Conductivity	2024/09/17	<2.0		uS/cm	
B520025	BTM	RPD	Conductivity	2024/09/17	0.27		%	10
B520028	RLC	Matrix Spike	Total Aluminum (Al)	2024/09/17		131 (1)	%	80 - 120
			Total Antimony (Sb)	2024/09/17		112	%	80 - 120
			Total Arsenic (As)	2024/09/17		109	%	80 - 120
			Total Barium (Ba)	2024/09/17		NC	%	80 - 120
			Total Beryllium (Be)	2024/09/17		109	%	80 - 120
			Total Bismuth (Bi)	2024/09/17		96	%	80 - 120
			Total Boron (B)	2024/09/17		NC	%	80 - 120
			Total Cadmium (Cd)	2024/09/17		101	%	80 - 120
			Total Chromium (Cr)	2024/09/17		101	%	80 - 120
			Total Cobalt (Co)	2024/09/17		98	%	80 - 120
			Total Copper (Cu)	2024/09/17		94	%	80 - 120
			Total Iron (Fe)	2024/09/17		106	%	80 - 120
			Total Lead (Pb)	2024/09/17		94	%	80 - 120
			Total Lithium (Li)	2024/09/17		NC	%	80 - 120
			Total Manganese (Mn)	2024/09/17		NC	%	80 - 120
			Total Molybdenum (Mo)	2024/09/17		NC	%	80 - 120
			Total Nickel (Ni)	2024/09/17		97	%	80 - 120
			Total Phosphorus (P)	2024/09/17		104	%	80 - 120
			Total Selenium (Se)	2024/09/17		100	%	80 - 120
			Total Silicon (Si)	2024/09/17		119	%	80 - 120
			Total Silver (Ag)	2024/09/17		100	%	80 - 120
			Total Strontium (Sr)	2024/09/17		NC	%	80 - 120
			Total Thallium (Tl)	2024/09/17		100	%	80 - 120
			Total Tin (Sn)	2024/09/17		103	%	80 - 120
			Total Titanium (Ti)	2024/09/17		107	%	80 - 120
			Total Uranium (U)	2024/09/17		99	%	80 - 120
			Total Vanadium (V)	2024/09/17		103	%	80 - 120
			Total Zinc (Zn)	2024/09/17		102	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Zirconium (Zr)	2024/09/17		NC	%	80 - 120
B520028	RLC	Spiked Blank	Total Aluminum (Al)	2024/09/17		98	%	80 - 120
			Total Antimony (Sb)	2024/09/17		98	%	80 - 120
			Total Arsenic (As)	2024/09/17		103	%	80 - 120
			Total Barium (Ba)	2024/09/17		99	%	80 - 120
			Total Beryllium (Be)	2024/09/17		105	%	80 - 120
			Total Bismuth (Bi)	2024/09/17		98	%	80 - 120
			Total Boron (B)	2024/09/17		109	%	80 - 120
			Total Cadmium (Cd)	2024/09/17		101	%	80 - 120
			Total Chromium (Cr)	2024/09/17		100	%	80 - 120
			Total Cobalt (Co)	2024/09/17		99	%	80 - 120
			Total Copper (Cu)	2024/09/17		98	%	80 - 120
			Total Iron (Fe)	2024/09/17		99	%	80 - 120
			Total Lead (Pb)	2024/09/17		97	%	80 - 120
			Total Lithium (Li)	2024/09/17		103	%	80 - 120
			Total Manganese (Mn)	2024/09/17		98	%	80 - 120
			Total Molybdenum (Mo)	2024/09/17		109	%	80 - 120
			Total Nickel (Ni)	2024/09/17		98	%	80 - 120
			Total Phosphorus (P)	2024/09/17		99	%	80 - 120
			Total Selenium (Se)	2024/09/17		101	%	80 - 120
			Total Silicon (Si)	2024/09/17		108	%	80 - 120
			Total Silver (Ag)	2024/09/17		101	%	80 - 120
			Total Strontium (Sr)	2024/09/17		102	%	80 - 120
			Total Thallium (Tl)	2024/09/17		99	%	80 - 120
			Total Tin (Sn)	2024/09/17		101	%	80 - 120
			Total Titanium (Ti)	2024/09/17		98	%	80 - 120
			Total Uranium (U)	2024/09/17		99	%	80 - 120
			Total Vanadium (V)	2024/09/17		99	%	80 - 120
			Total Zinc (Zn)	2024/09/17		101	%	80 - 120
			Total Zirconium (Zr)	2024/09/17		98	%	80 - 120
B520028	RLC	Method Blank	Total Aluminum (Al)	2024/09/17	<3.0		ug/L	
			Total Antimony (Sb)	2024/09/17	<0.020		ug/L	
			Total Arsenic (As)	2024/09/17	<0.020		ug/L	
			Total Barium (Ba)	2024/09/17	<0.050		ug/L	
			Total Beryllium (Be)	2024/09/17	<0.010		ug/L	
			Total Bismuth (Bi)	2024/09/17	<0.010		ug/L	
			Total Boron (B)	2024/09/17	<10		ug/L	
			Total Cadmium (Cd)	2024/09/17	<0.0050		ug/L	
			Total Chromium (Cr)	2024/09/17	<0.10		ug/L	
			Total Cobalt (Co)	2024/09/17	<0.010		ug/L	
			Total Copper (Cu)	2024/09/17	<0.10		ug/L	
			Total Iron (Fe)	2024/09/17	<5.0		ug/L	
			Total Lead (Pb)	2024/09/17	<0.020		ug/L	
			Total Lithium (Li)	2024/09/17	<0.50		ug/L	
			Total Manganese (Mn)	2024/09/17	<0.10		ug/L	
			Total Molybdenum (Mo)	2024/09/17	<0.050		ug/L	
			Total Nickel (Ni)	2024/09/17	<0.10		ug/L	
			Total Phosphorus (P)	2024/09/17	<5.0		ug/L	
			Total Selenium (Se)	2024/09/17	<0.040		ug/L	
			Total Silicon (Si)	2024/09/17	<50		ug/L	
			Total Silver (Ag)	2024/09/17	<0.010		ug/L	
			Total Strontium (Sr)	2024/09/17	<0.050		ug/L	
			Total Thallium (Tl)	2024/09/17	<0.0020		ug/L	
			Total Tin (Sn)	2024/09/17	<0.20		ug/L	
			Total Titanium (Ti)	2024/09/17	<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	QC Limits
			Total Uranium (U)	2024/09/17	<0.0050		ug/L	
			Total Vanadium (V)	2024/09/17	<0.20		ug/L	
			Total Zinc (Zn)	2024/09/17	<1.0		ug/L	
			Total Zirconium (Zr)	2024/09/17	<0.10		ug/L	
B520028	RLC	RPD	Total Aluminum (Al)	2024/09/18	9.1		%	20
			Total Antimony (Sb)	2024/09/18	6.9		%	20
			Total Arsenic (As)	2024/09/18	3.4		%	20
			Total Barium (Ba)	2024/09/18	0.32		%	20
			Total Beryllium (Be)	2024/09/18	NC		%	20
			Total Bismuth (Bi)	2024/09/18	NC		%	20
			Total Boron (B)	2024/09/18	0.35		%	20
			Total Cadmium (Cd)	2024/09/18	0		%	20
			Total Chromium (Cr)	2024/09/18	NC		%	20
			Total Cobalt (Co)	2024/09/18	0.79		%	20
			Total Copper (Cu)	2024/09/18	0.51		%	20
			Total Iron (Fe)	2024/09/18	0.60		%	20
			Total Lead (Pb)	2024/09/18	4.0		%	20
			Total Lithium (Li)	2024/09/18	0.68		%	20
			Total Manganese (Mn)	2024/09/18	0.99		%	20
			Total Molybdenum (Mo)	2024/09/18	1.3		%	20
			Total Nickel (Ni)	2024/09/18	2.6		%	20
			Total Phosphorus (P)	2024/09/18	5.0		%	20
			Total Selenium (Se)	2024/09/18	2.0		%	20
			Total Silicon (Si)	2024/09/18	2.0		%	20
			Total Silver (Ag)	2024/09/18	NC		%	20
			Total Strontium (Sr)	2024/09/18	2.1		%	20
			Total Thallium (Tl)	2024/09/18	NC		%	20
			Total Tin (Sn)	2024/09/18	NC		%	20
			Total Titanium (Ti)	2024/09/18	NC		%	20
			Total Uranium (U)	2024/09/18	2.2		%	20
			Total Vanadium (V)	2024/09/18	2.1		%	20
			Total Zinc (Zn)	2024/09/18	8.4		%	20
			Total Zirconium (Zr)	2024/09/18	0.61		%	20
B520031	JC8	Matrix Spike [CVI583-11]	Dissolved Mercury (Hg)	2024/09/17		98	%	80 - 120
B520031	JC8	Spiked Blank	Dissolved Mercury (Hg)	2024/09/17		97	%	80 - 120
B520031	JC8	Method Blank	Dissolved Mercury (Hg)	2024/09/17	<0.0019		ug/L	
B520031	JC8	RPD [CVI583-11]	Dissolved Mercury (Hg)	2024/09/17	NC		%	20
B522159	NKT	Matrix Spike	Total Phosphorus (P)	2024/09/18		93	%	N/A
B522159	NKT	Spiked Blank	Total Phosphorus (P)	2024/09/18		94	%	80 - 120
B522159	NKT	Method Blank	Total Phosphorus (P)	2024/09/18	<0.0010		mg/L	
B522159	NKT	RPD	Total Phosphorus (P)	2024/09/18	9.4		%	20
B524549	KA5	Matrix Spike	Total Suspended Solids	2024/09/18		109	%	80 - 120
B524549	KA5	Spiked Blank	Total Suspended Solids	2024/09/18		95	%	80 - 120
B524549	KA5	Method Blank	Total Suspended Solids	2024/09/18	<1.0		mg/L	
B524549	KA5	RPD	Total Suspended Solids	2024/09/18	18		%	20
B524878	C2L	Matrix Spike	Nitrate plus Nitrite (N)	2024/09/17		106	%	80 - 120
B524878	C2L	Spiked Blank	Nitrate plus Nitrite (N)	2024/09/17		109	%	80 - 120
B524878	C2L	Method Blank	Nitrate plus Nitrite (N)	2024/09/17	<0.0020		mg/L	
B524878	C2L	RPD	Nitrate plus Nitrite (N)	2024/09/17	NC (2)		%	25
B524879	C2L	Matrix Spike	Nitrite (N)	2024/09/17		104	%	80 - 120
B524879	C2L	Spiked Blank	Nitrite (N)	2024/09/17		98	%	80 - 120
B524879	C2L	Method Blank	Nitrite (N)	2024/09/17	<0.0020		mg/L	
B524879	C2L	RPD	Nitrite (N)	2024/09/17	NC (2)		%	25
B525284	VMP	Matrix Spike	Fluoride (F)	2024/09/17		105	%	80 - 120
B525284	VMP	Spiked Blank	Fluoride (F)	2024/09/17		103	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B525284	VMP	Method Blank	Fluoride (F)	2024/09/17	<0.020		mg/L	
B525284	VMP	RPD	Fluoride (F)	2024/09/17	12		%	20
B525293	JLP	Matrix Spike	Chloride (Cl)	2024/09/18		102	%	80 - 120
			Sulphate (SO4)	2024/09/18		NC	%	80 - 120
B525293	JLP	Spiked Blank	Chloride (Cl)	2024/09/18		99	%	80 - 120
			Sulphate (SO4)	2024/09/18		99	%	80 - 120
B525293	JLP	Method Blank	Chloride (Cl)	2024/09/18	<0.50		mg/L	
			Sulphate (SO4)	2024/09/18	<0.50		mg/L	
B525293	JLP	RPD	Chloride (Cl)	2024/09/18	1.4		%	20
			Sulphate (SO4)	2024/09/18	0.66		%	20
B525618	MDO	Matrix Spike	Weak Acid Dissoc. Cyanide (CN)	2024/09/18		104	%	80 - 120
B525618	MDO	Spiked Blank	Weak Acid Dissoc. Cyanide (CN)	2024/09/18		101	%	80 - 120
B525618	MDO	Method Blank	Weak Acid Dissoc. Cyanide (CN)	2024/09/18	<0.00050		mg/L	
B525618	MDO	RPD	Weak Acid Dissoc. Cyanide (CN)	2024/09/18	NC		%	20
B526471	CBK	Matrix Spike	Total Ammonia (N)	2024/09/18		NC	%	80 - 120
B526471	CBK	Spiked Blank	Total Ammonia (N)	2024/09/18		110	%	80 - 120
B526471	CBK	Method Blank	Total Ammonia (N)	2024/09/18	<0.0050		mg/L	
B526471	CBK	RPD	Total Ammonia (N)	2024/09/18	0.21		%	20
B538337	M2S	Matrix Spike [CVI583-04]	Total Organic Carbon (C)	2024/09/26		100	%	80 - 120
B538337	M2S	Spiked Blank	Total Organic Carbon (C)	2024/09/26		99	%	80 - 120
B538337	M2S	Method Blank	Total Organic Carbon (C)	2024/09/26	<0.20		mg/L	
B538337	M2S	RPD [CVI583-04]	Total Organic Carbon (C)	2024/09/26	5.6		%	20
B538339	M2S	Spiked Blank	Dissolved Organic Carbon (C)	2024/09/26		99	%	80 - 120
B538339	M2S	Method Blank	Dissolved Organic Carbon (C)	2024/09/26	<0.20		mg/L	

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

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

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.

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)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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

(2) Detection limit raised due to interferent.

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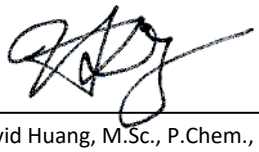
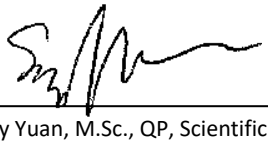
VALIDATION SIGNATURE PAGE

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



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager



Sandy Yuan, M.Sc., QP, 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 Raphael Kwan, General Manager, BC and Yukon Regions responsible for British Columbia Environmental laboratory operations.

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Page 1 of 1

Bureau Veritas
4000 19st N.E, Calgary, Alberta Canada T2E 6P8 Tel:(403) 291-3077 Toll-free:800-563-6266 Fax:(403) 291-9468 www.bvna.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#4977 Government of Yukon – Dept of ENV	Company Name	SAME AS INVOICE	Quotation #	C40560	Bureau Veritas Job #	Bottle Order #:
Contact Name	Norbert Botca	Contact Name	Norbert Botca	P.O. #			735044
Address	Water Resources Branch (V-310) Box 2703 Whitehorse YT Y1A 2C6	Address		Project #		Chain Of Custody Record	Project Manager
Phone	(867) 667-3233 Fax:	Phone	Fax:	Project Name		C#735044-01-02	Alikin Hehn
Email	Norbert.botca@yukon.ca	Email	Norbert.botca@yukon.ca	Site #			
				Sampled By			

Regulatory Criteria: YT CSR, CCME

Special Instructions:

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to Bureau Veritas

Analysis Requested

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	AMMONIA	CYANIDE	GENERAL	Hg Total	Metals ICP	Nutrients	Low Level D. Metals w/ CV Hg Diss				# of Bottles	Comments
1		AGS-04	24/09/11	11:30	water		Y	X	X	X	X	X	X	X					
2		AGS-07	24/09/11	12:00	water		Y	X	X	X	X	X	X	X					
3		BGRD	24/09/11	11:00	water		Y	X	X	X	X	X	X	X					
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT [X]
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____ [ ]
Rush Confirmation Number: _____ *(call lab for #)*

MVAN-2024-09-749

RECEIVED IN WHITEHORSE
BY: MDuncan@1125
2024-09-12
Ice: yes (5) no
TEMP: 7 7 6

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
N. BOTCA	24/09/12	11:00	Nadia Zamora	2024/09/13	08:49		[ ]	2/1/1	[X] Yes [ ] No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Bureau Veritas Yellow: Client

Ice Pack Frozen

Bureau Veritas Canada (2019) Inc.